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Analysis of the financing of medical services and the effects on the performance of the health system in Romania

SUMMARY

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THESIS

Analysis of the financing of health services and the effects on the performance of the health system in Romania

Doctoral field: Finance

Support Committee:

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content

1 . The content of the doctoral thesis

2. The topic of the doctoral thesis and the field(s) in which it falls

One of the biggest challenges facing Romania's healthcare system is the underfunding of health services. This problem has a significant impact on the performance of the system and directly affects the quality of health care provided to the population. Adequate and sustainable funding is essential to ensure an efficient and quality health system in a society. This should be a priority for governments and responsible authorities, as health is a fundamental right of every individual. Investment in the health system should be seen as an investment in the well-being and prosperity of the whole community.

Choice of theme with title: Analysis of health services financing and the effects on the performance of the health system in Romania, is extremely relevant in the current context of the health system in our country, given that the financing of health services is an important aspect in ensuring access to quality services for the population. It fits perfectly into the Finance PhD field, as it analyses the financial and economic aspects of the health system. By examining how health services are financed and their impact on the performance of the system, a deeper understanding of the financial problems facing the health system in Romania can be gained and solutions for improvement can be identified. Analysing the financing of health services and the effects on the performance of the health system can provide important information for making decisions about the allocation of financial resources and improving the efficiency of the system.

The scientific approach to the analysis of the current financing system is based on the current context, which is under unprecedented pressure, in the wake of the multiple economic crises that followed the pandemic crisis, and which has made the Romanian public health system vulnerable enough to cause a change in the perspective of financing until the re-evaluation of health costs per component of the Health Accounts System, in order to ensure optimal and sustainable performance.

A significant effect of the current health care financing system in Romania is the inadequate allocation of resources. Limited funding has led to a lack of essential medical equipment, outdated infrastructure and a shortage of health professionals. This has had a direct impact on the quality of healthcare services and has led to longer waiting times, reduced access to specialised treatments and general dissatisfaction among patients. In addition, the current funding system has also contributed to the unequal distribution of healthcare services across different regions of the country. Rural areas in particular have been disproportionately affected, with limited access to healthcare facilities and a shortage of medical staff. This disparity in the availability of healthcare has widened the gap between urban and rural populations, leading to increased health inequalities.

The current funding system relies heavily on out-of-pocket payments, which places a financial burden on individuals, particularly those on low incomes. This has resulted in many people forgoing necessary medical treatment or seeking alternative, often inadequate, healthcare options. Reliance on private funding has also led to the commercialisation of healthcare services, further exacerbating inequalities in access and quality of care.

To address these problems, a comprehensive reform of the healthcare financing system in Romania is needed. This should involve a shift to more equitable and sustainable financing models, such as increased government funding, insurance-based systems or a combination of the two. The focus should be on investing in healthcare infrastructure, improving medical education and encouraging health professionals to work in underserved areas. By addressing the shortcomings of the current financing

system, Romania can move towards a more resilient and efficient health system that ensures equal access to quality healthcare for all its citizens.

The proposed theme is topical and in line with international concerns in the field, as health spending has increased significantly in recent years and many people lack access to quality health care. This creates inequalities and inequities in access to health care, which can have serious consequences for the health and well-being of the population. Governments and international organisations are currently working to identify and implement solutions to ensure equitable and universal access to healthcare, especially for vulnerable and disadvantaged populations. There are also considerable efforts to reduce health costs and improve the efficiency of health systems so that they can cope with rising demand and ensure their financial sustainability. These efforts include the promotion of innovative health technologies, the development of prevention and health education programmes, and the improvement of infrastructure and health management capacity. Particular emphasis is placed on promoting collaboration between countries and between health organisations to exchange best practice and develop common policies. The ultimate aim of all these measures is to improve access to and quality of healthcare so that every individual can get the care they need, regardless of socio-economic status. Scientific research plays an important role in this respect, helping to develop new treatments and medical technologies and to identify and prevent serious diseases. These scientific efforts in health help to inform public health policies and strategies, providing data and information relevant to public health decision-making. Investing in research aims to continuously improve the health system, ensuring an evidence-based approach and improving therapeutic outcomes for patients.

The new managerial efficiency perspective motivates this research which aims to address the analytical approach to public health financing in a broad context, as well as the analytical approach to financing through the System of Health Accounts, in order to identify the shortcomings in the financing of the Romanian health system and to identify relevant proposals to remedy these shortcomings.

The research problem is based on the premise that under conditions of financial differentiation, some models and methods can stand out as efficient, generating assimilation options on the part of countries such as Romania, which, with the change of economic paradigm and the transition to a market economy, had to adopt performance in health as the only guarantee of an efficient functionality of the syncopated and inefficient national system.

The research question lies in the performance premise, i.e., can a viable adjustment of the public health system in Romania be carried out in such a way as to reduce the disparity of the public health status in relation to the performance of other more evolved health systems in Europe?

The novelty of the present research aims at highlighting insufficiently identified and analysed causal relationships in order to redress financial imbalances in health. The research aims to bring new insights and approaches to identifying and analysing the underlying causes of financial imbalances in the health system. By correctly identifying these causal relationships, effective interventions can be taken to remedy the problems and ensure more efficient management of financial resources. This research has the potential to provide innovative and sustainable solutions in the health field, thus contributing to improving the quality of health services provided and reducing financial inequalities in the health system. This research also aims to develop analytical models to assess the efficiency of health system financing. By applying these models, the efficiency and financial impact of health measures can be identified, thus facilitating informed decision-making and optimising the use of available resources.

Finally, the results of this research could be used to develop and implement more effective and sustainable public health policies, with a positive impact on society as a whole.

3. The objectives of the doctoral thesis

In Romania, the year 2023 began with the modification of the financing mechanisms in the sense of refocusing the health objectives on the efficiency of the medical act, being abandoned some of the healthy principles applied during the pandemic, namely the orientation towards the quality of the medical service and the development of financing in accordance with the need for medical services of the population . In the hospital environment, this change in optics has triggered changes in the approach to strategies for the provision of medical services in the sense of increasing their quantity with decreasing the average consultation time per patient and narrowing the area of offering interclinic services. The new perspective on managerial efficiency motivates the analytical approach to public health financing in a broad context, but also the analytical approach to financing through the Health Accounts System.

The scientific approach is based on the following research objectives, with the *aim of identifying the vulnerabilities of financial management in health and determining the efficiency of the Romanian health system in order to improve its performance:*

-Objective 1: *Carrying out a study of the evolution of public health from the perspective of the development of health systems at the international level*

-Objective 2: *Determining the differentiated need for financing public health systems.*

- Objective 3: *Simulative modeling of the differences between the main funding sources of the European health systems;*

-Objective 4: *Analysis of the main approaches to public health financing at the international and national level;*

-Objective 5: *Realization of a diagnostic table based on the dynamic stratified analysis of the financing of the public system in Romania starting from the health financing schemes;*

-Objective 6: *Carrying out a critical analysis of public health financing in Romania through the Health Accounts System;*

- Objective 7: *Determining in the European context the efficiency of the Romanian health system by means of the associated data analysis method*

-Objective 8: *To investigate the impact of socio-economic, health and environmental factors on life expectancy at birth in European Union countries, using comparative panel data analysis to identify and quantify causal relationships and the specific contributions of each factor in shaping life expectancy at birth;*

-Objective 9: *Correlative determination of the financial balance of the health system in Romania.*

