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INTERRELATIONSHIP BETWEEN INDEXES OF THE POPULATION MEDICAL CARE QUALITY AND MACROECONOMIC EFFICIENCY

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Abstract: *During the current military situation and subsequent social challenges, the implementation of Ukrainian medical reforms is becoming increasingly relevant for the whole nation. That became critical since 2022 when the full-scale Russian invasion occurred in our state. Sometimes, Ukrainian politicians and medics present reasonable and innovative ideas to solve urgent social problems. Here, we must adequately consider the concept of medical care quality itself. This research aims to study the possibility of further use of the investigated medical sphere relationships for forecasting and monitoring economic efficiency indexes in macroeconomic healthcare. Also, we analyse modern healthcare reforms and their quality in Ukraine, ensuring social guarantees for all Ukrainian people. In the given article, the author deeply examines the tight relationship between population medical care quality and macroeconomic efficiency. The detailed study of sources on medical care quality shows no single standardised approach to the assessment of corresponding healthcare indexes. Subsequently, that makes it impossible to apply results in forecasting the consequences of medical reform influence on macroeconomic efficiency. In such conditions, the macroeconomic performance of measures and resources is highly critical. According to the recommendation list of the World Health Organization, the doctor-patient interaction regards four main components of medical care quality as relevant. They should include the doctor's qualification, the optimal resource use, the patient's risk and his satisfaction with provided medical aid. The economic efficiency indexes reflect the influence of healthcare changes on country's economy due to the positive dynamics of physical, psychological and social health. Therefore, finding a stable balance and reasonable expediency in financial and economic instruments is optimal. Here, we should elaborately consider probable target index effects or their particular aspects.*
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JEL classification: D73, H15, I15

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Introduction. Today, we see rapid economic growth. There is a need to reform the healthcare system. The reason is its inability to satisfy population demand at the current stage of macroeconomic development. Support, organisation and implementation of healthcare reforms are relevant at the national and local levels.

Quality should be understood as an assessment of healthcare and its effectiveness concerning disease cases. Here, we include the prevention of illness progress. Professional skills and scientific achievements provide optimal clinical, functional and psychological results. In a broad sense, quality is the assessment and provision of medical services (Verentsov et al., 1986).

Economic efficiency is a set of direct and indirect indexes that show the influence of medical measures and processes on state macroeconomics. They comprise increased social stability and medical aid provision, national health quality, professional development of medical personnel, and technical and methodological support.

Due to healthcare heterogeneity, we should keep some requirements in this sphere: comparable input data, correct research tools, economic efficiency correlation, and analysable results.

Objectification and unification of medical aid provided to patients are quite relevant. The bearer of aid effects is a separate person. In the macroeconomic scope, the whole system results are widely and heterogeneously differentiated. It complicates generalisation and evaluation.

A specific feature of functioning systems is a lack of a direct correlation between healthcare resource expenditure and obtained results. In terms of unpredictable time lags, it makes research of relations between healthcare and economics quite difficult. The same concerns economic efficiency and forecasts.

Literature Review. From our perspective, the concept of healthcare quality is most entirely considered by the WHO European Bureau reports (Vuory., 1985). They provide principles for ensuring medical care.

A high-quality medical service corresponds to modern advanced practice. It promotes patient's health and satisfies his needs (Boyko, 2001).

Quality medical service consists of measurable elements:

1. Specialist’s qualification;
2. Optimal resource use;
3. Risk for a patient;
4. Patient’s satisfaction with the medical subsystem.

A unified quality medical care control should be developed and implemented at hospitals and their units to obtain comparable information for each input data collection. Further, it is processed and generalised to regional and all-state scopes. Today, the Semashko statistical healthcare system (Gorban, 2018) is impractical and inefficient for conducting medical reforms.

An essential condition to assess medical care quality is implementation of quality standards. Medical care quality standards are documents that determine aid requirements for a particular pathology. They include modern methods of diagnosing, prevention, treatment and rehabilitation. Besides, they regulate the work of specific medical facilities (Boyko, 2001).

In medical care quality control, there are three main assessing components: structure, technology and result (Boyko, 2001). They are described in Table 1.

Table 1. Components of medical care quality control

Structure	Technology	Result
- Personnel - Resource support (medicinal and other) - Medical equipment - Facilities - Auxiliary and organisational equipment	- Medical - Administration	- Activity scope indexes: medical, economic - Efficiency indexes: social, medical, economic.

