

## Efficiency of Financing the Regional Health System

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### Abstract

*The paper examines the theoretical and methodological issues of a comprehensive assessment of the effectiveness of state financing of health care for a number of criteria characterizing the level of development of the economy and health care of the regions of the Republic of Uzbekistan. A method for a comprehensive assessment of the effectiveness of state financing of health care based on indicators characterizing the main aspects of health care, the level of socio-economic development, and the demographic background of the regions is proposed. The comprehensive indicator of the effectiveness of the public health system obtained in the work is based on the developed system of financial and non-financial indicators that make it possible to form an assessment of the effectiveness of investing public funds in health care and draw conclusions about the resource provision, level of development, accessibility and quality of health care in the regions.*

**Keywords:** health care, efficiency, human resources, complex indicator, region, rating, public finances.

Until now, there are no unified approaches to assessing the medical and economic efficiency of not only the health care system as a whole, but also individual medical institutions. Effectiveness is closely related to the concept of efficiency [2-10, 13]. Effectiveness is usually understood as the degree of achievement of positive results, results regardless of the funds spent on it. The key health problems are the quality of medical care and the efficiency of medical institutions. Efficiency in health care is the best choice of limited resources for the implementation of promising health programs.

Evaluation of the effectiveness of expenditures in health care can be conditionally divided into 3 level [15,16]:

- social efficiency (characterized by indicators of public health - mortality from controlled causes, primary disability, temporary disability due to illness, etc.). The assessment is carried out by the governing bodies of the regions with the participation of public organizations and the population;
- structural efficiency (characterized by indicators of state programs for the provision of medical care - ambulance, inpatient, outpatient, inpatient replacement). The assessment is carried out at the level of the health sector of the district or as a whole by the regional (regional) health authorities;
- medical and economic efficiency (characterized by indicators of achieving results in the treatment of certain diseases when using various modern complex methods of treatment). Evaluation is carried out at the level of health facilities by the institutions' management bodies.

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Currently, healthcare is financed through such sources as the state budget, territorial budgets. According to their economic content, health care expenditures are combined into three main groups:

- expenses for medical institutions and activities;
- sanitary institutions and activities;
- other institutions and events.

Most of the financial resources of health care are directed to the maintenance of medical institutions, which include hospitals, polyclinics, rural and urban medical centers, ambulance stations, orphanages, sanatoriums and some other institutions. Sanitary and preventive institutions include sanitary and epidemiological stations, disinfection stations. The third group of institutions includes the Bureau of Forensic Medical Examination and some other institutions.

The costs of society for the development of health care have not only social, but also economic significance. Health care expenditures are made from all parts of the budget system. The state budget finances the largest medical centers, clinics, hospitals of republican significance, scientific institutions. Regional medical institutions, anti-epidemic measures, etc. are financed from regional budgets. The main goal of state policy in the field of healthcare is to improve the health status of the population by providing really affordable medical care and improving the quality of medical services provided [1,11,14]. Not unimportant is the increase in the efficiency of the state management of this system; rational implementation of the program of state guarantees of free medical care; development of standards for providing the population with free medicines.

We have created and implemented a methodology for a comprehensive assessment of the effectiveness of state financing of healthcare in the regions of the Republic of Uzbekistan. Coefficients characterizing the financing of the health care system were developed:

1) Provision of the population with hospital beds

$$K_{nhb} = \frac{\text{Number of hospital beds}}{\text{Population}} * 10000$$

where  $K_{nhb}$  is an indicator of the provision of the population with hospital beds for every 10,000 people, unit of measurement: pcs.;

*Number of hospital beds* - the total number of hospital beds for each region of the Republic of Uzbekistan, unit of measurement: pcs.;

*Population* - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

The indicator of provision of the population with hospital beds is the most general indicator for assessing the satisfaction of the population with inpatient care. This coefficient characterizes how much the population of each region of the Republic of Uzbekistan is provided with hospital beds, that is, how many hospital beds there are for every 10,000 people of the population. The higher this indicator, the greater the proportion of patients who applied for inpatient care will be able to receive it in full and under the right conditions.