4. Research methodology

Empirical and analytical scientific approaches were used in this research, and an extensive literature review was conducted, consisting of the review and systematization of more than 531 papers, using co-occurrence diagrams of the reviewed research topics and cluster analysis of related fields, the approach having an interdisciplinary character that combines financial, health management, organizational efficiency and performance notions and concepts. Thus, current trends in research and

factors influencing outcomes and performance in these areas were identified and analysed. The analytical methods consist of extensive analysis of public databases provided by the World Health Organization, Organization for Economic Cooperation and Development, Eurostat, Romanian Ministry of Finance, National Health Insurance House, calculation of descriptive statistics, application of econometric modelling procedures, use of dedicated statistical software such as SPSS, version 25, DEA online, VOSviewer. Through these databases and software, up-to-date and accurate data on key indicators such as health expenditure, health systems performance or the evolution of the Romanian health system within the economy were obtained. The use of econometric modelling processes and statistical software allowed forecasting and identification of relevant relationships and trends for decision making and policy development in health and health financing. Data analysis, synthesis, comparison and dissemination procedures have been applied and the results have been subject to verification through statistical testing. Trends and patterns in the data collected were identified and conclusions and recommendations were drawn through synthesis. By comparing the data with similar studies, the relevance and importance of the results obtained was assessed. Subsequently, the data and conclusions were disseminated through conclusions, participation in conferences and the publication of scientific articles, thus ensuring that the information is accessible and can be used in decision-making. Verification through statistical testing validated the results and confirmed that the analysis and synthesis of the data was carried out in a rigorous and objective manner.

5. The structure of the doctoral thesis

The thesis is structured in 6 chapters, a chapter of conclusions, original contributions, recommendations and future research directions, using a total of 531 bibliographical references from the literature and 599 references to it.

In Chapter 1, we have surveyed the evolution of public health from the perspective of international health systems development by presenting public health in the context of new global and European challenges (Research Objective 1), and we have drawn a picture of essential public health services and public health functions based on the literature. We brought into discussion the determinants of health status and the capacities of the International Health Regulations (IHR). The analysis integrated the concept of public health into the current consolidated view of a sustainable and healthy future. At the same time, we reviewed the European vision for health as transposed in the 2012 Treaty on the Functioning of the European Union. My personal contribution to this chapter is embodied in the production of six diagrams of the implementation of the IHR in relation to the countries in the sample studied, with the diagrams polarised on highlighting the improved capacities and risks associated with each public health system. Also, in this chapter we analysed the health status of the population for a selected sample of six Member States (Bulgaria, Germany, Italy, Latvia, Romania and Spain), starting from the premise of identifying the health status assessment items and mapping the dynamics of the items over the period 2010 - 2021 at the level of the selected sample. We also presented population dynamics in the six Member States analysed based on public data provided by the Organisation for Economic Co-operation and Development (OECD). The study continued with an analysis of economic status in terms of access to health services.

In the context of the vulnerability of health systems, as shown above, the role of the European Union in implementing a unified health policy at European level becomes a major one, with clearly defined public health policy objectives in the following areas:

- protecting and improving the health of EU citizens;
- supporting the modernisation of health infrastructure;
- improving the efficiency of Europe's health systems;
- strengthening preparedness and response to cross-border health threats.

In Chapter 2 we presented conceptual approaches to the need for financing public health systems (Research Objective 2). This chapter briefly outlines the evolution of the six models of financing health systems in the world, Beveridge, Bismarck, the compulsory health savings model, the private health insurance model, the out-of-pocket model and the Semashko model. We have carried out a comparative analysis of European health systems (with reference to the six Member States analysed in Chapter 1, an analysis which will form the basis of a personal contribution, a simulation modelling of the differences between the main sources of financing in Romania and the other five Member States analysed (Objective 3 of the research), based on public data presented by the World Health Organization. Health is currently at the top of the international political agenda. Efforts by the global community to reduce poverty and promote sustainable development goals are driving significant increases in healthcare financing at global, regional and national levels. Differences between rich and poor countries in healthcare costs and needs, as well as inequalities in financing, affect vulnerable populations and hinder the choice of the most effective health insurance system.

In Chapter 3 we have researched the main approaches to public health financing at international and national level, which are relevant to Objective 4 of the research. The personal contribution was to highlight the main opportunities and threats to health systems, and to forecast future changes in health systems. I have critically and conceptually addressed the taxonomy of financing public health systems with a focus on the main elements of budget organisation and the relationships between demand for health services, the need for financing and the actual elements that define health systems. Also, in this chapter we have addressed the concept of universal health coverage from its priority perspective as a means of promoting health and well-being and ensuring social protection for all.

In Chapter 4 we have made a brief historical overview of the development of financing mechanisms through a standardised homogenous system. Also, in this chapter we have carried out the dynamic stratified analysis of total health care expenditure, the dynamic stratified analysis of expenditure on government schemes and compulsory contributory health care financing schemes, the dynamic stratified analysis of voluntary health care payment expenditure and the dynamic stratified analysis of private health care expenditure. The analytical approach responds to Research Objective 5. The personal contribution consists in carrying out statistical analysis procedures to highlight the diagnostic picture of the financing of the public health system in Romania compared to the European average and the most developed European public health systems based on the financing schemes established through the System of Health Accounts. A critical analysis of the financing of public health in Romania through the Health Accounts System was carried out, thus responding to Objective 6 of the research. I have presented aspects of health financing according to the System of Health Accounts, and I have made, as a personal contribution, an analysis of the financing of the public health system in Romania.

The study conducted in this chapter highlighted that universal health coverage can be supported by health spending and that financial monitoring can contribute to effectiveness, efficiency, equity and accountability of all stakeholders. Health finance monitoring aimed to improve revenue generation and resource allocation strategies to reduce waste and ensure financial protection.

National health accounts are a strategic tool for monitoring and evaluating health system reforms and supporting day-to-day management of resources, and from a World Health Organisation (WHO) perspective they are priority information that helps to analyse health system performance. The activities of international bodies such as the World Health Organisation, the Organisation for Economic Co-operation and Development, the World Bank and the United States Agency for International Development have been key to scaling up national Health Accounts implementation exercises and ensuring that they are standardised, comparable and become institutionalised.

Since 2011, the Health Accounts system has aimed to increase comparability and performance assessment, regardless of the diversity of health systems around the world, increase standardisation, coherence and policy relevance, and facilitate the continuous generation of health accounts and their use in decision-making.

The path towards universal healthcare requires essential financial information and a high degree of financial protection for families, which is a target of the Sustainable Development Goals. The level of out-of-pocket expenditure is recognised as a challenge and a barrier to access to health care, representing the most inefficient source of financing.

By using a homogeneous and internationally standardised system, through the information provided by health accounts, comparable data over time and between countries is provided, regardless of differences in the organisation of health systems, leading to an increase in the quality of reporting, training and control strategies, with better sources of information facilitating better understanding for policy makers and other users.

In Romania, the implementation of the 2011 SHA methodology to produce health accounts providing information on total expenditure as well as indicators on health system revenue was achieved through the provisions of Regulation (EU) 2015/359 (Official Journal of the European Union, 2015) implementing Regulation (EC) No 1338/2008 of the European Parliament and of the Council as regards statistics on health expenditure and sources of financing.

The functional classification of health care has delimited health care activities which aim to improve, maintain and prevent the deterioration of the health status of individuals and communities and to alleviate the consequences of ill health through the use of specialised medical information and activities, specific technology, and the use of traditional, complementary and alternative medicine. The classification aimed to delimit the following groups of health care activities: health promotion and prevention; diagnosis, treatment, cure and rehabilitation of diseases; care of people with chronic diseases, health-related impairments and disabilities; palliative care; development and delivery of community health programmes; provision of administration and financing of health systems.

