The Romanian Health System: A Perspective Based on Essential Health Indicators

Ştefan-Daniel Florea★, Norina Popovici★★

A B S T R A C T

This article explores the relationship between the essential indicators of the medical system in Romania, focusing on the impact of the number of doctors and infrastructure on life expectancy and mortality rate. The analysis is based on official data from the period 2014-2023, using simple and multiple linear regression to identify correlations between variables. The results highlight the influence of medical resources on the health of the population, highlighting the challenges related to staff shortages and funding. The study provides insight into the factors influencing the performance of the healthcare system and provides a solid basis for future research on access and quality of healthcare services in Romania.

1. Introduction

The health system plays a primary role in ensuring the quality of life and well-being of the population. Access to quality medical services, the equitable distribution of resources and the efficiency of the health infrastructure are determinants of the general health of a nation. In Romania, the medical system has faced multiple challenges in recent decades, including staff shortages, underfunding and inequalities in access to healthcare. These aspects have a direct impact on life expectancy and mortality rates, reflecting the need for effective policies to improve the performance of the health system.

We expect that this study will contribute to understanding how key factors of the medical system influence the health status of the population and can be a starting point for the development of strategies to improve health services in Romania.

The results of this study indicate the need for more effective leadership approaches in health resource management. Strategic decisions made by healthcare leaders, such as policies to attract and retain healthcare workers, will have an impact on the accessibility and quality of healthcare services.

2. Literature review

The Romanian health system combines elements of the Bismarck model and the Semashko model, which generates both opportunities and challenges in terms of financing and organizing medical services (Vlădescu et al., 2016). Although significant reforms have been carried out, medical infrastructure remains unevenly distributed, affecting the quality and accessibility of health services. According to the European Observatory on Health Systems and Policies report, Romania has over 65,000 medical units, of which 543 are hospitals, but most of them are concentrated in urban areas, leaving rural regions with limited access to essential medical services (Vlădescu et al., 2016). This inequitable distribution of hospital infrastructure contributes to regional disparities and gaps in health outcomes (Vlădescu et al., 2016).

The financing of the health system is one of the main challenges, being based on mandatory social contributions, a model also used in Germany and France (Hernández-Quevedo et al., 2018). However, health spending as a percentage of GDP is below the European Union average, limiting investments in infrastructure modernization and attracting medical staff (Ionescu & Popa, 2023). Inefficient use of resources and chronic underfunding also affect the quality of services and access to specialist care (OECD, 2024).

One of the biggest obstacles of the Romanian health system is the shortage of medical personnel. After Romania's accession to the European Union in 2007, the migration of doctors and nurses increased significantly, driven by low wages, precarious working conditions and lack of opportunities for advancement (Vlădescu et al., 2016). This phenomenon particularly affects rural regions, where staff shortages further

★, ★★Ovidius University of Constanta, Romania. E-mail addresses: florea.daniel@365.univ-ovidius.ro (S. D. Florea – Corresponding author), norinapopovici@yahoo.com (N. Popovici)

aggravate access to basic medical services (Ionescu & Popa, 2023). In addition, 90.9% of hospitals in Romania are located in urban areas, accentuating regional inequalities in patient care (Vlădescu et al., 2016).

In addition, a study conducted by the European Observatory on Health Systems and Policies (2024) highlights that life expectancy in Romania is significantly lower than the European Union average, which highlights the combined impact of underfunding, staff shortages and regional inequalities on the health of the population. This report also indicates an increase in avoidable mortality, largely caused by lack of access to adequate medical care.

The healthcare system in Romania has undergone numerous changes from the transition from a centralized economy to a more market-oriented one. This is largely a mixed system, in which public health insurance coexists with contributions from the private sector, resulting in a combination of state-funded health services and privately funded services. However, despite this, the healthcare system in Romania faces several persistent challenges.

One of the most significant challenges facing the health system in Romania is underfunding. The budget allocated to health in Romania has historically been insufficient, and although public spending on health has gradually increased, it remains one of the lowest in the European Union, especially in relation to the size of the population and its health needs (OECD/European Observatory on Health Systems and Policies, 2024).

In addition to the challenges related to funding and personnel, the Romanian health system also faces difficulties in managing medical services. The development of the private sector has created opportunities for patients to afford better services, but has accentuated inequalities in access to care. In parallel, the decentralization of health facilities has given more autonomy to local authorities, but without effective coordination at the national level, which has led to significant discrepancies between regions (Bara, 2002).