2) Provision of the population with doctors of all specialties

$$K_{nd} = \frac{\text{Number of doctors of all specialties}}{\text{Population}} * 10000$$

where  $Kn_d$  is an indicator of the provision of the population with doctors of all specialties for every 10,000 people, unit of measurement: people;

*The number of doctors of all specialties* - the total number of doctors of all specialties for each region of the Republic of Uzbekistan, unit of measurement: people;

*Population* - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

One of the indicators characterizing the availability of medical care is the provision of the population with medical personnel. The calculation of the indicator is carried out for 10 thousand people of the population. This coefficient characterizes the quantity of the population of a certain subject provided with doctors, i.e. how many doctors per 10,000 population. population person. The higher this indicator, the more affordable outpatient care is for the majority of the population.

3) Provision of the population with medical personnel

$$K_{nms} = \frac{\text{Number of medical staff}}{\text{Population}} * 10000$$

where  $Knms$  - an indicator of the provision of the population with medical personnel for every 10,000 people, unit of measurement: people;

Number of medical personnel - the total number of medical personnel for each region of the Republic of Uzbekistan, unit of measurement: people;

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

This indicator is the second coefficient characterizing the availability of medical care. It shows the extent to which the population is provided with medical personnel, that is, how many medical personnel account for 10 thousand inhabitants. The higher the value of this indicator, the more efficient the public health system

four).

4) Power of outpatient and polyclinic organizations

$$K_{nvps} = \frac{\text{Number of visits per shift}}{\text{Population}} * 10000$$

where  $Knvps$  is an indicator of the capacity of outpatient organizations per 10,000 people, unit of measurement: (visit per shift);

Number of visits per shift - the total number of visits per shift for each subject of the Russian Federation, unit of measurement: (visit per shift);

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

The capacity index of outpatient clinics shows the number of visits to outpatient clinics per shift per 10,000 people. The lower the value of this indicator, the less people seek help from outpatient clinics, that is, more preventive work and activities are carried out that prevent the occurrence or development of diseases.

5) Load per doctor

$$K_{nd} = \frac{\text{Population}}{\text{Number of doctors of all specialties}}$$

where  $K_{nd}$  is the indicator of the load per doctor, unit of measurement: people;

Population - population for each region of the Republic of Uzbekistan, unit of measurement: persons;

The number of doctors of all specialties - the total number of doctors of all specialties for each region of the Republic of Uzbekistan, unit of measurement: people.

The coefficient shows how many people are accounted for by one doctor. The lower this indicator, the better outpatient care is more accessible to the majority of the population.

6) Load per employee of medical personnel

$$K_{nms} = \frac{\text{Population}}{\text{Number of medical staff}}$$

where  $K_{nms}$  is the indicator of the load per medical employee, unit of measurement: people;

Population - population for each region of the Republic of Uzbekistan, unit of measurement: persons;

Number of medical staff - the total number of medical staff for each region of the Republic of Uzbekistan, unit of measurement: people.

Shows how many people of the population are accounted for by one medical employee. The lower this indicator, the more accessible outpatient care is for the majority of the population.

7) Morbidity per 1000 population (registered diseases in patients diagnosed for the first time in their lives)

$$K_i = \frac{\text{Number of newly reported cases per year}}{\text{Population}} * 10000$$

where  $K_i$  is the incidence rate, the diagnosis of which is established for the first time in life per 1000 people of the population, unit of measurement: (number of diseases);

The number of newly registered cases of the disease per year - the number of first-ever registered cases of diseases per year for each region of the Republic of Uzbekistan, unit of measurement: (visit per shift);

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

Shows the incidence per 1000 people in whom a registered diagnosis is established for the first time in their lives. The lower this indicator, the lower the incidence of the population.

