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IMPACT OF STATE HEALTH PREVENTION FINANCING PROGRAMS ON THE ACTIVITIES OF HEALTH PROTECTION ENVIRONMENTS IN UKRAINE

ABSTRACT

The article examines the features of the application of correlation-regression analysis to identify the impact of state health prevention financing programs on the activities of health protection entities in Ukraine. The study used single-factor cubic regression models, which allow for a more flexible representation of the nonlinear relationship between the independent variable (the amount of state funding or net profit) and the dependent variable (the amount of preventive services provided). The least squares method was used to calculate the model parameters that minimize the sum of the deviations of empirical data from theoretical values. The results obtained confirm the high level of correlation between the increase in the volume of public investments and the positive dynamics of preventive measures, which indicates the effectiveness of the targeted allocation of funds. Analysis of the Fisher criterion made it possible to establish the adequacy of the constructed regression models and their predictive capabilities. It was found that the growth of the net profit of medical institutions also contributes to improving the quality and expanding the range of preventive services. At the same time, in situations of insufficient profitability, public funding acquires special importance, compensating for limited resources and ensuring the basic level of preventive measures. The results of the study can become the basis for the formation of effective public policies aimed at optimizing financial resources and improving the overall health of the population. In particular, the application of these methods allows for identifying points of maximum and minimum impact, determining possible threshold values of indicators and adjusting investment strategies in prevention accordingly. Thus, the presented methodological tools contribute to a more complete understanding of the impact of economic variables on the spheres of health care and form the basis for further research. This allows for better integration of preventive initiatives into strategic planning for the development of the healthcare sector.

Keywords: correlation-regression analysis, government programs, health prevention financing, one-factor cubic regression, least squares method, Fisher's exact test, healthcare services

JEL Classification: I18, H51, C13

INTRODUCTION

The main goal of the health care system is to improve the indicators of the level and quality of life of the population and to preserve the health of every citizen of the country. To achieve this goal, the state is faced with the task of providing healthcare institutions with appropriate financial resources at the proper level. The lack of health care financing in the country in the required volumes means that the state does not sufficiently apply the levers of influence to improve the quality and efficiency of medical care, and support for citizens in case of illness. This not only violates the constitutional right of a person to receive affordable and high-quality medical care but also leads to a deterioration in the health status and a decrease in the life expectancy of Ukrainians. For many years, a health care system financing model operated in Ukraine, which provided for the allocation of budget funds mainly to the maintenance of medical infrastructure. At that time, citizens were limited in access to the provision of quality medical services, and

healthcare institutions were not fully equipped with modern diagnostic and treatment equipment. In general, the main problems in financing the health care system that need to be solved are: financial insecurity of citizens, low quality and efficiency of medical services, and inefficient spending of budget funds.

In Ukraine today, the state is the main investor in the entire health sector, trying to ensure its transition to modern, sometimes market mechanisms of functioning. That is why, for example, the reaction of the state of economic development of medical institutions to changes in the exchange rate is not as obvious as it is observed within other systems of the national economy. The medical system is quite internally closed. When the exchange rate changes, first of all, the cost of foreign equipment may increase, as well as medicines, both foreign and not to a significant extent domestic. However, in the absence of a serious alternative, citizens still turn to state medical institutions, especially when serious treatment is necessary.

Global challenges related to preserving the life and health of the nation, ensuring the supremacy of the state on its territory and its independence in international relations, which Ukraine faced with the beginning of the full-scale military invasion of Russian troops, caused the need for maximum cohesion and effective work of all citizens, business entities and sectors of the national economy, without exception, the key task of which was the accumulation of all efforts to counter military aggression. Under these conditions, the healthcare sector, as one of the key sectors of the national economy, found itself in extremely difficult conditions, which is due to the sharp increase in society's need for relevant services. At the same time, the disproportionate size of the financial support of the domestic healthcare sector compared to the leading countries of the world, negatively affects the growth rate of the quality of relevant services, the preservation and development of human resources, and the innovative development of material and technical support of this sector. The development of the healthcare sector is taking place in conditions of transformational changes inherent in the national economy. Undoubtedly, the state of economic development in the country determines the capabilities of governments that can be used to ensure the development of medicine and increase the social security of citizens. At the same time, taking into account the complex structure of the healthcare sector, and the large number of its individual subsystems and components, each of them can react differently to new challenges of the external environment and differently influence the development of this sector. One cannot do without state programs.

