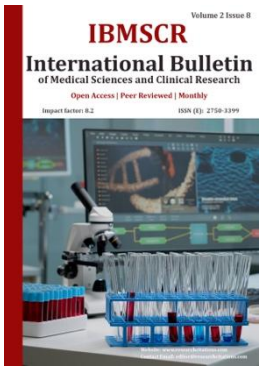

BASING AND FORECASTING THE PRIORITIES FOR THE INTRODUCTION OF INNOVATIVE MEDICAL SERVICES IN THE REGION

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Annotatsion. In this article, the results of the forecast for the development of the medical services market in the region for the period of 2022-2026 are presented. According to it, factors such as the number of private clinics and the number of employees of medical institutions in the development of the medical services market were made using the regression analysis method.

Key words. Model, quality medical service,private clinics,the number of medical personnel,private sector, health services,correlational analysis,real income, service price,population income, MARE indicator, Durbin-Watson index, Regression analysis.

Annotatsiya.Ushbu maqolada 2022-2026 yillarda mintaqada tibbiy xizmatlar bozorini rivojlantirishning prognoz taxlil natijalari keltirilgan. Unga ko‘ra, tibbiy xizmatlar bozorini rivojlantirishda xususiy klinikalar soni va tibbiyot muassasalari xodimlari soni kabi omillar regressiya tahlili usuli yordamida amalga oshirildi.

Kalit so'zlar.Model, sifatli tibbiy xizmat, xususiy klinikalar, tibbiyot xodimlari soni, xususiy sektor, sog'liqni saqlash xizmatlari, korrelyatsion tahlil, real daromad, xizmat narxi, aholi daromadi, MARE ko'rsatkichi, Durbin-Watson indeksi, regressiya tahlili

Аннотация. В данной статье представлены результаты прогноза развития рынка медицинских услуг региона на период 2022-2026 гг. Согласно ему, такие факторы, как количество частных клиник и количество сотрудников медицинских учреждений в развитии рынка медицинских услуг, были сделаны с использованием метода регрессионного анализа.

Ключевые слова.Модель, качество медицинского обслуживания, частные клиники, численность медицинского персонала, частный сектор, услуги здравоохранения, корреляционный анализ, реальный доход, цена услуги, доходы населения, показатель MARE, индекс Дурбина-Уотсона, регрессионный анализ.

Improving the quality of medical services at the global, national, regional and local levels in the world, and attracting foreign investment resources to the health care sector, is considered as a strategic goal of sustainable development in the period until 2030. All over the world, medical problems, especially due to the global impact of COVID-19, are increasingly affecting the economies of developed and developing countries. At a time when national economic growth is expected to slow down to 5.5 percent from the pre-pandemic level in developing countries starting from China, Taiwan (86.4), South Korea (82.3), France (80. 9), countries such as Japan (80.6), Denmark (79.9), Finland (76.4) are experiencing a decrease in GDP.[1]

A more promising model of quality management is a channel model based on systematic analysis and econometric modeling. The strength of this method is that it is possible to test for time-varying factors.

It is urgent to protect the health of the population, expand the level of coverage of quality medical services, increase the type and range of offered medical services, and attract new equipment to the medical field by involving the private sector.

For this reason, development of promising indicators for the next years, identifying the development trends of the industry today and the factors affecting the development of the industry, is considered one of the important tasks of this research work.

The number of existing private clinics and the number of medical workers in them can be seen as important indicators of the development of the medical field in the region. Because, in 2010-2021, both indicators increased by 7.9 percent and 15.7 times, respectively. As a result, it was possible to increase the real volume of healthcare services by 11.2 times.

From the results of the correlation analysis, it can be seen that health care services have a high degree of correlation with all the indicators selected for analysis. In addition, it was found that the correlation between the given indicators is high, and their inclusion in one model creates the problem of autocorrelation.**[13]**

Table 1

Correlation analysis results in Khorezm region

	PE	WPG	HSG	H	PCRINR	PCTINR
PE	1,00					
WPG	0,98	1,00				
HSG	0,96	0,93	1,00			
H	0,96	0,97	0,93	1,00		
PCRINR	0,91	0,87	0,98	0,84	1,00	
PCTINR	0,99	0,98	0,98	0,96	0,95	1,00

Here: PE – the number of available private clinics in the region (unit); WPG - number of medical workers working in private clinics (person); HSG- Real value of health care services at constant prices (billion soums); H - the number of operating hospital institutions (unit); PCRINR – real total income per capita at constant prices (thousand soums); PCTINR – total income per capita at constant prices (thousand soums).

Real and total income per capita was also considered as an important social factor. There are two reasons for this, firstly, the increase in the income of the population increases their ability to comply with and use medical standards, and secondly, the increase in the share of the private sector makes the price of the service and the income of the population one of the important factors in the use of medical services.