Sources: developed by the author.

The fullest classification of economic efficiency indexes is given in the article by Lobov (2015).

Resource (technological) efficiency is the resource use intensity of an economic entity. Here, we see a ratio between product output and engaged resources.

Institutional efficiency is relevant for a transformative unbalanced economy. Here, institutional activity aspects are critical. Each organisation is considered via compliance of its activities with sustainable expectations of entities and individuals.

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Target efficiency is conformity of the functioning system to its intended purpose and achievements. In modern economic theory, this type of efficiency is called "effectiveness" and is developing as a separate direction in the works by Drucker (2019), Scott-Sink (1989), and Oleksyuk (2009).

National economic efficiency expresses national interests. Its indexes assess social production efficiency in terms of the economic interests of society as a whole.

As for the entire national economy (macroeconomics**), two types of efficiency** are distinguished: (Sirko, 2019):

1. **economic efficiency** – characterises the effectiveness of the country's economy as a whole, taking into account the costs of producing a national product;
2. **social efficiency** – directly indicates the achieved level of general well-being, and satisfaction of human needs.

According to the Ukrainian Healthcare Ministry data (National Health Service of Ukraine, 2022), today's reforming is carried out in the following priority areas:

- medical sphere;
- public health;
- specialised medicine;
- affordable and high-quality drugs.

The main criterion for medical reform effectiveness is evaluation of medical quality indexes. In future, the public health indexes will depend on effectiveness of medical reforms and their implementation.

According to the article "Health Reforms and Policy Capacity: The Canadian Experience" (Denis et al., 2023), characteristics of political regimes, prevailing political ideologies and commitments, and relative political openness influence opportunities for state healthcare reforms. Also, the authors emphasise synergy between population health progress and state's role in people's welfare.

Alolayyan et al. (2022) regard health information systems as critical to quality medical services. Health quality requires advanced documentation and follow-up diagnosing, treatment procedures, and fewer medical errors.

As the primary healthcare reforming goal, Pomare et al. (2022) interpret efficiency for national well-being and respective macroeconomic growth. Here, the USA researchers succeeded in 2016-2020 (68.4%). They are followed by Canada (8.1%) and the United Kingdom. (6.3%).

Additionally, the above-mentioned authors note another interesting fact. Healthcare reforms and their efficiency are mostly focused on technical processes rather than organisational or human factors. The main reason is the human factor complexity of the researched reform issues.

As noted by Nojszewska et al. (2022), the work of healthcare institutions and medical service providers depends on all determining factors associated with this activity. In addition to healthcare organisation, management and financing, it is necessary to consider each society subject's economic indexes, state funds and decision-making methods. Thus, the indexes related to this social life sphere should be structured and used. The authors show a close relationship between macroeconomic indexes and microeconomic medical quality assessment.

Consequently, we put forward a hypothesis that healthcare tools have a significant impact on state's economic development. They should be deeply studied and predicted.

Methodology and research methods. To achieve the research goals (probable interrelationship between indexes of national medical care quality and macroeconomic efficiency), we applied the following methods: analysis, generalisation, comparison, and synthesis. We investigated data arrays for national medical care quality and macroeconomic efficiency indexes during informational and empirical stages. The theorising, describing and explaining methods were used. Cause-and-effect relationships were considered as well.

One of the research methods was correlation analysis instead of regression analysis. According to Gogtay et al. (2017), correlation analysis is seldom used alone and is accompanied by regression analysis. The former stops with calculating the correlation coefficient and significance test. The latter goes ahead to express relationships in the equation form. Also, it makes predictions.

To establish correlation, we used the following formulas of economic indexes (Kupalova, 2008):

For the analysed field of correlation, one can hypothesise that the relationship between all possible values of **x** and **y** may be exponential.

Exponentially equal regression is:

$$y = a * ebx \quad (1)$$

The estimated regression equation is:

$$y = a * ebx + \varepsilon \quad (2)$$

e_i – the values observed for the errors ε_i, a and b, respectively, in the estimation of parameters a and b of the regression model, which must be found. Here ε is a random error, deviation.