In today's conditions, when the national economy of Ukraine is experiencing significant shocks and transformations. At the same time, considerable attention is paid to the issue of increasing the efficiency of the healthcare system. State programs for financing health prevention are increasingly considered as a key tool for ensuring long-term stability and sustainable development of medical institutions. All economic transformations and changes covering all levels of governance require parallel integration of qualitative and quantitative methods for analyzing development indicators. In this context, it is the correlation regression analysis that forms a real opportunity to assess the strength of the relationship between public investment in health prevention and the performance of healthcare entities. The use of modern economic and mathematical methods makes it possible to create effective and scientifically sound recommendations for optimizing existing financial flows and improving the overall efficiency of preventive measures. Conducting such an assessment will facilitate early detection of potential risks, as well as identifying vectors for improving the public financing system. Given this, the use of this integrated approach to quantitative analysis can become a key component in forming an effective strategy for the development of the country's medical sphere.

LITERATURE REVIEW

As Posylkina (2021) notes, the national system is faced with a complex problem - a lack of resources and their irrational use. The state health policy to improve the work of the industry must solve the main task - this is to improve the system's activities and ensure coordination of joint actions and sectors of public activity, state and private structures and citizens.

As Romanchenko, (2023) notes, population health is one of the key indicators characterizing the well-being of the nation. This goal can be achieved only by forming an effective healthcare system, in which every citizen should be confident in the realization of their rights to high-quality and affordable medical care. At the same time, Zhukevych, (2022) emphasizes that the world has accumulated rich experience in building and optimizing financial and organizational models of health care. Therefore, large countries are working hard to expand the coverage of the population with free medical care, rationalize sources and methods of financing, as well as methods of managing healthcare systems to increase their efficiency and eliminate duplication of costs. At the same time, state funding programs play a significant role.

In their work, Ivanova and Petrova-Gotova (2018) emphasize the criticality of integrating effective financial management mechanisms that include both strategic development priorities and features of rational budget planning for the healthcare sector. In their study, the authors conclude that effective management of available finances has a direct impact on the

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quality of medical services. This is due to the fact that it forms the basis for the rational use of resources, increasing the availability of treatment and preventive measures. At the same time, Prus and Savchenko (2018) in their work explore another important aspect - the role of reforming the financial resource system in the context of the overall reform of the medical industry. In particular, the authors emphasize the importance of forming effective mechanisms aimed at improving the level of transparency of expenditures and the effectiveness of budget allocation.

In this area, special attention from the scientific community is focused on the possibilities of public-private partnerships. Thus, according to the data from the study by Baxter, Casady (2020), during the pandemic restrictions, it was the public-private partnership mechanism that acquired the greatest relevance, because it made it possible to optimize limited public resources through innovative approaches of the private sector. This work draws attention to the possible risks associated with the implementation of these partnerships and the possibility of solving the consequences of economic uncertainty through such projects. In the context of generalizing foreign experience in the studied topic, the work of Havrychenko, Shtyrov (2024) is interesting, which studies the features of the functioning of health insurance systems in different countries. The work emphasizes the importance of adapting these models to national characteristics. At the same time, the authors also introduce the thesis that unsystematized and unadapted integration of direct measures taken from foreign experience often leads to low efficiency and effectiveness due to cultural, social, economic and other differences. The work of Thomson, (2022) discusses the level of resilience of healthcare systems in European countries to economic crises and shocks. In particular, the authors place special emphasis on pandemics and global financial crises. As a result, the authors found that those healthcare systems that have more diversified profit mechanisms (taxes, insurance, investments, etc.) are more sustainable and have a wider range of operational sources of financing at critical moments. This approach allows not only to maintain a high standard of medical services but also to minimize negative socio-economic consequences.