Health financing is one of the main components of health systems, and the classification of health care according to health systems financing can be used as a tool for detailed national analyses to help health professionals obtain a clear and transparent picture of health financing and, together with the other two classifications, provide the necessary tools to represent as comprehensively as possible both the financing of health care and the structural description of the flow of financial resources in the health system.

Health financing schemes mobilise and allocate money within health systems to meet the current or future health needs of the population, both individually and collectively.

Romania's health system is in a state of permanent transition, and our country has a long tradition of organising it. In accordance with Law No 95 of 2006, the functioning of the health system in Romania is ensured according to the social health insurance model, by introducing the Framework Contract which defines the benefit package for the insured, the conditions for the provision of medical services and the modalities of payment for health care.

In our country, the financing of health services is mostly provided from public revenues, with a share of more than 80% by 2020, the majority of which represents revenues from the budget of the Single National Health Insurance Fund (FNUASS), from social contributions, state budget revenues or own revenues of central or local public administration institutions, from the budget of the Ministry of Health and other ministries with their own health network, from local budgets, but also from private income, which is represented by income from private health insurance funds or income from schemes implemented by employers to provide health services to their employees or their families. In terms of health expenditure per capita, in 2020, Romania recorded the second lowest amount in the European Union, with 713 euros, which is less than a quarter of the EU average of 3269 euros.

An analysis of the structure of the income composition of the Single National Health Insurance Fund over the period under review shows that it has changed. Thus, the share of income from social health insurance contributions owed by insured persons increased significantly, by 103.87% in 2023 compared to 2014. Non-tax revenue and revenue from amounts received from the European Union were below 0.5% of total expenditure during the period under review. The revenue of the Single National Health Insurance Fund from social health insurance due from employers had a negative evolution, recording a decrease of 87.13% in 2023 compared to 2014, from 37.16% in 2014 to 4.78% in 2023. This is due to the transfer of the tax burden of the compulsory social health contributions due by the employer to the employee in the case of income from wages and salaries, starting in 2018.

Analysis of the System of Health Accounts shows that, at European level, 80% of expenditure is financed from public funds, with Romania being in a similar situation to other European countries and supporting more than 80% of health expenditure from these funds. The influence of the pandemic on funding schemes has put pressure on the public system, which has had to cover both efforts to combat the disease and measures to inform and educate the population to prevent the spread of the pandemic.

Measuring and monitoring changes in health care expenditure, categorised according to certain characteristics of the beneficiaries, and subsequently linking these to changes in the health status of the population, using indicators such as life expectancy, healthy life years and quality-adjusted life years, provides information on expenditure and health outcomes. This essential information helps health policies to be properly implemented, to ensure the effectiveness of health care and the functioning of health systems.

In the case of Romania, the structure of expenditure on financing schemes has changed between 2011 and 2022 in favour of expenditure on government schemes and compulsory contributory schemes, whose share has increased from 75.25% in 2011 to 80.59% in 2022. Voluntary payment schemes have seen a small increase, from 0.47% to 0.8%, and do not constitute a payment formula for healthcare in Romania. Private expenditure on health care experienced a structurally negative dynamic in the taxonomy of public health financing.

In Chapter 5 we have analysed the efficiency of the financing of the Romanian health system in comparison with the health systems of the Member States of the European Union. The research aimed

at identifying the conceptual framework on the efficiency of health systems financing and measuring efficiency through outcome indicators. A personal contribution was to determine the efficiency of the Romanian health system through the method of analysis of associated data in the European context (Objective 7 of the research). I identified the efficiency thresholds against which the input and output indicators of the Romanian health system should be adjusted in order to reach the efficiency optimum determined by applying the associated data analysis method.

In order to provide universal health coverage and superior health care, governments should be continuously concerned with increasing financial resources for health. While there are many strategies to increase resources in the health sector, attention has recently shifted to improving the efficiency with which these resources are used. Part of the reason is that governments are facing increasing pressure to limit the growth of health-related spending. This is due to a number of factors, including rapid population growth, rising costs of disease, technological advances and rising public expectations. The efficiency of healthcare delivery is becoming a major concern worldwide due to the economic challenges caused by the financial crisis. In the healthcare system, efficiency refers to the ability of healthcare providers to deliver high quality care, it refers to the ability to minimise expenditure and reduce risk, optimise resource allocation and improve health outcomes. Efficiency also helps economic growth and ensures increased overall satisfaction through health promotion.

The level of health sector financing in a country influences the health status of the population, and health performance is directly dependent on the efficient allocation of government financial funds.

In order to assess the performance of a health system, it is necessary to know the boundaries of the health system, to identify the factors that influence the performance of the health system and to set health system objectives. Limitations of a health system include insufficient funding, inadequate health infrastructure, shortage of health professionals, inequities in access to health care due to socio-economic status, geographical disparities, unequal distribution of health care resources between different regions or communities. Underfunding of healthcare can have a significant impact on the effectiveness and efficiency of a health system.

Three inputs (Inputs I1 - I3) and three outputs (Outputs O1 - O3) for a total of 28 Decision-Making Units (DMUs), European Union Member States and the European Union as a whole, were considered for the study. The type of model used was the basic radial model, oriented by inputs, and the model using the CRS (Constant returns to scale) approach, the software used them data were available on Eurostat for a period of 10 years (2012-2021). According to the DEA method the effective public health models are those of Estonia, Ireland, Cyprus, Latvia, Luxembourg and Malta. An efficiency diagram has been designed, according to which the Romanian model is inefficient. According to the efficiency scores, by country and at European level, Sweden became efficient from 2014, Denmark became efficient from 2017 and Finland became efficient from 2020. The efficiency diagram was projected, according to which the Romanian model is inefficient, the coefficient value obtained (0.9) ranking the Romanian model as the second most efficient model after Sweden.

In terms of healthcare expenditure, a decreased efficiency ceiling of 1287.18 million euro was determined. In terms of total number of hospital beds, a decreased efficiency ceiling of 59 hospital beds per 100,000 inhabitants was determined. As regards the number of doctors, an efficiency ceiling increased by 51998 specialists was determined. In terms of healthy life expectancy based on self-perceived health, an increased efficiency ceiling of 30.9% was determined. For the indicators very good

self-perceived health and treatable and preventable mortality of residents` no changes in the efficiency ceilings were determined. These indicators do not require efficiency adjustments.

In Chapter 6 we conducted a comparative analysis of the impact of socio-economic, health and environmental factors on life expectancy at birth in EU Member States, including Romania, using panel data analysis to identify and quantify causal relationships and the specific contributions of each factor in determining life expectancy. (Research objective 8). The analysis presented in the paper shows a positive correlation between economic development and improved population health. Increased investment in health, education and infrastructure is shown to have a significant impact on increasing life expectancy at birth. However, the persistence of economic disparities and disparities in access to quality health services between Member States suggests the need for more equitable and integrated policies at European level. Also in this chapter, a correlative determination of the financial balance of the health system in Romania was carried out. The analysis carried out used the PCA approach to determine the main components affecting the financial balance in the Romanian health system (Research Objective 9). The approach allowed the identification of vulnerabilities related to financial management in health, and proposed some strategic directions that can be considered by health policy makers to prevent future disruptions to public health systems

The conclusions of the research present the relevant results drawn from the study of the literature on methods and models of financing public health systems and will translate into a logical framework the main issues analysed, highlighting solutions for rebalancing the public health system in Romania.

In relation to the research objectives, it emerges that under the impact of pandemic stress, measures to improve health management, increase performance and streamline financial allocations are vulnerable and cannot counteract the effects that the pandemic has on the health of the population, as reflected in the morbidity and mortality indicators collected during the pandemic.