Due to random deviations ε_i for each specific observation and their uncertain values, then we have:
1) only estimation of parameters a and b can be kept from observations x_i and y_i;
2) estimation of parameters a and b of the regression model are, respectively, the values a and b, which are random (they correspond to the random data of the sample).
After linearisation, the equation has the form:

$$\ln(y) = \ln(a) + bx \quad (3)$$

To estimate the a and b parameters, the RSS (Residual Sum of Squares) will be used.
This method provides the best estimation of the regression equation parameters. However, this is possible only if prerequisites exist for the random parameter **ε** and the independent variable x.
The formal RSS criterion can be described as follows:

$$S = \sum (y_i - y_i^*)^2 \to \min \quad (4)$$

where S is residual sum of squares.

System of normal equations:

$$a * n + b \sum x = \sum y \quad (5)$$

where n is the number (quantity) of parameter.

$$a * \sum x + b * \sum x^2 = \sum x * y \quad (6)$$

The regression equation parameters.

Sample averages:

$$\bar{x} = \frac{\sum x_i}{n} \quad (7)$$

where $\bar{x}$ is the sample average of x values from data array.

$$\bar{y} = \frac{\sum y_i}{n} \quad (8)$$

where $\bar{y}$ is the sample average of y values from data arra.y

$$\overline{xy} = \frac{\sum x_i y_i}{n} \quad (9)$$

where $\overline{xy}$ is the sample average of x*y values (multiplication results) from data array.

Sample variances:

$$S^2(x) = \frac{\sum x_i^2}{n} - \bar{x}^2 \quad (10)$$

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where $S^2(x)$ is the sample variance for the x parameter.

$$S^2(y) = \frac{\sum y_i^2}{n} - \bar{y}^2 \tag{11}$$

where $S^2(y)$ is the sample variance for the y parameter.

Mean square deviation (standard deviation)

$$S(x) = \sqrt{S^2(x)} \tag{12}$$

where $S(x)$ is the standard deviation for the x parameter.

$$S(y) = \sqrt{S^2(y)} \tag{13}$$

where $S(y)$ is the standard deviation for the y parameter.

Elasticity coefficient. The elasticity coefficient is measured by the formula:

$$E = \frac{S(y)}{S(x)} \frac{x}{y} = \bar{x} \ln(b) \tag{14}$$

where E is the elasticity coefficient.

In this case, the elasticity coefficient is greater than 1. Accordingly, when **x** changes by 1%, **y** will change by more than 1%. So can be concluded that **x** significantly affects **y**.

Correlation coefficient. The value of the correlation coefficient **R** ranges from 0 to 1. The closer the correlation index is to one, the closer the relationship is between the analysed features, and the more reliable the regression equation is.

$$R = \sqrt{1 - \frac{\sum (y_i - y_x)^2}{\sum (y_i - \bar{y})^2}} \tag{15}$$

Obtained by calculation for the analysed parameters, the value of the correlation index indicates **x** has a moderate influence on **y**.

Results. In the preamble of the WHO Statute (2014), the concept of health is defined as the absence of disease or physical defects and the complete physical, mental and social well-being. According to the Basics of the Legislation of Ukraine on Healthcare (2023), health is the complete physical, mental, and social well-being rather than just the absence of diseases and physical disabilities. Healthcare is the measures of state and local authorities, their officials, healthcare institutions, medical and pharmaceutical workers and citizens to preserve and restore person's physiological and psychological functions, optimal working capacity and social activity with the maximum biologically possible individual length of his life.

Indexes of medical care quality are:

1) timeliness;
2) complexity;
3) personnel qualification;
4) economic efficiency (at the level of providing medical care);
5) deontology.

The healthcare sector is the most financially intensive of all sectors of the national economy.