8) Average bed occupancy of a medical institution per year

$$K_{mnbo} = 365 - (t * f)$$

$$F = \frac{\text{Mean number of bed occupancy days per year}}{\text{Average length of stay in bed}}$$

where  $Kmnbo$  – parameter of the mean number of hospital bed occupancy per year, unit of measurement: days; number of days when the bed was idle (due to repairs or other circumstances) unit of measure: days;

F - bed turnover, unit of measure: days.

The above coefficient shows how many days a year a hospital bed is occupied in a medical facility. The indicator characterizes the volume of activities of the hospital and the efficiency of the use of the bed fund. Numerous factors influence the use of a bed in various hospitals and in various profiles: hospitalization of non-core patients, admission of planned patients on Saturday and Sunday, discharge of patients on pre-holiday and public holidays, pre-hospital outpatient examination of patients in the clinic, etc. The higher this indicator, the hospital beds are used more efficiently, there is no downtime of hospital beds, which means that more patients can receive inpatient care in a hospital under the supervision of doctors and nursing staff.

9) Provision of the population with hospital facilities

$$K_{phf} = \frac{\text{Population}}{\text{Number of medical institutions}}$$

where  $K_{phf}$  is an indicator of the provision of the population with hospital facilities, unit of measurement: people / number of hospitals;

Number of hospitals - the total number of hospitals for each region, unit of measure: pcs;

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

The indicator of provision of the population with hospital institutions shows how many people are accounted for by one hospital institution. The lower this indicator, the more efficient the public health system, since for every 1000 people there will be fewer hospitals, medical care will be provided more quickly.

10) Health care expenditure per inhabitant

$$K_{ps} = \frac{\text{health care costs}}{\text{Population}}$$

where  $Khce$  is an indicator of health care expenditure per capita, unit of measurement: million rubles/person;

Health care costs - the amount of health care costs for each subject of the Russian Federation, unit of measurement: million rubles;

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

The coefficient presented above shows how much money from the consolidated budgets of the regions of the Republic of Uzbekistan falls on one resident of the region of the Republic of Uzbekistan. The higher this indicator, the higher the effectiveness of health care financing, since the more money is allocated for each person, the freer preventive a person will be able to receive

inpatient and outpatient services.

11) Financing per inhabitant

$$K_f = \frac{\text{Allocation of funds for health care}}{\text{Population}}$$

where  $K_f$  is the indicator of financing per inhabitant, unit of measurement: million soums/person;

Financing for each region of the Republic of Uzbekistan, unit of measurement: million soums;

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: persons This coefficient shows how much money is financed per each resident of the regions of the Republic of Uzbekistan. The higher this indicator, the more money is allocated and the larger the health care budget.

12) Gross regional product (GRP) per capita

$$K_{GRPpc} = \frac{\text{GRP}}{\text{Population}}$$

where  $K_{GRPpc}$  - GRP indicator per capita, unit of measure: million soums / person;

GRP - the total cost of goods and services produced in each region of the Republic of Uzbekistan, unit of measurement: million soums;

Population - the population for each region of the Republic of Uzbekistan, unit of measurement: people.

This coefficient shows how many final goods and services produced by the region's economy over a certain period of time, on average, per inhabitant of this region (in value terms).

13) Health spending to GRP

$$K_{hcGRP} = \frac{\text{health care costs}}{\text{GRP}}$$

where  $K_{hcGRP}$  is the indicator of health care expenditures to GRP, unit of measurement: shares;

Health care costs - the amount of health care costs for each region of the Republic of Uzbekistan, unit of measurement: million soums;

GRP - the total cost of goods and services produced in each region of the Republic of Uzbekistan, unit of measurement: million soums;

This indicator characterizes the share of healthcare financing from the total GRP in the region of Uzbekistan. The higher this indicator, the more money goes to finance healthcare in a given region.

14) Nominal salary of doctors

$$K_{i/n} = \frac{\sum \text{Nominal salary of doctors of all specialties}}{\text{Number of doctors of all specialties}}$$

where  $K_{i/n}$  is the indicator of nominal wages per doctor unit of measure: soum;

The nominal salary of doctors of all specialties is the sum of the nominal salary of doctors of all specialties for each region of the Republic of Uzbekistan, unit of measurement: soum;

The number of doctors of all specialties - the total number of doctors of all specialties for each region of the Republic of Uzbekistan, unit of measurement: people.