At the same time, Jowett et al. (2020) propose an integrated approach to the analysis and evaluation of the healthcare system through the use of a specific tool - the healthcare financing progress matrix. According to the results presented by the authors, the use of this tool allows not only to identify the strengths and weaknesses of individual financial mechanisms but also to create effective recommendations for improving government programs aimed at disease prevention. Kryshtanovych et al. (2023) analyze the issue of ensuring effective interaction between society and government bodies, which today is an important component of the sustainability and stability of economic processes. The authors also analyze the mechanisms that contribute to the formation of synergy in the relationship between the state and society, which in the context of government health prevention programs can ensure a more transparent and rational distribution of available resources. See also Rokicki et al. (2021) in their study compare in detail the most popular approaches to ensuring the financial sustainability of the healthcare system, highlighting their advantages and disadvantages. The results obtained by the authors can become a powerful guide for the adaptation of the most effective practices and mechanisms in the field of health prevention. This is especially relevant for the realities of Ukraine, where there is an urgent need to optimize state programs and attract innovative mechanisms for managing financial resources. Ultimately, Konieva (2023) examines the specifics of managing the financial security of medical institutions in Ukraine. The author focuses on the challenges and threats in which Ukrainian medical institutions operate during the implementation of prevention activities and programs. In this context, the author forms models for improving financial sustainability through optimization of budget allocation. This study has significant practical significance since it provides direct recommendations for improving the effectiveness of health prevention financing programs.

AIMS AND OBJECTIVES

The purpose of the article is to determine and quantify the impact of state programs of financing health prevention on the activities of business entities in the field of health care in Ukraine using correlation regression analysis. The tasks set within the framework of this article are:

1. Analysis of scientific and theoretical approaches to assessing the impact of state funding programs.
2. Justification of the use of single-factor cubic regression models in the study of nonlinear dependencies.
3. Calculation of the parameters of regression equations and assessment of the closeness of the relationship between the variables under study.
4. Verification of the adequacy of the constructed models using statistical significance criteria.
5. Formulation of recommendations for improving the effectiveness of state policy in the field of health prevention.

METHODS

To determine the specifics of the impact of indicators on other parameters (in our case, these will be indicators related to the impact of state programs for financing health prevention on the activities of business entities in the healthcare sector of Ukraine), we will use the method of correlation-regression analysis. In our case, it is advisable to build single-factor regressions, since the feature of the impact of only one factor on the dependent variable is determined (Koenker, 2004; Bottai, 2014). At the same time, as experience shows, the best way to reflect the specified impact is to search for a nonlinear model, in this case, a cubic model for an algebraic description of the dependence of one parameter on another. The cubic univariate regression model has the following form (1):

$$y=a_0+a_1x^3+a_2x^2+a_3x+\varepsilon, \quad (1)$$

where y is the value of the dependent variable; x is the value of the independent variable. a0, a1, a2, a3, are parameters; ε is the error.

The estimated model, that is, the model that most closely describes the real dependence between two quantities, has the following form (2):

$$\hat{y}=\hat{a}_0+\hat{a}_1x^3+\hat{a}_2x^2+\hat{a}_3x, \quad (2)$$

where $\hat{y}$ – is the estimated value of the dependent variable (determined within the estimated model).

The parameters a0, a1, a2, a3 are usually determined using the least squares method. It is possible to find the parameters of the model a0, a1, a2, a3 by determining such an econometric equation that minimizes the sum of errors ∑=e in the model. A necessary condition for the minimum of a function is that the derivatives of this function are equal to zero. Using mathematical transformations, we obtain that the cubic univariate regression model is characterized by the following system of equations:

$$\begin{cases} a_3\sum x^3+a_2\sum x^2+a_1\sum x+na_0=\sum y \\ a_3\sum x^4+a_2\sum x^3+a_1\sum x^2+a_1\sum x=\sum xy \\ a_3\sum x^5+a_2\sum x^4+a_1\sum x^3+a_1\sum x^2=\sum x^2y \\ a_3\sum x^6+a_2\sum x^5+a_1\sum x^4+a_1\sum x^3=\sum x^3y \end{cases} \quad (3)$$

The system of equations formed as a result of algebraic transformations is solved by Cramer's rule in order to find the parameters a (a1,), b (a), c (a3) and d (a0) in the cubic regression equation $y = ax^3 + bx^2 + cx + d$.