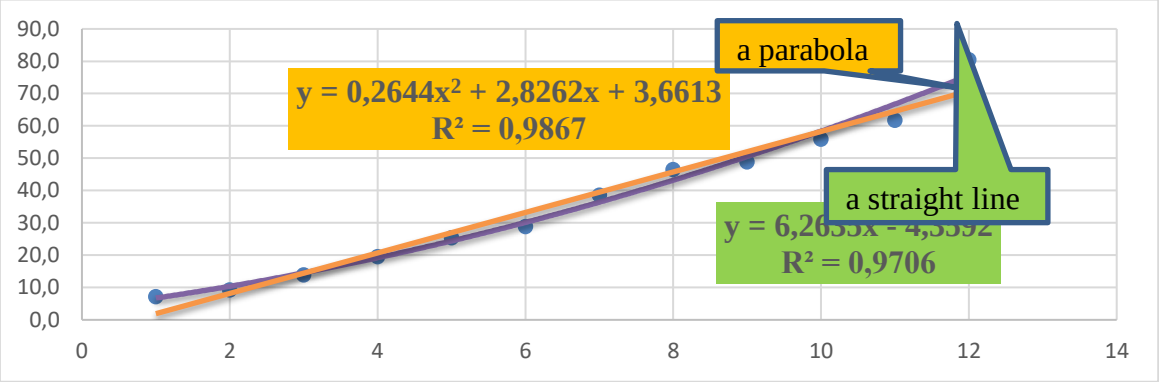
Based on the results of the above-mentioned analysis, the volume of health care services in the region and the factors influencing it were developed for the next years. For this, the necessary model was developed using regression analysis. First of all, we will focus on the results of the regression analysis, which was carried out on the development of the necessary model to calculate the forecast values of the change of healthcare services in the region in the next five years.

A graphical method was used to select the type of the model, and when connecting the points, two views correspond to their shape, i.e. a straight line and a parabola (Figure 1). According to the results of the implemented graphic method, it is appropriate to use a two-view model to develop a prognosis. In both cases, the coefficient of determination is close to one. But

the results obtained using this method are not enough to justify the adequacy of the models and their parameters, so we found it appropriate to carry out additional analyzes to choose the most optimal model.[13]

Figure 1.

The results of the graphical method for the selection of the necessary model for the development of forecast values of the volume of health services in Khorezm region



The Gretl program was used to perform the comparative regression analysis, and as a result of developing the mentioned linear model, the free term was found to be inadequate according to Student's criterion. All other criteria are at the required level, indicating the adequacy of the model. However, it was found that the MAPE indicator representing the reliability of the model is 12.3 and has a slightly higher value (Appendix 1). The results of the model determined by excluding the free term are adequate for almost all criteria, except for the decrease of the Durbin-Watson index and the almost unchanged MAPE index.Taking into account the results of the aforementioned analysis, an alternative option, i.e. a comparative analysis of the results of the parabola, was carried out. Similarly, when the model presented in the graph was developed using Gretl, it shows that the free term is not adequate according to the Student's criterion, but other parameters are adequate. In addition, the remaining factors justify the high level of the model In particular, the value of MAPE was found to be equal to 5.6.Therefore, we found it appropriate to use the following model to calculate the forecast indicators of the real value of healthcare services provided in the region.

$$HSC = 3,99 * t + 0,19 * t^2$$

Here: HSC- Real value of health care services at constant prices (billion soums); t – the trend starts from 2010.

Adequacy of this model was judged by a number of criteria and it was proved that the model is adequate and reliable in all of them (Table.2)The results of the model developed to calculate the forecast indicators of the real value of health services provided in Khorezm region[13].

Table.2

(Model 7: OLS, using observations 2010-2021 (T = 12)
Dependent variable: HSC)

	Coefficient	Std. Error	t-ratio	p-value	
Time	3.99465	0.470951	8.482	<0.0001	

					**
time2	0.186511	0.0487307	3.827	0.0033	**

Mean dependent var	36.35353		S.D. dependent var	22.92323
Sum squared resid	89.37712		S.E. of regression	2.989601
Uncentered R-squared	0.995870		Centered R-squared	0.984537
F(2, 10)	1205.554		P-value(F)	1.20e-12
Log-likelihood	−29.07501		Akaike criterion	62.15002
Schwarz criterion	63.11983		Hannan-Quinn	61.79096
Rho	−0.200290		Durbin-Watson	1.796001

In particular, all the coefficients are not only adequate according to Student's criterion, but their p-value is less than 0.01 and their reliability is high. The coefficient of determination equal to 0.99, that is, almost one, indicates that the selected factors are fully covered by the resulting factor changes.

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