Reports on the health system in Romania highlight major problems related to mortality and life expectancy, essential indicators for assessing the performance of this sector. Romania's overall mortality remains well above the European Union average, especially due to cardiovascular diseases and limited access to quality medical services, especially in non-university cities. Life expectancy in Romania is below the European average, but it has registered a slight increase in recent years, even in the context of the COVID-19 pandemic, which suggests a capacity of the health system to adapt (OECD/European Observatory on Health Systems and Policies, 2024).
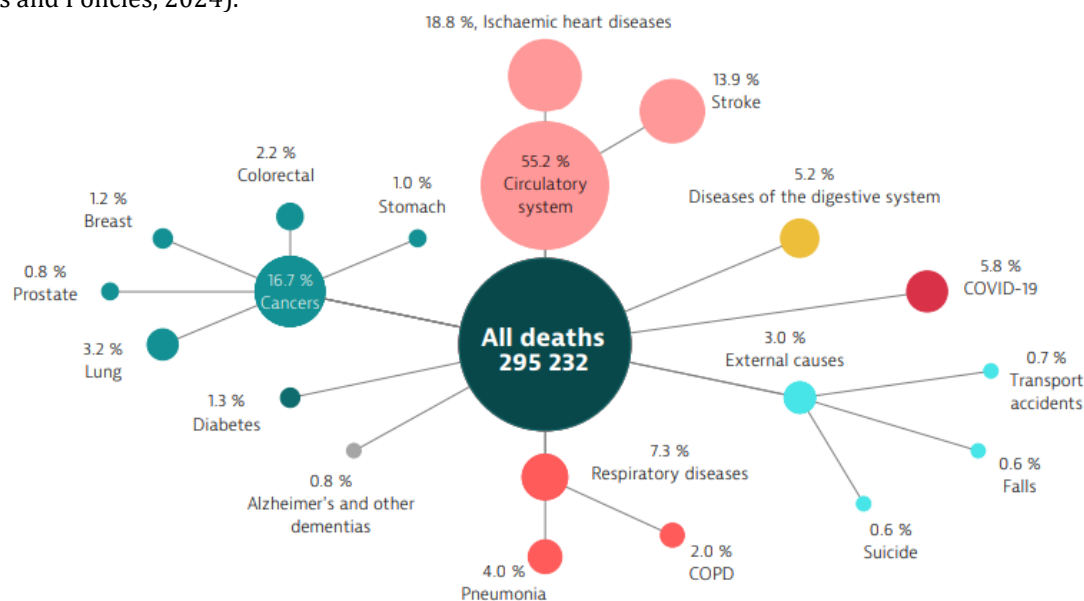
Figure 1. Mortality rate from treatable and preventable causes
Source: OECD/European Observatory on Health Systems and Policies (2024), Romania: Health Profile 2023, OECD Publishing, Paris

Mortality in Romania is influenced by a number of factors, including the prevalence of chronic diseases and access to medical services. As shown in Figure 1, mortality rates from treatable and preventable causes are well above the EU average, indicating deficiencies in prevention and treatment. Cardiovascular diseases, including ischemic disease and stroke, are the leading causes of death, followed by lung and colorectal cancer (Scientia, 2023).

In terms of medical infrastructure, in 2023, Romania had over 67,000 health units in operation, according to data from the National Institute of Statistics. This figure includes both hospitals and other types of medical facilities, highlighting an extensive network of health services designed to cover the diverse needs of the population (Scientia, 2023). However, the quality and equipment of these facilities varies significantly, with many hospitals facing issues related to outdated infrastructure and insufficient or outdated medical equipment. These deficiencies can negatively influence the quality of care provided and the health outcomes of patients.

According to preliminary data from 2023, life expectancy in the European Union was estimated at 81.5 years. In contrast, Romania recorded a life expectancy of 76.6 years, ranking third at the bottom of the ranking in the EU, after Bulgaria (75.8 years) and Latvia (75.9 years) (Euronews, 2024). This discrepancy underlines the challenges faced by the Romanian health system and the need to implement effective policies to improve the quality of life and medical services.