The correlation coefficient quantifies the strength and direction of the association between two variables, demonstrating the degree to which an independent variable influences a dependent variable. A correlational relationship exists when one variable is affected not only by another variable but also by random influences, or when both variables are shaped by shared underlying factors. This statistical measure is derived through a defined mathematical formula (4):

$$R=\sqrt{1-\frac{\sum(y-\widehat{y})2}{\sum(y-\bar{y})2}} \quad (4)$$

To check econometric models for adequacy, the F-criterion is also used, which is usually determined by the following formula (5):

$$F= (R^2/1-R^2)*(n-k/k-1) \quad (5)$$

The adjusted coefficient of determination (R) is calculated using the following variables: n (the sample size or number of observations), k (the total number of parameters in the model, which equals m + 1), and m (the number of independent variables or predictors included in the regression equation).

The Fisher criterion is used to check the equality of variances of two samples. It is referred to as a dispersion criterion. If Ffact.> Ftab., then it can be stated that the regression model is adequate and reflects the real relationship between the two parameters.

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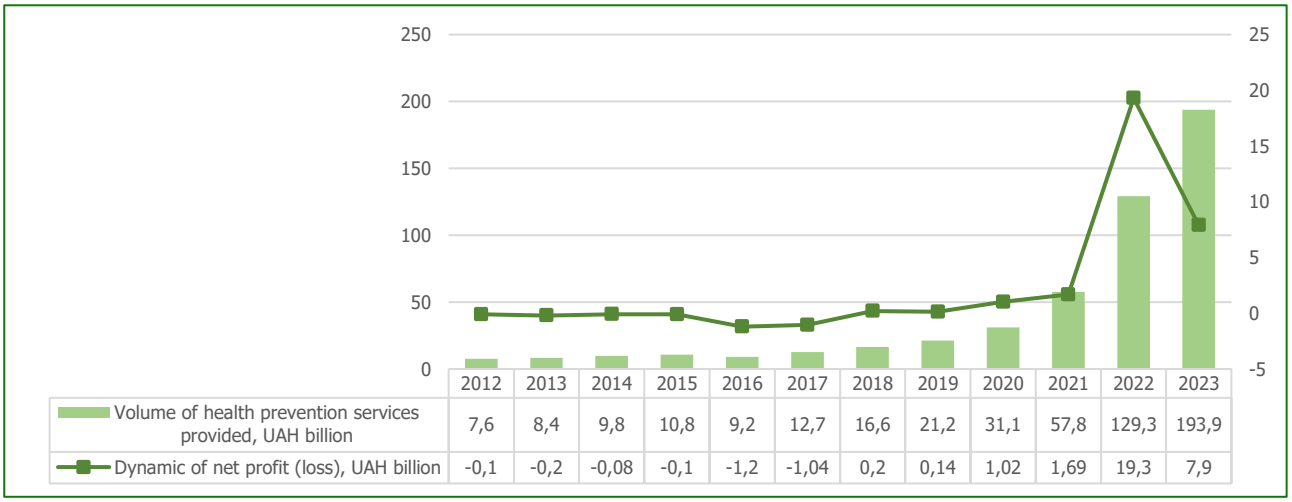
RESULTS

In the current section of the article, we will expand our knowledge about the peculiarities of the development of the healthcare sector in the context of transformational changes in the national economy by conducting econometric modelling of the interaction between various factors that affect this sector. In our case, these factors are related to the impact of state programs for financing health prevention on the activities of healthcare business entities in Ukraine. In order to conduct such a study, based on the use of methodological provisions of econometric modelling, we will build appropriate models of the relationship between the following economic indicators:

1. The impact of net profit (loss) of health care business entities in Ukraine on the volume of health care services provided.
2. The impact of capital investments in health care through state programs on the volume of services provided by health care business entities.

To conduct a study of the impact of the net profit (loss) of healthcare business entities in Ukraine on the volume of healthcare services provided, we will use the input data presented in Figure 1.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Volume of health prevention services provided, UAH billion	7,6	8,4	9,8	10,8	9,2	12,7	16,6	21,2	31,1	57,8	129,3	193,9
Dynamic of net profit (loss), UAH billion	-0,1	-0,2	-0,08	-0,1	-1,2	-1,04	0,2	0,14	1,02	1,69	19,3	7,9

Figure 1. Dynamics of financial and economic indicators as information for modelling the impact of net profit (loss) of healthcare entities in Ukraine on the volume of health prevention services provided. (*Source: State Statistics Service, 2025*)

Using formula 3, we will search for the corresponding unknown parameters a0, a1, a2, a3. To do this, we will construct a table of intermediate calculations (Table 1).