In this regard, there is a need to rethink strategic health management, better plan the procurement of medicines and medical supplies, rethink partnerships with the European Commission and other global entities that can effectively improve the impact of the pandemic on the health status of the population, rebalance health supply and demand, and maintain strategic programmes in line with the targets set in the planning, as these programmes protect already medically affected groups.

This research has identified vulnerabilities related to financial management in health, and proposed several strategic directions that can be considered by health policy makers to prevent future disruptions to public health systems.

6. Final conclusions. Original Contributions . Recommendations and research relevance. Limits of research. Future research directions.

6.1. Final conclusions

The research on the Analysis of Health Care Financing and the Effects on the Performance of the Romanian Health Care System aimed to identify vulnerabilities in the financial management of health care and to determine the efficiency of the Romanian health care system in order to improve its performance.

1. The research started from the premise that under conditions of financial differentiation, some models and methods can stand out as performing well, generating uptake options from some countries, where the national health system has proven to be syncopal and inefficient.

2. In order to achieve Objective 1 - Conduct a study of the evolution of public health from the perspective of health systems development at international level, we conducted a literature review, which identified the following significant issues:

2.1. The globally recognised health system represents a complementarity of needs and factors influencing the health and well-being of the population;

2.2. Public health is a concept that has been transformed under the influence of the development of medical technologies, with the functions of this science changing over time from the basic functions of prevention and ensuring people's lives to modern functions relating to biological well-being and health promotion through community effort;

2.3. Essential public health services have associated public health functions, differentiated according to the purpose of the services, along a continuum of 10 distinct typologies relating to: population public health assessment, investigation and diagnosis, health information and education, building health partnerships, implementing health policies, protecting community health, ensuring equitable access to services, developing specialised human resources, medical research and developing organisational infrastructure;

2.4 In the context of new global pandemic challenges, efforts to improve health systems have been unified and a new definition for a sustainable and healthy future has crystallised, namely that of single multidimensional health;

2.5 The outbreak of the COVID-19 pandemic has resulted in a change of focus in the public health system, with the countries of the world, through the World Health Organisation (WHO), attempting to adopt a common approach to ensuring health security for the global population, focusing on developing prevention strategies and limiting the spread of disease;

2.6 In these circumstances, the WHO has stepped up its monitoring of health determinants with a view to establishing optimal strategies for combating diseases, with all coordination efforts resulting in a shortening of the pandemic period and an increase in health education through public information programmes.

3. We have conducted an analysis based on information published by the World Health Organization following the monitoring of the International Health Regulation's capacities in the period 2018-2021. The analysis highlighted the main vulnerabilities and their dynamics during the period analysed for a sample of six EU Member States, including Romania. These vulnerabilities, together with the opportunities for development, built the picture of the health status of the population, in the global and European context, as follows:

3.1 Globally, the capacities monitored by the IHR have strengthened by 8.11% over the period 2018-2021;

3.2. In Europe, population health status decelerated, compared to the global level, by 5%, amid the effects of the pandemic on the ageing European population;

3.3. The strongest influences of the pandemic were felt in countries where the ageing population suffered most, such as Italy and Spain, and in countries such as Romania and Bulgaria the effect of alignment with European standards was destabilised by the pandemic, yet these countries saw the highest rates of improvement in capacity compared to 2018 baseline, without being able to assess that there is uniformity in health status compared to developed countries.

4. Research objective 2 - Determining the need for differentiated financing of public health systems of the study was achieved in chapter 2, when the analysis of the need for financing of public health systems was carried out, and on this occasion, for the six financing models, opportunity/vulnerability diagrams were drawn up, highlighting from a financial and managerial point of view the balance between performance and the need for resources of each model.

5. A diagnostic assessment of the public health systems in the six countries analysed was carried out, showing the specific features and effects of the disturbances in each country. The analysis shows that, from both a managerial and an economic point of view, performance is achieved in countries where decentralised models of the Beveridge or Bismarck type have been successfully implemented, while in countries such as Romania and Bulgaria, where the experience of the former Semashko system has not been fully overcome, performance and financial management of resources continue to generate non-productivity in health services, with incidents being noted in the context of poor infrastructure or access to new therapies.

6. In order to achieve Objective 3 - Simulative modelling of the differences between the main sources of financing of European health systems, based on the observations from the diagnostic analysis, a modelling procedure was carried out using a geospatial model for the period 2000-2021, which revealed the following aspects of the Romanian health system:

6.1. Romania has the lowest allocation of health expenditure from GDP compared to the 5 European countries analysed;

6.2. This allocation is similar, in particular to the Latvian and Spanish allocations, with a similarity percentage of 75%;

6.3. Romania has a health system financed mainly from public sources;

6.4. This system does not have a similar representation to the other countries analysed, Romania being the country that allocates the most public funds to health in the total allocation basket, the latter being the lowest in the sample;

6.5. The private financial contribution to health does not exceed 25%, the average being 21% in the period analysed;

6.6. The level of similarity with other European countries is low, maximum 24% in the case of Bulgaria;

6.7. Of the private contribution to health care, more than 95% is accounted for by the costs covered by the patient;

6.8. The level of similarity is low, with Romania having a level of similarity of 34% with Bulgaria and 24% with Germany in terms of the costs covered by the patient.

7. In order to achieve Objective 4 - Analysis of the main approaches to public health financing at international and national level, we have analysed the main challenges and opportunities of public health financing, showing the following:

7.1 Ensuring public health is directly interdependent with the availability of adequate resources: financial, human, material, technological.

7.2 In most countries of the world, including Romania, funding is made up of a combination of public and private funds that directly ensure the operation of public health systems and indirectly support them through healthcare delivery bodies;

7.3 The quality and quantity of financial resources affect the types and effectiveness of public health activities. From an economic perspective, the way public policies can be used influences the change in public health financing and the quality of services provided by addressing the types and mechanisms of financing;

7.4. Analysis of international and national approaches to public health financing has shown that health expenditure can generally be financed through five mechanisms: from general government taxes, from social insurance contributions, from voluntary insurance contributions, from charitable donations or financial aid, and from direct individual expenditure;

7.5. The following public health financing challenges and opportunities have been highlighted:

- The outbreak of the COVID-19 pandemic has partially changed the paradigm of health systems financing and brought to the fore the social need for health of a population with a declining demographic rate and an increasing ageing rate. At European level, public health policies, particularly in the field of disease prevention, have had to be put in place and intensive public information campaigns have been carried out, for which substantial funds have been allocated;

- The main post-pandemic opportunity has been to increase public awareness of the need for health care, to restructure hospital circuits and to establish clearer procedures for achieving quality of care. The focus has been shifted to the patient, with medical and hotel conditions subject to regular assessments, including the establishment of quality rankings in public hospitals. Other post-pandemic opportunities have been in changing approaches to quality in health and integrating the service user into health management structures;

- The main threats have been the accelerated need for funding, the creation of new guidelines on how to build cost centres, the emergence of new diseases that have required sustained efforts in terms of both material and human resources, and the continuing impact on the mental status of the COVID-19 affected population;

- In the long term, we believe that the needs of healthcare systems will shift towards digital investigations, with telemedicine and remote consultations developing, and intra-hospital cooperation agreements will be geared towards this.

8. We have introduced and defined the concept of a Taxonomy of Public Health Systems Financing. In our opinion, the taxonomy of public health system financing is the public budget organisation that allows for the achievement of economic and health indicators in an equitable manner, so that the objective of providing optimal health services in accordance with the health needs of the population, in line with technological progress and the expected level of quality can be achieved.

9. We have shown that in the health sector, countries have different levels of income and there is a diversity of approaches to budgeting and resource allocation. In this regard, we have shown that countries around the world, including Romania, have programmes aimed at improving public health through health promotion and disease prevention.