This indicator characterizes the average nominal salary of doctors of all specialties in the region of the Republic of Uzbekistan.

15) Lifespan

$$K_e = \frac{\sum_{x=1}^{\omega-1} d_{x+x}}{L_0} + 0,5$$

where  $K_e$  - indicator of life expectancy in the region of the Republic of Uzbekistan, unit of measurement: years;

$d_x$  is the number of deaths at age  $x$ ;

$x$  - age in years;

$L_0$  - the number of newborns according to the survival table.

This indicator characterizes the average life expectancy in the regions of the Republic of Uzbekistan. The higher this indicator, the more efficient the healthcare system, since increasing life expectancy is one of the key tasks of the healthcare sector.

Next, we standardized the above indicators in order to bring them to a common form so that they could be compared across the regions of the Republic of Uzbekistan. The essence of standardization lies in the fact that, in the process of assessing the effectiveness of public financing of the healthcare sector, one has to face the fact that the calculated indicators have different dimensions, importance or weight. In this regard, it is possible to apply a method based on a linear transformation of the initial indicators: for example, the values of the standardized indicators will lie in a given interval from 0 to 1. Such standardization leads to a loss of dimension, but at the same time, the structure of changes in individual indicators is preserved, which makes it possible to compare them and represent in a single coordinate system. To bring the indicators of all regions from the original form to the standardized (normalized) one, the following stages of processing were carried out.

At the first stage, the presented indicators are classified for the purpose of their further normalization into two groups:

1. "the greater the value of the indicator, the better";
2. "The lower the value of the indicator, the better."

The first group includes the following indicators: provision of the population with hospital beds; provision of the population with doctors of all specialties; provision of the population with medical personnel; health care to GRP, nominal wages of doctors, life expectancy.

The second group includes such indicators as: workload per doctor, workload per employee of medical personnel, capacity of outpatient clinics, incidence per 1000 people (registered diseases in patients diagnosed for the first time in their lives).

The actual values of the indicators can be used to compare health financing across regions over time, as well as to compare the specific state of the country with similar indicators in other countries. These coefficients can be used as standards (criteria) for assessing the state of health care financing in the regions.

At the third stage, a consolidated normalized indicator of the effectiveness of health care financing is calculated by summing the normalized values of the coefficients calculated using formulas (15). The greater the value of the consolidated normalized indicator of health care financing in the region of the Republic of Uzbekistan, the more effective its financing.

Further, for each of the considered periods of time, the indicators were ranked by regions of the Republic of Uzbekistan, that is, a rating is formed from the highest value of the aggregate normalized indicator to the lowest. A composite normalized measure of health financing performance is compared with an appropriate performance benchmark. It is proposed to single out 3 levels of health care financing efficiency: the 1st level characterizes effective health care financing; 2nd level - moderately effective financing of health care; Level 3 - inefficient financing of health care.

Threshold reference values for the consolidated normalized indicator of health financing efficiency are established by expert means based on the most successfully developing and efficiently operating regions of the Republic of Uzbekistan, as well as the maximum and minimum spread of the values of the composite indicator for the totality of regions of the Republic of Uzbekistan. The value of the consolidated normalized indicator, averaged over all regions, is determined as a benchmark for the second level of health financing efficiency. Thus, the developed methodology makes it possible to identify regions with an effective level of healthcare financing, regions with a moderate level of efficiency in healthcare financing, and regions with an inefficient level of healthcare financing.

The proposed method of multi-criteria expert evaluation of the effectiveness of healthcare financing in the Republic of Uzbekistan on the basis of the aggregate normalized coefficient makes it possible to evaluate the effectiveness of financial resource management. The method also takes into account the multidirectionality of indicators characterizing: the dynamics of reducing mortality rates from individual causes; increase in salaries for medical workers; maintaining the availability of free medical care for the population; implementation of a set of measures to restructure the system of medical care and improve its efficiency.