Table 1. Intermediate calculations for finding the equation.

i	1	2	3	4	5	6	7	8	9	10	11	12	ΣΣ
Xi	7.6	8.4	9.8	10.8	9.2	12.7	16.6	21.2	31.1	57.8	129.3	193.9	509.8
Yi	-0.1	-0.2	-0.08	-0.1	-1.2	-1.04	0.2	0.14	1.02	1.69	19.3	7.9	27.4
x^2	58.5	72.1	97.2	117.1	84.8	163.1	275.5	450.7	964.7	3344.3	16736.5	37632.1	5995.8
x^3	447.6	612.9	959.6	1267.7	782.2	2083.4	4575.3	9569.6	29965.3	193403.4	2165214.6	7300255.9	9709124.7
x^4	3424.8	5196.6	5196.5	13708.9	7196.2	26593.8	75944.3	203144.1	930692.6	11184403.1	280113676.8	141718474.2	1708749873.1
x^5	26200.3	44111.1	94194.1	149299.4	66268.1	339599.7	1261494.1	4313718.2	29919381.9	65893969.4	36349305398.3	285834194111.2	311644370448.2
x^6	200433.7	374496.1	918888.7	1604589.1	61033.3	4336561.3	20924184.9	91558774.3	897860175.4	37404095213.1	4688149788935.2	53284733846718.3	58020294908276.1
xy	-0.6884	-1.87	-0.8	-1.6	-10.9	-13.3	3.1	2.8	31.7	97.1	2492.7	1531.6	4129.1
x^2y	-5.2	-15.86	-7.8	-17.6	-101.1	-168.6	53.4	63.1	985.1	5619.5	322347.8	295918.4	625667.1
X^3y	-40.3	-135.6	-77.7	-191.1	-922.8	-2166.7	868.1	1338.6	30565.6	324915.4	41702015.8	5799012.8	99655183.1

We find the coefficients a, b, c and d: $\hat{y} = ax^3 + bx^2 + cx + d$ from the system of equations. We solve this system of linear equations by Cramer's rule:

Δ=5.8543599e+24;

$$\Delta a=\begin{vmatrix} 27.4 & 5995.8 & 509.8 & 12 \\ 4129.1 & 9709124.7 & 5995.8 & 509.8 \\ 625667.1 & 1708749873.1 & 9709124.7 & 5995.8 \\ 99655183.1 & 311644370448.2 & 1708749873.1 & 9709124.7 \end{vmatrix}=\frac{\Delta a}{\Delta}=0;$$

$$\Delta b=\begin{vmatrix} 9709124.7 & 27.4 & 509.8 & 12 \\ 1708749873.1 & 4129.1 & 5995.8 & 509.8 \\ 311644370448.2 & 625667.1 & 9709124.7 & 5995.8 \\ 58020294908276.1 & 99655183.1 & 1708749873.1 & 9709124.7 \end{vmatrix}=\frac{\Delta b}{\Delta}=0.055;$$

$$\Delta c=\begin{vmatrix} 9709124.7 & 5995.8 & 27.4 & 12 \\ 1708749873.1 & 9709124.7 & 4129.1 & 509.8 \\ 311644370448.2 & 1708749873.1 & 625667.1 & 5995.8 \\ 58020294908276.1 & 311644370448.2 & 99655183.1 & 9709124.7 \end{vmatrix}=\frac{\Delta c}{\Delta}=-0.207;$$

$$\Delta d=\begin{vmatrix} 9709124.7 & 5995.8 & 509.8 & 12 \\ 1708749873.1 & 9709124.7 & 5995.8 & 4129.1 \\ 311644370448.2 & 1708749873.1 & 9709124.7 & 625667.1 \\ 58020294908276.1 & 311644370448.2 & 1708749873.1 & 99655183.1 \end{vmatrix}=\frac{\Delta d}{\Delta}=1.4;$$