10. In our view, health budgets have an important role to play, not only to improve well-being, but also to reduce the burden on health systems and the pressure on public budgets to protect citizens from threats to public health. Thus, programmes should pool all the resources needed to achieve their objectives, including staff salary income, goods and services, subsidies and transfers, and investments by health institutions to protect public health.

11. We pointed out that the adoption of the Sustainable Development Goals included universal health coverage as one of the targets, as a means of promoting health and well-being and ensuring social protection for all. The World Health Organization has identified universal coverage and set a target of increasing the number of people with universal health coverage by 1 billion by 2023. Accordingly, we have shown that universal health coverage has been identified as the top priority for all health systems worldwide.

12. The analysis conducted on universal public health coverage highlighted that achieving this goal, including protection against financial risks, access to quality health services and access to safe, effective, quality and affordable medicines and vaccines for all, from the perspective of the Health Financing Atlas 2018, is possible if health financing systems are designed so that: obtain sufficient and sustainable financial resources for health, which are then allocated in an equitable and efficient manner, and their mobilisation must ensure sustainability and sustainability; pool and manage the financial resources collected to ensure equity in financing and use, so as to ensure financial protection for all; and use the financial resources obtained to provide appropriate incentives to both providers and beneficiaries, under conditions of increased financial efficiency and sustainability.

13. Through our study of international and national approaches to public health financing, we have highlighted that health financing reforms involve, in addition to changing health financing mechanisms, changing their architecture and the flow of funds from revenue sources to beneficiaries. The core objectives of the health financing agenda under the Global Financing Facility are to increase both the volume and efficiency of domestic public resources for health, and the core indicators used by this health financing mechanism are: health expenditure per capita financed from domestic sources; the ratio of public expenditure on health to total public expenditure; the percentage of current health expenditure devoted to primary health care; and the incidence of catastrophic financial expenditures.

14. We have shown that public health systems have undergone significant restructuring in the wake of the pandemic, with the focus shifting from patient-centred care to quality care geared to the specific health needs of the population. This shift in focus has included changes in the financing of public health systems, with a dynamisation of health management and the typology of health system stakeholder participation.

15. In order to achieve Objective 5 of the research - To produce a diagnostic picture based on the dynamic stratified analysis of public system financing in Romania starting from health financing schemes, we used the following tools:

15.1. We carried out a dynamic stratified analysis of the financing of the public health system in Romania with reference to European statistics, based on financing schemes. We have shown that understanding how resources are obtained, through financing schemes, and the distinction between public and private financing of health care financing is important from a financing perspective. In our view, an increase in funding needs to be both sustainable and equitable so that policy makers can inform their decision making in relation to existing and planned mechanisms for financing health systems.

15.2. The analysis of the components of public health financing was carried out in Chapter 3. Thus, the revenues presented in the financing schemes provide information on the financing of health expenditure, in particular on how the revenues financing the different schemes are obtained and on the sources providing financing. Identifying how the revenue is raised can differentiate between the private versus public funding side. Health expenditure is a measurement tool for a certain period of time within

the Health Accounts. As we have shown, the calculation of expenditure on health systems contains two broad categories of expenditure: expenditure by public and compulsory contributory health systems and expenditure by voluntary health care financing systems.

15.3. The dynamic stratified analysis of the financing of the public health system in Romania, by reference to European statistics, on the basis of financing schemes, revealed the following aspects:

- Dynamic stratified analysis of total health care expenditure: In Europe, total health care expenditure has been on an increasing trend, from €1,026,687 million in 2011 to €1,591,900 million in 2021, with a growth rate of 55.05%. Romania had a more accelerated growth rate of total expenditure during the period under review, 122.85%, from €6,199 million in 2011 to €13,815 million in 2021, ranking 16th in the EU-27. The level of total expenditure in Romania represents 0.76% of the EU-27 average total expenditure. Compared to more developed countries such as Germany, France and Italy have allocated funds representing 28.18% in the case of Germany, 20.20% in the case of France or 11.70% in the case of Italy. This distribution highlights the different national approaches and priorities for health financing, as well as differences in economic strength and demographics between countries.

- Dynamic stratified analysis of expenditure on government schemes and mandatory contributory healthcare financing schemes: According to the analysis carried out, we observed that in Europe, expenditure on government schemes and mandatory contributory healthcare financing schemes has been on an increasing trend, i.e. from 797,640 million euros in 2011 to 1,291,267 million euros in 2021, with a growth rate of 61.89%. The share of this expenditure in total expenditure was 80%. Romania had an adequate growth rate of this expenditure over the period analysed, i.e. 162.48%, from €4,665 million in 2011 to €12,245 million in 2021, ranking 15th in the EU-27. Romania is at the lower end of the distribution with a share of about 0.76% of total expenditure on government schemes and compulsory contributory healthcare financing schemes at EU-27 level. This indicates that, compared to larger and more developed EU economies such as Germany (29.96%) and France (20.67%), Romania's average expenditure on government schemes and compulsory contributory schemes for health is relatively low.

- Dynamic stratified analysis of voluntary healthcare expenditure: From the analysis carried out, we observed that in Europe, voluntary healthcare expenditure was on an increasing trend, i.e. from 53,517 million euros in 2011 to 69,445 million euros in 2021, with a growth rate of 29.76%. The level of this expenditure represented for Romania a share of 0.10% of the EU-27 average voluntary healthcare expenditure. In comparison, in more developed countries such as France, Germany and Spain, funds were spent with a share of 36.35% in the case of France, 15.33% in the case of Germany and 10.85% in the case of Spain, which indicates that in Romania there is either a more limited access or a lower preference for such schemes or a higher efficiency in managing healthcare costs.

- Dynamic stratified analysis of private expenditure on health care: The analysis shows that in Europe, private expenditure on health care has been on an upward trend, i.e. from € 175,213 million in 2011 to € 231,118 million in 2021, with a growth rate of 31.91% and a share of 15% in total expenditure. Romania had a significant growth rate of this expenditure in the period analysed, i.e. 81%, from €1,505 million in 2011 to €2,729 million in 2022, ranking 17th in the EU-27. The level of this expenditure represents 1.00% of the EU-27 average private expenditure on health care. By comparison, in more developed countries such as Germany, Italy and France, funds were consumed representing 23.42% in the case of Germany, 17.09% in the case of Italy, 12.4% in the case of France, which indicates

that in Romania the consumed level of private expenditure on health care was at the bottom of the ranking among the Member States analysed.

16.In order to achieve Objective 6 - To carry out a critical analysis of public health financing in Romania through the System of Health Accounts, we used scientific investigation methods, starting from international classifications and statistical data reported by Eurostat, observing the following:

16.1 The extended framework of the System of Health Accounts consists of the System of Health Accounts Interfaces (Health Service Beneficiary Interface; Health Service Delivery Interface; Financing Interface) and the International Classification of Health Accounts (Types of Goods and Services Provided; Providers of Goods and Services; Financing Schemes).

16.2. The identification of the specific needs of health systems started from the premise that in any country, including Romania, policy makers need timely and reliable information to formulate health policies and to monitor their implementation. Knowing that financing is one of the pillars of the health system, the quality of financing data is very important. The quality of health services is as important as financing but difficult to quantify. Based on these considerations, we have shown that the use of a homogeneous and internationally standardised system through the information provided by health accounts can provide comparable data over time and between countries, regardless of differences in the organisation of health systems, leading to an increase in the quality of reporting, training and control strategies. At the same time, we have shown that improved information sources facilitate better understanding for policy makers and other users.