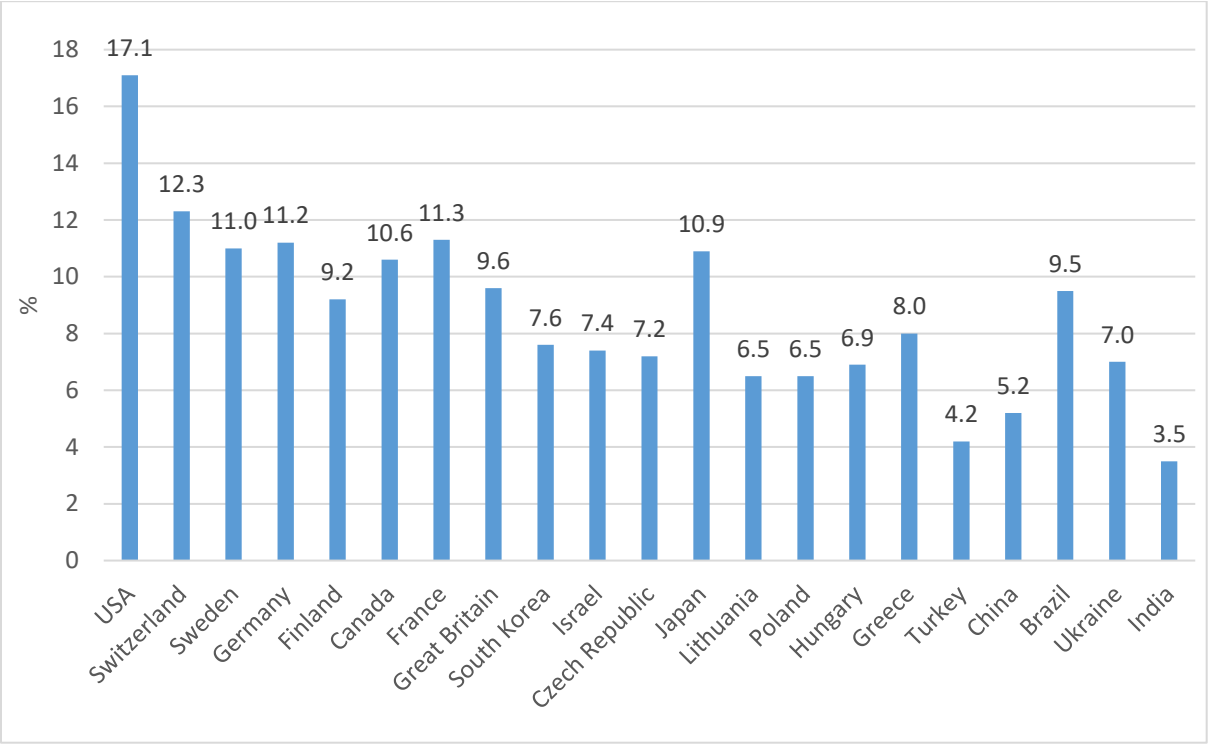

Figure 1. Healthcare costs as a share of GDP (Gross Domestic Product) in some OECD (Organisation for Economic Cooperation and Development) countries and Ukraine in 2020

Sources: developed by the author on the basis of (OECD. Health at a Glance, 2021).

As shown in Figure 1, the higher the country's economy is developed, the greater the healthcare expenditure is traced in a GDO percentage. We can make a preliminary conclusion: to increase healthcare costs throughout the country, it is necessary to influence the country's general level of economic development as a whole. Affecting the GDP volume, we can apply natural (system development) and manipulative (macroeconomic management tools) ways to increase the efficiency of funds distribution and feedback evaluation in society and among individuals. At first glance, there should be a direct correlation between healthcare expenditure and country's development. The GDP per capita was taken as the country's economic development index. We put forward a hypothesis that healthcare tools have a significant impact on country's economic development. They should be studied and predicted deeply.

To investigate the interrelation between country's development and healthcare expenditure, we determined the correlation and elasticity coefficients for the indexes:

1) correlation of healthcare expenditure (% of GDP) and GDP per capita (USD) across OECD member countries;
2) correlation between GDP per capita (USD) and healthcare costs per capita (USD);
3) Table 2 shows the initial calculation data.

Table 2. The healthcare expenditure indexes by OECD member countries and Ukraine in 2020

Country	Healthcare expenditures, % of GDP	GDP per capita, USD	Healthcare expenditures per capita, USD
USA	17.1	63,544	10,866
Switzerland	12.3	71,352	8,776
Sweden	11.0	54,563	6,002
Germany	11.2	53,694	6,014
Finland	9.2	51,090	4,700
Canada	10.6	48,073	5,096
France	11.3	46,227	5,224
Great Britain	9.6	44,916	4,312
South Korea	7.6	43,124	3,277
Israel	7.4	41,855	3,097
The Czech Republic	7.2	41,737	3,005
Japan	10.9	40,146	4,376

Continued Table 2

Country	Healthcare expenditures, % of GDP	GDP per capita, USD	Healthcare expenditures per capita, USD
Lithuania	6.5	38,735	2,518
Poland	6.5	34,265	2,227
Hungary	6.9	33,084	2,283
Greece	8.0	28,464	2,277
Turkey	4.2	28,119	1,181
China	5.2	17,312	900
Brazil	9.5	14,836	1,409
Ukraine	**7.0**	**13,057**	**914**
India	3.5	6,454	226

Sources: developed by the author on the basis of (OECD. Health at a Glance ,2021).