Therefore, the initial cubic regression equation has the form:

$\hat{y} = 0.055x^3 + -0.207x^2 + 1.4$

Let's write it not in a generalized form:

$V_{HC}^{Pr}=0.005*V_{HC}^2-0.2* V_{HC}+1.4$

In accordance with the methodology of correlation-regression analysis, it is necessary to assess the adequacy of the obtained dependence. This can be done by determining the correlation coefficients, determination and Fisher's criterion:

$R^2=0.99^2=0.97$

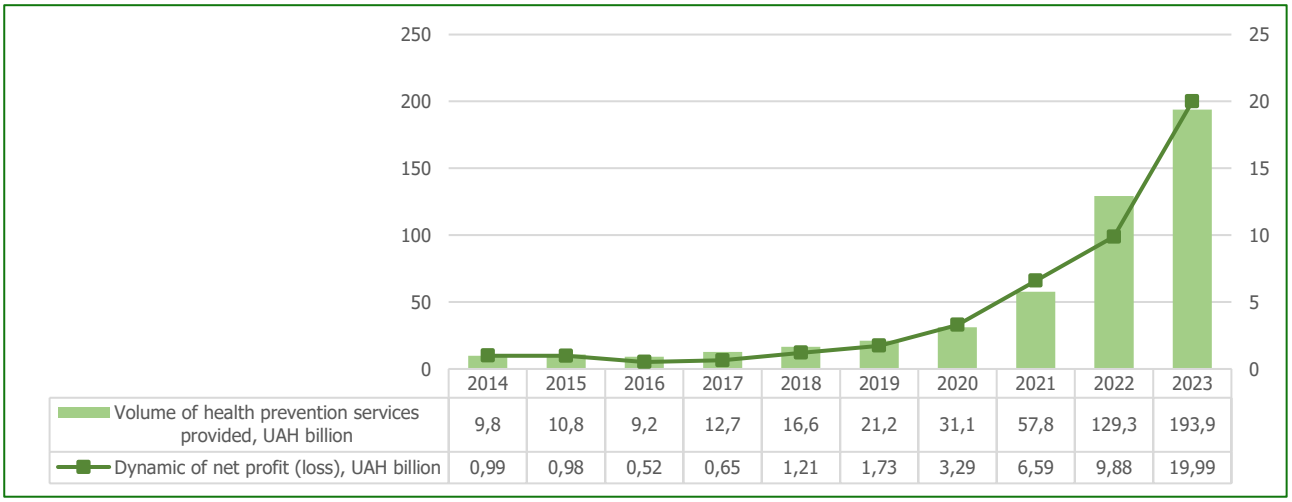
$F_{fakt}=113.8$

$F_{tabl}=4.0$

Since k1 = m = 3, k2 = n – m – 1 = 12– 3 – 1 = 8, at a=0.05.

m – is the number of parameters in the variables of the regression equation.

Since Ffakt>Ftabl, it can be argued that the constructed regression model is significant and correct, that is, it quite correctly determines the impact of net profit (loss) of Ukrainian healthcare entities on the volume of health prevention services provided. We will conduct a similar study to investigate the impact of capital investments in health prevention through state programs on the volume of services provided by healthcare entities (Figure 2).



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Volume of health prevention services provided, UAH billion	9,8	10,8	9,2	12,7	16,6	21,2	31,1	57,8	129,3	193,9
Dynamic of net profit (loss), UAH billion	0,99	0,98	0,52	0,65	1,21	1,73	3,29	6,59	9,88	19,99

Figure 2. Dynamics of financial and economic indicators as information for modelling the impact of capital investments in the field of health prevention through state programs on the volume of services provided by health care entities. (*Source: State Statistics Service, 2025*)

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Since the modelling process has already been presented in detail in all details in the context of studying the impact of net profit (loss) of healthcare entities of Ukraine on the volume of healthcare services provided, in the case of the impact of capital investments in the field of health prevention through state programs on the volume of services provided by health care entities, we will present only the direct results of the modelling (Table 2).