16.3. The analysis of the main aspects of public health financing based on the System of Health Accounts in Romania revealed that the implementation of the 2011 SHA methodology for the production of health accounts providing information on total expenditure as well as indicators on health system revenue was achieved through the provisions of Regulation (EU) 2015/359 implementing Regulation (EC) No 1338/2008 of the European Parliament and of the Council as regards statistics on health expenditure and sources of financing.

16.4. We have highlighted the main directions of action in Romania, which, following the initiative of international bodies such as the World Health Organization, the Organisation for Economic Cooperation and Development, Eurostat, has developed the methodological framework for improving indicators on current health expenditure, identifying the best solutions for linking SBS expenditure with expenditure recorded in the System of National Accounts - SNA and the European System of Integrated Social Protection Statistics. We have shown that the National Institute of Statistics is the body that provides the methodological framework, data collection and analysis in Romania through the periodic report - System of Health Accounts (SHA) in Romania, the last report will be made at the end of 2022 for the year 2020.

16.5. The analysis of the main aspects of public health financing on the basis of the System of Health Accounts in Romania was carried out according to the synthetic classification diagram presented in Chapter 4: Curative services (HC. 1); Rehabilitative services (HC. 2); Long-term health care services (HC. 3); Ancillary health care services (HC. 4); Medical goods (HC. 5); Preventive services (HC. 6); Management and administration of the health system and health financing system (HC. 7); Other health care services not elsewhere classified (HC. 9); Memorandum items: Reporting (HC.RI); Memorandum items: Related health services (HC.R).

16.6. Analysis of the System of Health Accounts shows that, at European level, 80% of expenditure is financed from public funds, with Romania being in a similar situation to other European countries and supporting more than 80% of health expenditure from these funds. The influence of the pandemic on funding schemes has put pressure on the public system, making it necessary to cover both efforts to combat the disease and measures to inform and educate the population in order to prevent the spread of the pandemic.

17.In order to achieve Objective 7 - Determining the efficiency of the Romanian health system in a European context using the associated data analysis method, we carried out an extensive study of the efficiency of financing at European level, the analysis highlighting the following aspects:

17.1 There are priority concerns about achieving efficiency levels in health systems. Globally, these relate to the unstable distribution of resources to ensure equal access to health services; increasing the capacity of health providers to deliver high quality care; reducing waste in health systems; creating a unified system for assessing the performance of health systems based on monitoring indicators; involving all stakeholders in the process of setting and prioritising objectives.

17.2. We have shown that achieving efficiency in the use of health resources requires a systemic approach to inputs through good governance and leadership, so that the ultimate objectives of health security and well-being are continuously monitored through the level of access to and quality of services.

17.3 Measuring the effectiveness of health systems is an appropriate basis for assessing their performance. To this end, we have presented a conceptual approach to the main outcome indicators specific to health systems. These indicators are markers of potential gaps in healthcare provision. We have shown that implementing and monitoring performance indicators makes it easier to improve the quality of services and the management of health systems.

17.4. We have presented OECD approaches to improving health systems by thematic areas, population health status, risk factors, access to health services, quality and outcomes of care, health expenditure, health workforce, pharmaceutical system, ageing and long-term care in the form of performance schemes.

17.5 Using the same algorithm, the research has highlighted the methodological framework for health system performance in Romania in terms of demographic indicators, morbidity and mortality indicators, health determinants, resources and health network activity.

17.6 We used the DEA method to determine the efficiency of the Romanian health system in the European context. We used a basic radial input-oriented model, using three input indicators and three output indicators that can be monitored over a 10-year period.

17.7. DEA SOFTWARE was used to test the efficiency of the 28 DMUs (27 Member States and EU). The research showed that in Europe in 2021 only 9 DMUs are efficient. The health systems that are effective throughout the period analysed are those of Estonia, Ireland, Cyprus, Latvia, Luxembourg and Malta. In dynamics, efficiency gains, becoming efficient, have been gained by Luxembourg's systems in 2016 after a single hiccup in 2015, Sweden from 2014, Denmark from 2017 and Finland from 2020.

17.8 We have shown that Romania is in the inefficient range of European countries, second only to Sweden, according to the calculated score.

17.9. The reference set determined for the efficiency of the Romanian system is the Irish system and the vulnerabilities determined for the Romanian health system concern the three outputs (health care expenditure, total number of hospital beds and number of doctors, and the output of healthy life expectancy based on self-perceived health. For the other two outputs (self-perceived very good health and attractive and preventable mortality of residents) no vulnerabilities of the Romanian system were identified for the period analysed.

17.10. Efficiency ceilings were designed to adjust the performance of the Romanian system. According to these ceilings, healthcare expenditure should be reduced by at least 1287 million euro, the total number of beds per 100000 residents should be reduced by 59 beds, and the number of active doctors in the healthcare system should be increased by approximately 52000 specialists. The change in these health system parameters should be made at the same time as the perceived health-based healthy life expectancy indicator is increased by at least 31% compared to the level of the indicator in 2021.

18.With reference to Objective 8 - Investigate the impact of socio-economic, health and environmental factors on life expectancy at birth in European Union countries, using a comparative panel data analysis to identify and quantify causal relationships and specific contributions of each factor in modelling life expectancy at birth, by using comparative panel data analysis, we were able to identify and quantify causal relationships between different factors and life expectancy at birth, highlighting the specific contributions of each factor studied.

18.1 We clearly defined the factors analysed, which included socio-economic variables, health factors and environmental factors, providing a solid basis for further analysis and facilitating the interpretation of the results in the specific context of each factor.

18.2. We explained how we collected and used the panel data to conduct a longitudinal analysis of EU countries, thus allowing a deeper understanding of long-term dynamics and cross-sectional effects. We applied advanced statistical methods to manage potential autocorrelation and heteroscedasticity issues in the data.

18.3 We presented the econometric models used, such as the fixed effects model and the random effects model, explaining the advantages and limitations of each model in the context of our analysis. We described how these models helped us isolate and quantify the impact of each factor on life expectancy, controlling for possible omitted or confounding variables.

18.4 We discussed our results in detail, indicating which factors had the most significant effects on life expectancy and how these factors interact with each other. For example, we noted that economic factors have a greater impact in some contexts, while environmental factors are decisive in others. We have also highlighted national or regional particularities that influence these relationships.

18.5 Finally, we discussed the implications of the study for public policy formulation and health practices. I have suggested specific recommendations for improving living conditions and public health in various EU countries and Romania, based on the empirical results obtained.

18.6 Given the specific results for Romania, which show a weaker correlation between economic factors and life expectancy compared to other Member States, there is a need to focus more on improving the quality of health services and increasing investment in public health. Stricter environmental protection policies are also needed to combat the effects of industrial pollution. These recommendations are designed to harness panel data analysis to develop informed and sustainable

policies. They aim to promote improvements in life expectancy in Romania and other EU Member States by effectively addressing the key factors influencing this indicator.

19.In order to achieve Objective 9 - Correlative determination of the financial balance of the health system in Romania, in Chapter 6, the main financial indicators in Romania were assessed and interpreted using the Principal Component Analysis (PCA) method. The results showed strong correlations between budget revenues in the health sector and expenditure in this sector, suggesting that they are generally predictable. Budgetary revenues from social assistance showed a significant correlation with their expenditure in the budget. Expenditure on pharmaceuticals and specific medical supplies, including medical devices, also showed strong correlations with budgetary expenditure.

19.1. We conducted a comprehensive analysis of the financial situation of the Romanian health system using Principal Component Analysis (PCA). This methodology was used to assess and interpret the main financial indicators, allowing a deeper understanding of the financial structure and dynamics of the health system.