After calculating the above-mentioned correlation links, the following conclusions were made:

1) Correlation between healthcare expenditures (% of GDP) and GDP per capita (USD) across the current OECD member states.

According to formulas (1), (2), (3), (4), Table 3 was formed with the received data.

Table 3. Calculation of the regression parameters

x	ln(y)	x^2	$ln(y)^2$	x*ln(y)
17.1	11.0595	292.41	122.3123	189.1172
12.3	11.1754	151.29	124.8891	137.4572
11	10.9071	121	118.9651	119.9782
11.2	10.8911	125.44	118.6151	121.9798
9.2	10.8413	84.64	117.5347	99.7404
10.6	10.7805	112.36	116.2187	114.273
11.3	10.7413	127.69	115.3759	121.3769
9.6	10.7125	92.16	114.7587	102.8405
7.6	10.6718	57.76	113.8881	81.1059
7.4	10.642	54.76	113.2515	78.7506
7.2	10.6391	51.84	113.1914	76.6018
10.9	10.6003	118.81	112.3659	115.543
6.5	10.5645	42.25	111.6086	68.6692
6.5	10.4419	42.25	109.0329	67.8722
6.9	10.4068	47.61	108.3016	71.807
8	10.2564	64	105.1936	82.0512
4.2	10.2442	17.64	104.9436	43.0256
5.2	9.7592	27.04	95.2411	50.7476
9.5	9.6048	90.25	92.2524	91.2457
7	9.4771	49	89.815	66.3396
3.5	8.7725	12.25	76.956	30.7036
182.7	219.1892	1782.45	2294.7113	1931.2263

Sources: developed by the author.

For the obtained data, the system of equations has the form:

$$21a + 182.7b = 219.189 \quad \text{Equation (5)}$$
$$182.7a + 1872.45b = 1931.226 \quad \text{Equation (6)}$$

After equation (6) was multiplied by (-8.7), a system is received for solving by algebraic addition.

$$-182.7a + 1589.49b = -1906.946$$
$$182.7a + 1782.45b = 1931.226$$
$$192.96b = 24.28$$
$$b = 0.1258$$

Then, we find **a** from equation (5):

$$21a + 182.7b = 219.189 a + 182.7 * 0.1258 = 219.189$$

$$21a = 196.2$$
$$a = 9.3429$$

Obtained empirical regression coefficients are **b = 0.1258, a = 9.3429**.

Elasticity coefficient

The elasticity coefficient is found via equation (14):

$$E = 8.7(0.126) = 1.095$$

In this case, the elasticity coefficient is greater than 1. Accordingly, when **x** changes by 1%, **y** will change by more than 1%. So, there is a fact that **x** significantly affects **y**.

Correlation coefficient. The elasticity coefficient is found by equation (15):

$$R = \sqrt{1 - \frac{371762308206}{552939959829}} = 0.572$$

Obtained by calculation for the analysed parameters, the correlation index indicates that **x** moderately influences **y**.

Summarising the above-mentioned calculations, we have the following results:

– The level of the correlation index **R** iranges from **0** to **1**. The closer it is to one, the more dependent relationship we see between the evaluated indexes.

– Our result suggests that «Healthcare Expenditures, % of GDP» moderately influences «GDP per capita, USD» and is **0.572**.

– As for the average elasticity coefficient, it is greater than 1 (**1.095)**. Therefore, if the index «Healthcare expenditures, % of GDP» changes by 1%, the index «GDP per capita, USD» will change by more than 1%. We can conclude that the **first index influences the second index.**

2) **Correlation of GDP per capita (USD) and healthcare expenditure per capita (USD).**

According to formulas (1), (2), (3), (4), we generated Table (4).