Table 2. Intermediate calculations for finding the equation.

i	ΣΣ
Xi	45.8
Yi	493.8
x2	559.1
x3	9273.7
x4	170932.5
x5	3291386.5
x6	64635186.8
xy	57228.6
x2y	93048.3
X3y	1690149.8

So, like the previous time, we will find the coefficients a, b, c and d of the cubic regression equation $\hat{y} = ax^3 + bx^2 + cx + d$ from the system of equations. Let's solve this system of linear equations using Cramer's rule:

Δ=3048911939303.3

$\Delta a = = \frac{\Delta a}{\Delta} = -0.0836;$

$\Delta b = = \frac{\Delta b}{\Delta} = 2.261;$

$\Delta c = = \frac{\Delta c}{\Delta} = -2.993;$

$\Delta d = = \frac{\Delta d}{\Delta} = 13.997.$

Therefore, the initial cubic regression equation has the form:

$\hat{y} = -0.0836x^3 + 2.261x^2 + 13.997.$

Let's write it in a non-generalized form:

$V_{HC}^{Pr} = -0.008 * V_{HC}^3 + 2.26 * V_{HC}^2 - 2.99 V_{HC} + 13.99.$

According to the correlation-regression analysis method, it is necessary to assess the adequacy of the obtained dependence. This can be done by determining the correlation coefficients, determination and Fisher's criterion:

$R^2 = 0.999^2 = 0.99;$

$F_{fakt} = 294.9;$

$F_{tabl} = 4.066;$

Since k1 = m = 3, k2 = n – m – 1 = 12– 3 – 1 = 8, at a=0.05.

m – is the number of parameters in the regression equation variables.

Since Ffakt>Ftabl, it can be stated that the constructed regression model is significant and correct, that is, it quite correctly determines the impact of capital investments in the field of health prevention through state programs on the volume of services provided by healthcare entities.

DISCUSSION

A summary comparative table is provided, which shows how our results correlate with the conclusions of a number of other studies (Table 3).

Table 3. Results of the discussion of the obtained research results.

References	Focus	Comparison with our results
Solonenko et al. (2020)	The need for a comprehensive reform combining changes in management and efficient use of funds is highlighted	Our results correlate with the statement about the importance of a unified methodology for analyzing investment flows and their impact on prevention programs
Fitzpatrick et al. (2022)	The role of primary health care for Indigenous people in times of crisis	Our study also confirmed the significant impact of prevention, but we focused on economic factors, while the authors emphasize ethnocultural features
Hurzhyi (2023)	Evaluation of the effectiveness of medical institutions	Our cubic regression models were applied to single-factor variables, but the approach can complement the analysis, expanding the list of factors for a more comprehensive study
Mihalache et al. (2018)	Economic models of financing medical services in the EU	Our conclusions about the relevance of state investment programs coincide with the idea that a variety of funding sources increases the flexibility and stability of the system
Sylkin (2022)	Information support for public administration in the context of COVID-19	Our econometric analysis model is part of the general information environment, which can increase the efficiency of decision-making, resonating with the position on the role of information systems

As we can see, our results on the impact of public investment programs in the field of health prevention are generally consistent with the idea that multi-component financing systems and rapid adaptation to changes are key to ensuring the sustainability of the industry. At the same time, certain differences lie in the focus of analysis: while some studies emphasize socio-cultural or multifactorial aspects (for example, the ethnic component or complex models of efficiency assessment), our work focuses mainly on economic indicators and correlation-regression analysis.

CONCLUSIONS

The results of the conducted econometric modelling allow us to confirm that state programs for financing health prevention have a significant impact on the key indicators of business entities in the healthcare sector. In particular, through the selected methods, we have identified a high correlation between the increase in the volume of state investments and the growth of preventive measures and services. Such a correlation is evidence of the effectiveness of targeted measures. The cubic form of the regression model allowed us not only to determine the linear nature of the relationship but also potential deviations at individual stages of development. This, in turn, is evidence of the dynamism and complexity of the interaction of various factors. Due to the calculation of correlation coefficients and significance criteria, the model confirms its correctness, validity and high predictive ability. The totality of the obtained results indicates the need for further improvement of the mechanisms for distributing funds for health prevention. In practice, this can become the basis for improving the quality of medical services and increasing the overall level of public health.