According to the National Health Strategy, ensuring an adequate human resource, its retention and professionalization are some of the biggest challenges of the health system in Romania. The human resource in the field of health is mainly concentrated in large urban centers, especially in university medical centers, and their distribution by specialties and skills does not meet the real needs of the population. This is particularly evident in areas such as public health, primary health care and basic health services, where there is a constant demand for well-trained professionals. Shortages are also felt in niche areas or in hospitals that offer high-performance medical services (Romanian Government, 2023).

The organizational framework and human resource management in public hospitals are often rigid and out of sync with the actual health service needs of the regions served. Moreover, the salary rules do not reflect the activity carried out by professionals, and the inequities between the different categories of personnel create frustration and decrease their motivation. In terms of medium- and long-term human resource planning, the Romanian health system suffers from the lack of an efficient mechanism based on comprehensive statistical data to support an optimal allocation of resources (Romanian Government, 2023). In addition, the migration of medical staff to countries with higher wages and better working conditions has led to a significant shortage of doctors and nurses, especially in rural areas and smaller towns. The lack of effective retention and career stimulation policies in the medical field has contributed to the deepening of this crisis, directly affecting the quality and accessibility of the medical act (Baba, Brînzaniuc, Chereceş & Rus).

3. Research methodology

For this research we used a quantitative approach, based on the analysis of official data available on the Tempo Online platform, for the period 2014-2023. The data collected includes information on the number of doctors, the number of hospitals, life expectancy and the mortality rate, giving us a picture of the evolution of the medical system in Romania.

For statistical analysis we used Microsoft Excel, applying simple and multiple linear regression to examine the relationships between variables. The LINEST function was used to calculate the regression coefficients, and the Pearson correlation coefficient (CORREL) was used to evaluate the strength of the relationships between the variables.

The first regression looks at the relationship between the number of doctors and the mortality rate, the second regression explores the combined influence of the number of hospitals on life expectancy, and the third regression represents the combined influence of the number of doctors and the number of hospitals on life expectancy The results are interpreted according to the trends observed in the analyzed data, providing insight into the main factors influencing the performance of the healthcare system.

4. Findings

The results of the analysis highlight factors that influence the distribution of medical resources and the efficiency of the health system, highlighting the need to implement an appropriate leadership model for Romania's specific context.
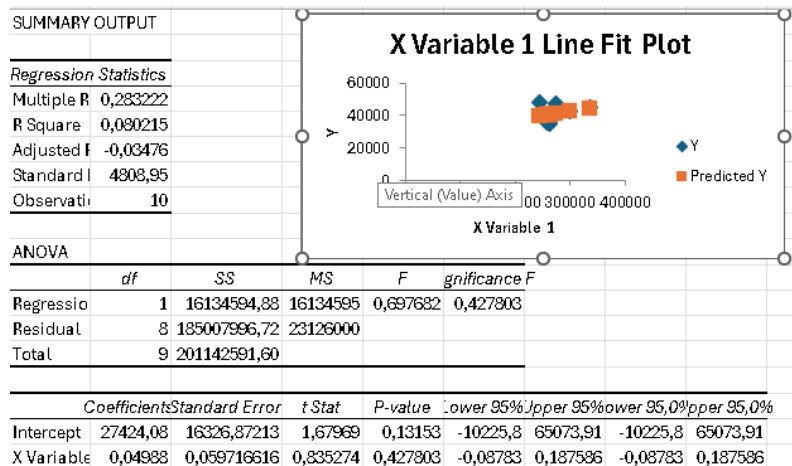
	Doctors	Hospitals	Life expectancy	Deaths
Doctors	1			
Hospitals	-0,2478	1		
Life expectancy	-0,02	0,213827	1	
Deaths	0,283222	-0,27221	-0,933238493	1

Figure 2. Correlations of the targeted indicators, computed by the author using Tempo Online (INS) data and processed in Microsoft Excel
Source: own calculations

The correlations obtained in Figure 2 highlight some aspects about the medical system in Romania. First, there is a weakly positive correlation between the number of doctors and the number of deaths, which suggests that simply increasing the number of doctors is not enough to reduce mortality. The negative correlation between the number of hospitals and deaths indicates that more hospitals could help reduce mortality, but the link is not very strong.