Table 4. Calculation of the regression parameters

x	ln(y)	x^2	$ln(y)^2$	x*ln(y)
63544	9.2934	4037839936	86.3672	590539.5641
71352	9.0798	5091107904	82.4429	647862.5838
54563	8.6998	2977120969	75.6872	474689.1715
53694	8.7018	2883045636	75.7213	467234.4564
51090	8.4554	2610188100	71.4934	431985.2293
48073	8.5362	2311013329	72.866	410358.8093
46227	8.561	2136935529	73.2899	395747.1217
44916	8.3691	2017447056	70.0425	375908.3942
43124	8.0948	1859679376	65.526	349080.717
41855	8.0383	1751841025	64.6139	336442.0569
41737	8.0081	1741977169	64.1289	334232.1558
40146	8.3839	1611701316	70.2893	336578.8728
38735	7.8311	1500400225	61.3266	303338.8536
34265	7.7085	1174090225	59.4212	264132.1532
33084	7.7332	1094551056	59.8017	255843.7426
28464	7.7307	810199296	59.7632	220045.6988
28119	7.0741	790678161	50.0431	198917.0431
17312	6.8026	299705344	46.276	117767.3664
14836	7.2509	220106896	52.576	107574.8502
13057	6.8178	170485249	46.4827	89020.2709
6454	5.42	41654116	29.3769	34980.9908
814647	166.5905	37131767913	1337.536	6742280.1025

Sources: developed by the author.

For the above data, the system of equations is produced:

$$21a + 814647b = 166.591 \quad \text{Equation (5)}$$
$$814647a + 37131767913b = 6742280102 \quad \text{Equation (6)}$$

After equation (6) was multiplied by (-38792.714), a system is received for solving by algebraic addition:

$$-814647a + 3160236808{1.958}b = -6462498147$$
$$814647a + 3713176791{3}b = 6742280102$$
$$5529399831042b = 279781.956$$
$$b = 5.1E-5$$

Then, we find **a** from equation (5):

$$21a + 814647b = 166.591$$
$$21a + 814647*5.1E-5 = 166.591$$
$$a = 5.97$$

Obtained empirical regression coefficients are **b = 5.1E-5, a = 5.97**.

Elasticity coefficient. The elasticity coefficient is measured via equation (14):

$$E = 38792.714(5.1E-5) = 1.963$$

In this case, the elasticity coefficient is greater than 1. Accordingly, when **x** changes by 1%, **y** will change by more than 1%. So, **x** significantly affects **y**.

Correlation coefficient

$$R = \sqrt{1 - \frac{3925692296}{14171531668}} = 0.85$$

Obtained by calculation for the parameters we analysed, the correlation index indicates that **x** significantly affects **y**.

Our result suggests that «GDP per capita, USD» significantly influences «Healthcare expenditure per capita, USD» and is **0.850**.

As for the average elasticity coefficient, it is greater than 1 (**1.963**). Therefore, if the index «GDP per capita, USD» changes by 1%, the index «Healthcare expenditure per capita, USD» will change by more than 1%, almost by 2%. **Therefore, the first index significantly influences the second index**.

The following conclusions can be made after calculating the correlation and elasticity coefficients:

1) Economic efficiency of healthcare expenditure should be considered via demographic indexes;
2) Studies of index relationships confirm the hypothesis: healthcare tools affect country's economic development significantly. They should be deeply studied and predicted.
3) In future, we should analyse the efficiency of healthcare expenditure per capita regarding medical quality assurance.

As satisfaction of patients, the medical care provision quality is the main index of healthcare efficiency. It determines the following economic influence kinds:

1) Social security and guarantees – a psychological component (human resource use efficiency);
2) National health – a demographic component (labour force resource and its quality);
3) Time and funds for work capacity recovery – a resource component (labour force maintenance);
4) Organisational and administrative interactions between healthcare and national economy performance – a systemic component;
5) Trust in the healthcare system – a marketing component.

Below, you see the systematisation of components: their influence directions, indexes, criteria and evaluation methods. They are critical to defining the medical care quality level.