It should also be noted that the analysis revealed that the net profit of healthcare business entities, as a single factor, has a significant impact on the volume of preventive services provided. This indicates that the effectiveness of health prevention financing is closely related to the overall financial condition of healthcare institutions. With a stable level of profitability, healthcare institutions have the opportunity to direct part of their financial resources to the innovation and development of preventive programs aimed at reducing the incidence of acute and chronic diseases, improving the quality of medical examinations, and raising the overall standard of living of the population. On the other hand, a low level of profit can significantly limit the functionality of implementing the above measures, thereby reducing the effectiveness of government programs. Given this, the use of a systems approach to analyzing financial and medical indicators is critically important. This is due to the fact that it allows for a comprehensive determination of funding volumes, while simultaneously optimizing financial flows in accordance with strategic goals.

Taking into account all the obtained results, we come to the conclusion that the correlation and regression analysis used in the study is an effective tool for forecasting and assessing the impact of government programs for financing health

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prevention on the activities of economic entities in the healthcare sector. Due to the formed cubic regression model, researchers have the opportunity to take into account nonlinear characteristics of the interaction of factors, as well as to identify potential intersection points where the influence of government funding can be especially significant. The obtained results open up new prospects for further scientific research, as well as practical application of the results. In practice, this can be useful for formulating policies aimed at improving the efficiency of the healthcare system. At the same time, the prospects for further research may include the analysis of multifactor models and the study of the specifics of other indicators in order to provide a more complete picture of the interaction of all entities in the field of medical service. Taking this into account, the systematic and coordinated use of static and econometric methods will significantly contribute to a deeper understanding of internal processes and improve the quality of management decisions on health prevention. Such activities will have a positive impact on the overall level of public health and ensure the stability of the medical sector in the long term.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ВПЛИВ ДЕРЖАВНИХ ПРОГРАМ ФІНАНСУВАННЯ ПРОФІЛАКТИКИ ЗДОРОВ'Я НА ДІЯЛЬНІСТЬ СУБ'ЄКТІВ ГОСПОДАРЮВАННЯ ГАЛУЗІ ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ

У роботі досліджено особливості застосування кореляційно-регресійного аналізу для виявлення впливу державних програм фінансування профілактики здоров'я на діяльність суб'єктів господарювання в галузі охорони здоров'я України. У рамках проведеного дослідження використано однофакторні кубічні регресійні моделі, що дають змогу більш гнучко відображати нелінійну залежність між незалежною змінною (обсяг державного фінансування чи чистий прибуток) і залежною змінною (обсяг наданих профілактичних послуг). За допомогою методу найменших квадратів розраховано параметри моделі, які мінімізують суму відхилень емпіричних даних від теоретичних значень. Отримані результати підтверджують високий рівень кореляції між збільшенням обсягів державних інвестицій і позитивною динамікою профілактичних заходів, що свідчить про ефективність цільового спрямування коштів. Аналіз критерію Фішера дав змогу встановити адекватність побудованих регресійних моделей та їхні прогностичні можливості. Установлено, що зростання чистого прибутку медичних закладів також сприяє підвищенню якості й розширенню спектра профілактичних послуг. Водночас, у ситуаціях недостатнього рівня прибутковості державне фінансування набуває особливої ваги, компенсуючи обмежені ресурси та забезпечуючи базовий рівень профілактичних заходів. Результати дослідження можуть стати основою для формування ефективних державних політик, спрямованих на оптимізацію фінансових ресурсів і підвищення загального рівня здоров'я населення. Зокрема, застосування цих методів дозволяє ідентифікувати точки максимального та мінімального впливу, визначити можливі порогові значення показників і відповідно коригувати стратегії інвестування в профілактику. Отож, представлений методичний інструментарій сприяє більш повному розумінню впливу економічних змінних на галузь охорони здоров'я та формує основу для подальших досліджень. Завдяки цьому можна досягти кращої інтеграції профілактичних ініціатив у стратегічне планування розвитку медичної галузі.

Ключові слова: кореляційно-регресійний аналіз, державні програми, фінансування профілактики здоров'я, однофакторна кубічна регресія, метод найменших квадратів, критерій Фішера, медичні послуги

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