19.2. We have demonstrated that revenue dynamics in the health sector are relevant for understanding and predicting budgetary behaviour in this sector.

19.3. We have assessed various financial aspects of the health system, including revenue, expenditure, investment and debt. This included analysing how these indicators influence the system's ability to deliver sustainable and efficient health services.

19.4. By applying PCA, we were able to reduce the complexity of the financial data by extracting the main components that capture most of the variation in the dataset. This facilitated the identification and focus on the key factors contributing to the financial balance of the system. The analysis revealed significant correlations between different financial variables, providing insight into how interactions between these variables affect the financial health of the system.

19.5. The results of the PCA analysis provided empirical evidence for policy recommendations in Romania, showing that improvements in financial management and resource allocation could contribute to a more robust and responsive health system.

19.6 We have shown that the allocation of health funding has always sought to strike a balance between problem and solution. However, the results of the allocation management strategy have led to inconsistencies that perpetuate imbalances from year to year. We believe that a rebalancing of allocations could help to eliminate synergy in health. This redistribution should take into account the impact that economic and budgetary factors have on health factors and vice versa, so that at some point, after successive adjustments, the minimum distance between forecast and realisation or between need and financing needs can be achieved.

19.7 Based on the findings, we have proposed reform initiatives to improve the financial management of the health system, such as optimising expenditure, improving efficiency in revenue collection and regularly assessing financial performance, contributing significantly to the understanding of the financial balance of the health system in Romania and providing a sound basis for future strategic decisions in the field of public health.

19.8. Social investment must focus on people and support skills and capacity development. The most important measures for optimal social investment are: education, health, vocational skills, job search management, rehabilitation management and good parenting. The economic effects of the

recent global economic crisis, the negative economic effects, as well as the demographic trend at EU level, are also leading to a deterioration of the European economic and social environment.

19.9. I believe that there is a need to rethink the strategic management of health, better plan the procurement of medicines and medical supplies, rethink partnerships with the European Commission and other global entities that can effectively improve the health status of the population, rebalance supply and demand, balance health and maintain strategic programmes in line with the objectives set out in the planning, given that these programmes protect categories of people already medically affected.

In conclusion, the research has demonstrated that a viable adjustment of the public health system in Romania can be carried out in order to reduce the disparity of the public health status in relation to the performance of other European systems.

Through the research, all nine research objectives were achieved and accomplished in six chapters, using a bibliographical toolbox of 531 titles and a complex research methodology.

6.2. Original contributions

The study carried out at a theoretical and practical level identifies implementable tools using a complex methodology based on analysis and modelling in the form of significant own contributions:

1.Based on the literature review, we produced six diagrams of the implementation of CSR in 6 European countries, including Romania, with the diagrams focused on highlighting the improved capacities and risks related to each public health system.

2.We conducted a diagnostic assessment of the public health systems in the six countries analysed, differentially showing the specific features and the effects of disruptions in each country.

3.We have formulated and demonstrated the following economic hypothesis: The marginal component of the increase in life expectancy is reflexive in relation to purchasing power if and only if, in real terms, purchasing power evolves for the majority of citizens of a state within the limits of the average (median) purchasing power, which is strictly lower than the community purchasing power.

4.We have shown that the health status of the population is sensitive to purchasing power, with margin differences of the segregated profile relative to the general profile, depending on the level of socio-economic development of the subject state and the health risk factors impacting the health of the population in the target state.

5.Through the analysis carried out, we have shown that, from both a managerial and an economic point of view, performance is achieved in countries where decentralised models of the Beveridge or Bismarck type have been successfully implemented, while in countries such as Romania and Bulgaria, where the experience of the former Semashko system has not been fully overcome, performance and financial management of resources continue to generate non-productivity in health services, with incidents being observed in the context of poor infrastructure or access to new therapies.

6.We carried out simulation modelling of the differences between the main sources of funding for European health systems, based on a geospatial model for the period 2000-2019, which highlighted the vulnerabilities of the Romanian health system.

7.We analysed the main challenges and opportunities of public health financing and made predictions on future changes in health systems.

8.We introduced and defined the concept of Taxonomy of Public Health Systems Financing.

9.We have carried out a dynamic stratified analysis of public health system financing in Romania by reference to European statistics, based on financing schemes.

10.We have used scientific investigation methods to perform critical analysis of public health financing in Romania through the Health Accounts System.

11. We have highlighted the main directions of action in Romania to improve indicators on current health expenditure, and to find solutions to link SHA expenditure with expenditure recorded in the System of National Accounts - SNA and the European System of Integrated Social Protection Statistics.

12.We have presented in the form of performance schemes the OECD approaches to improving health schemes according to thematic areas

13.We have used the DEA method to determine the efficiency of the Romanian health system in the European context and we have identified the efficiency thresholds against which the input and output indicators of the Romanian health system must be adjusted in order to reach the efficiency optimum determined by applying the associated data analysis method.

14.I have investigated through the application of a fixed effects panel data model, the influence of seasonal factors on life expectancy at the European level, focusing on Romania as a case study, which allowed the comparative analysis of the influence of risk and socio-economic factors on public health at the level of European member countries.

15.I have developed a robust analytical framework to identify and quantify the impact of different independent variables (level of education, environment, economic freedom) on the dependent variable, life expectancy. This methodology was essential to ensure that the differences found in life expectancy are accurately attributed to the influences of the specific factors analysed, rather than to unobserved characteristics of the countries included in the study.

16.We have provided a detailed insight into how structural factors and public policies influence health in different national contexts, highlighting the particularities and challenges faced by Romania in the European context, and have contributed to the existing literature by providing empirical evidence from recent data and applying advanced statistical methods to support the development of effective public health policies at EU level.

17.We have highlighted the importance of strategic actions aimed at improving public health factors with immediate impact on sustainable economic growth.

18.We supported the need to develop adequately funded public policies with an impact on reducing inequalities and improving health parameters, contributing to the economic well-being of the population and the growth of the Romanian economy.

19.We presented the correlative determination of the financial balance of the Romanian health system using the PCA method and demonstrated that the dynamics of revenues in the health and medical sector are relevant to understand and predict the budgetary behaviour in this sector.

20.We have shown that the dynamics of budget expenditure on social care has a very strong correlation with the dynamics of budget revenue, thus highlighting the existence of coherent policies for financing social care expenditure.

21.We have shown that the allocation of funds in the health sector has always sought to strike a balance between problem and solution. However, the results of the allocation management strategy

have led to inconsistencies that perpetuate imbalances from year to year. In this context, we have shown that a rebalancing of allocations could help to eliminate synergy in health

22.We made the following proposals to improve the performance of the Romanian health system by:

- Achieving universal health coverage under optimal financial monitoring, with the involvement of all stakeholders;
- Increasing the level of health security of the Romanian population;
- Strengthening preparedness and response to geopolitical threats to health;
- Identifying alternative sources of financing the health system in Romania (intensifying medical research and developing international cooperation in the field);
- Increasing the private financial contribution to health in Romania;
- Reducing waste in the public health system;
- Increased monitoring of the quality of Romanian health services.
- Take steps to modernise the Romanian health infrastructure;
- Improving the logistical capacity of the Romanian healthcare system.
- Improving the efficiency of the Romanian health system based on the efficiency ceilings calculated using the DEA method (health care expenditure should be reduced by at least 1287 million euro, the total number of beds per 100,000 inhabitants should be reduced by 59 beds, and the number of active doctors in the health system should be increased by approximately 52,000 specialists). The change in these health system parameters should be carried out at the same time as the increase in the indicator of healthy life expectancy based on perceived health by at least 31% compared to the level of the indicator in 2021;
- Support the Romanian health system and achieve health performance through sustainable social investments focused on people. We believe that an important contribution is the improvement of the educational system in order to improve the knowledge of health risks and to make prevention more effective through adequate information of the population, especially young people.
- Achieving health performance through a rethink of strategic health management, better planning of medicines and medical supplies procurement, a rethink of partnerships with the European Commission and other global entities.