## Conclusion

1. The proposed approach makes it possible to assess the stability of health care financing, improve the transparency of the rules for the allocation of resources.
2. An additional, detailed consideration of the indicators of the analysis system is the basis for improving the efficiency of health care financing.
3. The results obtained can be used in making effective public financial decisions that allow to achieve an increase in the availability and quality of healthcare, focusing on human capital in a knowledge economy.

## References

1. Асадов Х. С. Современные тенденции экономического развития регионов Узбекистана., Экономика центральной Азии., Том 4 № 3 июль-сентябрь 2020с.251-262.
2. Алиева В.Ф. Анализ методик оценки эффективности функционирования объектов здравоохранения / В.Ф. Алиева // Глобальный научный потенциал.2013. - № 7(28). - С. 80-85.
3. Арбитайло И.Я. Эффективность региональной системы здравоохранения // Современные проблемы науки и образования. - 2014. - №5. - С.739.



4. Абдурахманов, З. 2021. Вопросы экономической безопасности в системе регионального здравоохранения. Общество и инновации. 2, 2/S (мар. 2021), 601–607. DOI:<https://doi.org/10.47689/2181-1415-vol2-iss2/S-pp601-607>.
5. Борщук Е.Л. Сравнительный анализ методик оценки эффективности системы здравоохранения / Е.Л. Борщук // Студенческая наука XXI века. - №1-1(8). - С.27-31.
6. Васкес Абанто Х.Э. Здравоохранение и вопросы его финансирования // Новости в мире медицины и фармации. - 2014. - №3(487). - С.22-24
7. Власова О.В. Анализ факторов внутреннего потенциала системы здравоохранения региона / О.В. Власова // Карельский научный журнал. - 2018. - Т.7. - № 1(22). - С. 113-116.
8. Власова О.В. Оценка направлений оптимизации управленческой и финансовой деятельности системы здравоохранения региона / О.В. Власова // Карельский научный журнал. - 2018. - Т.7. - № 1(22). - С.109-112.
9. Ковалев С.П. Реализация государственного контроля и регулирования в здравоохранении при переходе к цифровой экономике / С.П. Ковалев, П.В. Сороколетов // Управленческое консультирование. - 2018. - № 4(112). - С. 53-62.
10. Колмыкова Т.С. Методические аспекты оценки эффективности системы здравоохранения региона / Т.С. Колмыкова, В.В. Лобачев // Регион: системы, экономика, управление. 2018. № 1 (40). С. 87-92
11. Магрунова З.Н. Совершенствование методики оценки эффективности учреждений здравоохранения / З.Н. Магрунова // Современная образовательная практика и духовные ценности общества. - 2016. - №3. - С.86-90.
12. Набибуллаева Р.З. Государственная политика республики Узбекистан в области здравоохранения Ежегодник Материалы XVIII Международной научной конференции в рамках Общественно-научного форума "Россия: ключевые проблемы и решения". 2019 Институт научной информации по общественным наукам РАН (Москва)
13. Панасюк М.В. Проблемы совершенствования экономики здравоохранения регионов России / М.В. Панасюк, Р.Д. Дасаева // Актуальные проблемы экономики и права. - 2014. - № 2(30). - С. 61-67.
14. Русских Т.Н. Мониторинг эффективности деятельности медицинских организаций региона: методика и эмпирические результаты / Т.Н. Русских, В.И. Тинякова, С.П. Строев // Учет и статистика. - 2017. - № 1 (45). - С. 6674.
15. Kulkarni, L. Health Inputs, Health Outcomes and Public Health Expenditure: Evidence from the BRICS Countries. International Journal of Applied Economics, 2016. vol. 31(1), pp. 72-84.
16. Yashina, N., Petrov, S., Pronchatova-Rubtsova, N., Kashina, O. (2017). Effectiveness of Financing the Public Expenditures on Health Care: In: European Financial Systems 2017. Proceedings of the 14th International Scientific Conference, Brno: Masaryk University, 2017, part 2, pp. 474-482.