The strongest negative correlation is between life expectancy and the number of deaths, which confirms the expectations that a higher life expectancy is associated with a lower number of deaths. However, there is no significant correlation between the number of doctors and life expectancy, suggesting that other factors could influence this indicator. These results underline the importance not only of the number of doctors or hospitals, but also of the way in which they are distributed and organized.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,283222
R Square	0,080215
Adjusted R	-0,03476
Standard I	4808,95
Observati	10

ANOVA

	df	SS	MS	F	gnificance F
Regressio	1	16134594,88	16134595	0,697682	0,427803
Residual	8	185007996,72	23126000		
Total	9	201142591,60			

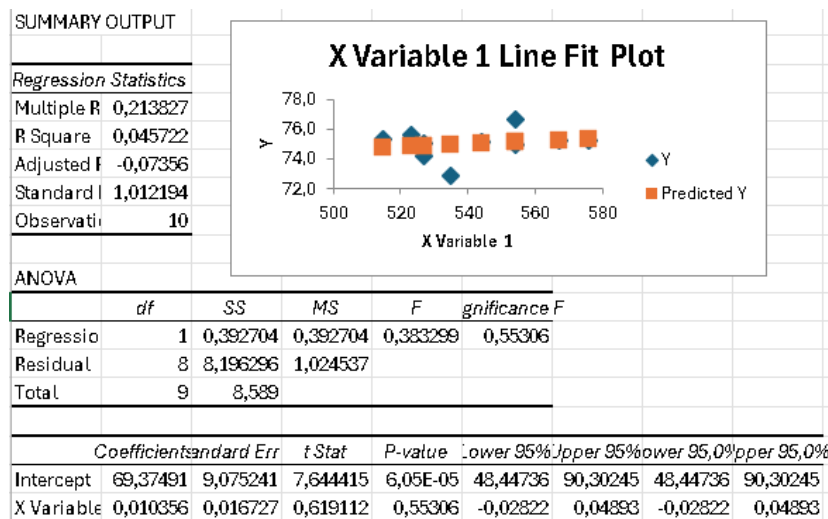|	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	ower 95,0%	pper 95,0%
Intercept	27424,08	16326,87213	1,67969	0,13153	-10225,8	65073,91	-10225,8	65073,91
X Variable	0,04988	0,059716616	0,835274	0,427803	-0,08783	0,187586	-0,08783	0,187586

Figure 3. Linear regression analysis between the number of doctors and the number of deaths, performed by the author using Tempo Online (INS) data and processed in Microsoft Excel
Source: own calculations

Figure 3 represents the linear regression analysis between the number of physicians and the number of deaths, indicating a weak relationship, with a correlation coefficient of 0.283 and a coefficient of determination R^2 of 0.08. This result suggests that only about 8% of the variation in the number of deaths can be explained by the variation in the number of doctors, which indicates a very small link between the two variables. In addition, the p-value of 0.4278, considerably higher than the materiality threshold of 0.05, confirms the absence of a statistically significant relationship.

The coefficient of the independent variable (number of doctors) is 0.0498, indicating a very small positive influence on the number of deaths, but not statistically significant. These results suggest that the availability of physicians, analyzed in isolation, is not a determining factor in reducing mortality. Additional factors, such as access to medical infrastructure, quality of health services, health education and socio-economic conditions, are likely to have a much more significant impact.

We must not forget that the lack of strategic leadership can lead to an inefficient allocation of medical personnel, maintaining significant inequalities between urban and rural regions. Previous studies show that poor management contributes to the migration of doctors and to the maintenance of chronic imbalances in the system.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,213827
R Square	0,045722
Adjusted R	-0,07356
Standard I	1,012194
Observati	10

ANOVA

	df	SS	MS	F	gnificance F
Regressio	1	0,392704	0,392704	0,383299	0,55306
Residual	8	8,196296	1,024537		
Total	9	8,589			

	Coefficients	andard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95,0%	pper 95,0%
Intercept	69,37491	9,075241	7,644415	6,05E-05	48,44736	90,30245	48,44736	90,30245
X Variable	0,010356	0,016727	0,619112	0,55306	-0,02822	0,04893	-0,02822	0,04893