6.3. Research relevance and recommendations

The impact of financial differentiation on health systems was deepened under conditions specific to European health systems. The ways in which proposed models and methods have proven to be effective in generating options for health systems efficiency have been explored. We proposed the paradigm shift towards performance-based healthcare with the aim of highlighting the need for this change and its implications for healthcare systems. It was analyzed how countries such as Romania have implemented the concept of performance in the health system. In our opinion, health performance will represent the only guarantee of an efficient functionality for the Romanian system in the current context of the challenges induced by the economic crisis and the difficulties in ensuring sufficient allocations for the proper functioning of the system. We carried out the evaluation of the efficiency of the differentiated financing models. In this sense, I focused on the evaluation of the different models used in the financing of health systems and on the analysis of their efficiency, and I examined how these models contribute to improving the overall efficiency of the system. To overcome the synchronization

problems in the national health system, I focused on the inefficiencies observed due to the lack of synchronization and proposed improved financial strategies for the Romanian health system. To ensure the efficiency of the health system in Romania, I propose the following recommendations:

1. The adoption of adequate and adapted public policies the health needs of the population :
    - Achieving universal health coverage under optimal financial monitoring, with the co-interest of all interested parties;
    - Active promotion of new prevention programs through information on risk factors and ways to prevent various ailments and through active promotion of a healthy lifestyle;
    - Improving the sanitary culture of the population through one can encourage and make the individual responsible for his own health;
    - The introduction of health education in schools will contribute to the formation of responsible adults who are aware of the importance of a healthy life;
    - Consolidation of some measures of preparation and response to threats regarding the health of the population;
    - Streamlining policies for ensuring the quality of the medical act by implementing clear standards and procedures, constant monitoring of medical services and periodic evaluation of results.
2. Rethinking partnerships with the European Commission and other global entities:
    - Acquiring good practices in financing the health system to ensure its sustainability and efficiency by adopting financing policies and strategies based on principles of equity and solidarity to increase social inclusion;
    - Increasing cooperation with European Union and international institutions in ensuring rapid exchanges of information and medical technologies and finding solutions to common challenges in population health to ensure universal access to quality health services and to respond to global threats such as pandemics or climate change;
    - Rebalancing demand and supply in the field of health through strategic planning and close collaboration between authorities, medical service providers and the medical community, by ensuring investments in medical infrastructure and the development of human resources in the field of health;
    - Increasing the degree of coverage of medical services to improve access to specialized care;
    - Balancing the distribution of health care resources among different regions or communities by implementing policies and programs to redistribute medical personnel and equipment to areas with deficiencies and develop medical infrastructure in less developed regions so that they can provide quality services and attract medical professionals;
    - The growth the degree of involvement of primary and secondary medical activity in the medical act by ensuring a more constant monitoring of patients and a faster diagnosis of health problems.
3. Increasing administrative capacity in health:
    - The adoption of legislative reforms in health regarding the protection of the health of the population and the rights of patients;

- Realizing active and effective communication between all actors involved in the medical act, including patients and their families, to improve the quality of medical services and increase trust in the health system;
- Increasing the involvement of decision-makers at the central, regional and local level in identifying and ensuring the functionality of the health system by developing more efficient and personalized solutions for each local community, region in part a better distribution of resources in the field of health.
- Supporting the Romanian health system and achieving health performance through sustainable social investments focused on people.

4. Improving the financing of the health system:
    - Adoption of macro-fiscal measures to reduce underfunding and ensure the sustainability of the health system;
    - Increasing the private financial contribution to health in Romania;
    - Increase in special fees or taxes intended exclusively for health financing;
    - Development of public-private partnerships to bring additional resources to the health system, respectively collaboration with private companies, NGOs or other institutions interested in improving access to medical services;
    - Increasing the efficiency and transparency of spending in the health system by adopting policies for the strategic purchase of medicines and medical equipment, negotiating contracts with medical service providers;
    - Strengthening health systems, by increasing their resilience and optimizing the use of their resources;
    - Increasing investments in medical infrastructure, recruitment and adequate training of medical personnel, as well as the implementation of an efficient procurement policy for medicines and medical equipment;
    - Identifying alternative sources of funding for the Romanian health system (intensification of medical research and development of international cooperation in the field);
    - Ensuring access to medicines for the population from the perspective of prices and availability.
5. Rethinking strategic health management:
    - Results orientation of hospital management activities;
    - Maintaining strategic programs, in accordance with the objectives assumed in planning;
    - Increasing decision-making transparency at the level of hospital units;
    - Increasing the degree of digitization of hospitals;
    - Improving hospital infrastructure by ensuring viable investment plans;
    - Increasing the active involvement of medical staff in the decision-making act, in the quality assurance process, by participating in training and professional development programs;
    - Increasing the degree of inter-institutional communication in the health system;
    - Reducing the shortage of health professionals through measures to attract and retain medical staff, as well as significant investment in health training and education.
    - Improving the efficiency of the Romanian health system based on the efficiency ceilings calculated using the DEA method (medical assistance expenses should be reduced by at

least 1287 million euros, the total number of beds per 100,000 inhabitants should be reduced by 59 beds, and the number of active doctors in the medical system should be increased by approximately 52000 specialists). The modification of these parameters of the health system should be carried out simultaneously with the increase of the healthy life expectancy indicator based on perceived health by at least 31% compared to the level of the indicator in 2021;

6.4. Limits of research

The limits of this research consist in the difficulty of identifying consolidated databases, the health objectives being monitored in different ways by bodies such as OECD, Eurostat, IMF, WHO, etc. These bodies monitor and collect data in different ways, using distinct criteria and methodologies. This can lead to discrepancies and difficulties in identifying consolidated databases that provide a complete and accurate picture of health objectives globally.

At the same time, the identification of data for the last calendar year represents a special challenge, because the collection and transmission of statistical data involves a cumbersome and complex informational process. This process requires the involvement of several institutions and organizations that must provide and verify information on various economic and social aspects. In addition, data collection can be difficult due to the lack of cooperation of some entities or due to discrepancies between the collection methods used.

Another limitation is the lack of relevant statistical indicators, which have to be deduced based on the variation of other indicators or even omitted from the analysis. This can lead to misinterpretations or incomplete conclusions regarding the economic situation or trends. The lack of relevant statistical indicators can affect the strategic planning of the government or stakeholders, as there is no accurate data to base decisions on. The absence of these indicators can compromise the comparability and evaluation of performance over time, making it difficult to monitor progress or effectiveness.

6.5. Future research directions

The author proposes to continue this research by implementing the following two future research directions:

D1. Forecast analysis of the evolution of the Romanian health system in the context of the systemic European crisis.

D2. Application of the scenario method to identify sustainable alternatives for the development of the Romanian health system in the era of digitization.

D3. Carrying out an analysis regarding the sources of funding for medical services in Romania and their impact on the quality and accessibility of these services.

D4. Evaluation and quantification of the way in which the level of financing influences the performance of the Romanian health system, with an emphasis on indicators such as: mortality rate, life expectancy or medical insurance coverage.

D5. Study on the evaluation of the role of the private sector in the provision of medical services in Romania, analyzing the financial implications for patients and the quality of the medical act provided.

D6. The impact of innovations in the financing of medical services in Romania on the sustainability and performance of the health system.