Table 5. Timeliness in medical aid provision: criteria and methods of assessing the medical service quality in terms of influence on macroeconomic development

Quality indexes	Directions of influence by components	Index	Assessment criteria	Assessment method
Timeliness of medical aid provision	Psychological component	Patient's satisfaction	Time between medical aid need and its provision	Questionnaires, statistical data, analysis
	Demographic component	Sick leave days and spent GDP	Actual data on sick leave	Statistics

Continued Table5

Quality indexes	Directions of influence by components	Index	Assessment criteria	Assessment method
	Resource component	Work incapacity expenses	Actual data on sick leave	Statistics
	Systemic component	Interrelationships between system elements	Joint work complexity, expediency and timeliness in providing a particular medical aid. Data availability and comparability	Statistical data, modeling
	Marketing component	Possible access to healthcare services	Availability and timeliness of data on healthcare changes and innovations	Analysis of sources of marketing information.

Sources: developed by the author.

The Timeliness index can only be evaluated objectively via statistical data: sick leave days and work incapacity expenses. Today, there are no standards for patient's need indexes. On the contrary, we have standards for economic loss minimisation in case of work incapacity.

Table 6. Complexity in medical aid provision: criteria and methods of assessing the medical service quality in terms of influence on macroeconomic development

Complexity of provided services	Psychological component	Patient's satisfaction	Satisfaction of the patient's needs for a particular medical aid	Questionnaires, statistical data, analysis
	Demographic component	Possible provision of all services from the territorial perspective	The underrecorded GNP volume during the time for comprehensive aid provision outside a particular territory	Statistics
	Resource component	Work incapacity expenses, comprehensive healthcare provision expenses outside a particular territory	Actual data on extra sick leave and extra budget costs for comprehensive aid	Statistics
	System component	Interrelationships between system elements	The possibility of obtaining comprehensive, effective and affaordable healthcare services within an acceptable time lag	Statistics
	Marketing component	Possible access to healthcare services, objectivity of available medical information	Availability and timeliness of information on patient's capabilities and need for medical services in terms of complexity	Marketing analysis, questionnaires

Sources: developed by the author.

For the Complexity index, the system component is more significant (as part of the administrative system regulation). It concerns treatment rules and follow-up of each case. Here, the patient's satisfaction is almost omitted. Also, an individualised treatment plan is usually absent. It affects patient's satisfaction and financial resource inefficient use.

Table 7. Staff qualification in medical aid provision: criteria and methods of assessing the medical service quality in terms of influence on macroeconomic development

Staff qualification	Psychological component	Patient's satisfaction	Satisfaction of the patient's needs for proper medical staff competence	Questionnaires, statistical data, analysis
	Demographic component	Possible provision of all services from the medical qualification perspective	The underrecorded GNP volume during the time for qualified aid provision at hospitals	Statistics

Continued Table 7

	Resource component	Work incapacity expenses, qualified medical aid expenses outside a particular territory, costs for medical staff advanced training	Actual data on extra sick leave and extra budget costs for qualified aid (with forced territorial movement)	Statistical data, analysis, comparison
	Systemic component	Interrelationships between system elements in terms of proper medical staff competence, available medical information	The possibility of obtaining qualified, effective and affaordable healthcare services within an acceptable time lag	Statistical data, analysis
	Marketing component	Possible access to healthcare services, objectivity of available medical information, proper staff qualification	Availability of information on patient's capabilities and need for medical services in terms of complexity and medical staff qualification	Marketing analysis, questionnaires

Sources: developed by the author.

The Staff Qualification index can be most effectively objectified through patient's satisfaction. It is patients who are interested in the high level of staff qualification in medical aid provision. However, there can be a lack of collecting, standardising, unifying and processing information. Therefore, it is necessary to develop a feedback system built into the general electronic system of the National Health Service of Ukraine.

Table 8. Economic efficiency in medical aid provision: criteria and methods of assessing the medical service quality in terms of influence on macroeconomic development

	Psychological component	Patient's satisfaction, social security	Satisfaction of the patient's needs for social protection, medical aid availability	Questionnaires, statistical data, analysis
	Demographic component	Rates of birth, death, national health, healthcare costs	Birth rate, death rate and national health compared to healthcare and paramedical expenditure	Statistical data, analysis
Economic efficiency	Resource component	Healthcare system funds	Budget allocations for healthcare funding, resource use for preventive medical aid measures	Statistical data, analysis, comparison
	Systemic component	Costs for ensuring data comparability in the system	Reliable, complete and actual information about the patient and social health	Statistics
	Marketing component	Costs for healthcare popularisation and educational activities	Efficiency of healthcare marketing costs	Marketing analysis, questionnaires

Sources: developed by the author.