Figure 4. Analysis of the linear regression between the number of hospitals and life expectancy, conducted by the author using Tempo Online (INS) data and processed in Microsoft Excel
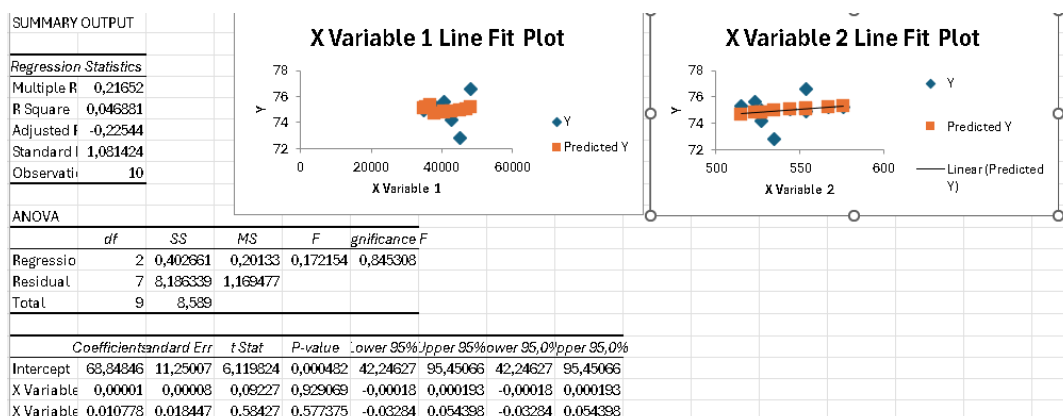*Source: own calculations*

Figure 4 shows the linear regression analysis between the number of hospitals and life expectancy over a 10-year period The results of the linear regression analysis indicate that the number of hospitals has a limited influence on life expectancy, explaining only 4.57% of its variation.

Although the regression coefficient suggests a slight increase in life expectancy with the number of hospitals, the effect is not strong enough to be considered determinant. This result does not invalidate the

importance of medical infrastructure, but suggests that its impact must be analyzed in correlation with other factors.

One element that should not be avoided in this equation is leadership in healthcare. Thus, it is not only the number of hospitals that matters, but also the way in which they are managed and integrated into a coherent national strategy to improve the health of the population. The results highlight the need for a leadership vision that addresses not only the quantitative aspects of the health system, but also the qualitative ones.

Figure 5. Combined influence of the number of doctors and the number of hospitals on life expectancy, assessed by the author using Tempo Online (INS) data and processed in Microsoft Excel
Source: own calculations

The analysis of multiple regression on the influence of the number of doctors and the number of hospitals on life expectancy indicates a weak relationship between these variables. The value of the coefficient of determination suggests that only a small percentage of the variation in life expectancy is explained by these factors, which underlines the complexity of the determinants of population health. Also, high P-values for both coefficients indicate that their individual impact is not statistically significant in this model.

However, this result does not mean that the medical infrastructure is unimportant, but rather that the way resources are managed is inefficient. This is where leadership in health management comes in, which can transform resources into quality medical services, capable of positively influencing the health of the population. A well-coordinated medical system can have a greater impact than the simple numerical increase of medical facilities.

Thus, in order to improve life expectancy, it is not enough to rely only on expanding infrastructure and increasing the number of medical professionals. A strategic vision in medical leadership is required, capable of optimizing resources and implementing effective policies that respond to real needs.

At the same time, the study provides a basis for future research, which will analyze in depth the interactions between medical infrastructure and population health, thus contributing to a better understanding of the optimal strategies for improving the health system.

5. Conclusions

The study highlighted the relationship between the number of doctors, the number of hospitals and life expectancy in Romania, providing a clear perspective on the influence of these factors on the performance of the health system. The analysis of the regressions indicated that both the availability of doctors and the health infrastructure play an essential role in determining the health indicators of the population. However, their effects are not always direct or uniform, being influenced by other contextual factors such as geographical distribution, financial resources and health policies.

The results suggest that an increase in the number of doctors can help reduce mortality, but its impact depends on the distribution of specializations and the efficiency of the use of available resources. Also, the combined analysis of the number of hospitals and medical staff on life expectancy indicated a positive but moderate influence, suggesting that the improvement of infrastructure must be accompanied by an optimized allocation of human resources in order to have significant effects.

This study not only highlights the relationship between medical infrastructure and health indicators, but also highlights the importance of effective leadership in managing these resources. Without a clear vision and strategic management, any investment in the health system risks being suboptimal. Future research should explore in detail leadership models that can help reduce inequalities and increase the performance of the healthcare system.

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