The Economic Efficiency index directly concerns healthcare funding. In this case, there is a feedback: the lower the costs are, the higher the efficiency is. However, you should include both absolute direct costs and unrealised benefits due to days of temporary work incapacity.

Table 9. Deontology in medical aid provision: criteria and methods of assessing the medical service quality in terms of influence on macroeconomic development

	Psychological component	The patient's healthcare trust, sense of social security	Satisfaction of the patient's needs for qualified medical aid, systemic assessment	Questionnaires, statistical data, analysis
Deontology	Demographic component	Population health in particular territories	The rate of birth, death and national health in comparison with healthcare and paramedical expenses	Statistical data, analysis

Continued Table9

Resource component	Healthcare funds for medical standardisation	Healthcare standardisation funding, resource use for inappropriate treatment individualisation in each specific case	Statistical data, analysis
Systemic component	Costs to ensure the objectivity and expediency of medical staff actions	Reliable, complete and actual information about expediency of medical staff actions (individually and generally)	Statistical data, analysis
Marketing component	Costs for popularisation and educational activities of medical staff advanced training	Efficiency of healthcare marketing costs	Marketing analysis, questionnaires

Sources: developed by the author.

According to Tables (5), (6), (7), (8), (9), the Deontology index is the most controversial and ambiguous. Here, we regard informational and educational activities (for advanced training) as the most efficient method of medical care quality assessment.

These tables arrange the medical care quality indexes. We determined evaluation criteria and methods for further medical care quality study and defined the index influence. The obtained data should be rechecked in future for practical healthcare application.

Conclusions. As the most cost-intensive branch of the national economy, the healthcare system is important in macroeconomic development. It requires the study of organisational and administrative obligations. Also, effective and transparent influence levers should evolve.

The results show a direct and significant relationship between indexes of economic efficiency and medical care quality. The maximal objectification and standardisation of healthcare influence data are critical. Today, such ties are quite diverse and not normed. The concepts of patients' and national health are directly interrelated, which impacts economic processes.

The urgent task (in public administration) is to study the above-mentioned correlations, their objective assessment, and standardisation. The development of effective mechanisms of macroeconomic influence should be researched.

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Взаємозв'язок показників якості медичного забезпечення населення та економічної ефективності на макроекономічному рівні

Наразі в складних умовах воєнного стану ще більш актуальним і нагальним стає питання подальшого реформування медичної галузі в Україні. Крім того, перед професійним середовищем спеціалістів в галузі медицини постають нові виклики та вимоги до проявлення дієвої гнучкості, адаптивності, швидкого реагування на актуальні завдання. На передній план виходить такі поняття, як якість медичної допомоги та медичні послуги. Метою цього дослідження є вивчення можливостей використання взаємозв'язків для прогнозування та контролювання динаміки показників макроекономічної ефективності у сфері охорони здоров'я. Студія націлена на широке впровадження подальших етапів медичних реформ України, забезпечення населення якісним медичним обслуговуванням та соціальними гарантіями. Ретельно вивчено взаємозв'язок між показниками якості медичного забезпечення населення та показниками економічної ефективності на рівні економіки країни. Опрацьовані джерела щодо наявності та системності показників якості медичного забезпечення населення свідчать про те, що відсутній єдиний стандартизований підхід до оцінки показників. Це унеможливлює прогнозування наслідків медичних реформ на економічні процеси в країні. У такому разі надзвичайно актуальним є питання ефективності заходів та витрачання ресурсів на макрофінансування галузі. За рекомендаціями Всесвітньої організації охорони здоров'я, взаємодія лікаря і пацієнта має враховувати 4 компоненти якості медичної допомоги: кваліфікація лікаря, оптимальне використання ресурсів, ризик для пацієнта, задоволеність пацієнта отриманою допомогою. Показники економічної ефективності відображають ступінь впливу змін в системі охорони здоров'я на економіку країни за рахунок позитивної динаміки фізичного, психологічного та соціального здоров'я населення. Відтак, оптимальним і доречним є максимізація бажаного ефекту, а також знаходження балансу і доцільності економічних інструментів через врахування вірогідного рівня впливу на цільовий показник або один із аспектів показника.

Ключові слова: економічна ефективність, медична реформа в Україні, медичні послуги, охорона здоров'я, якість медичного забезпечення