

DETERMINANTS AND TRENDS IN PUBLIC HEALTHCARE EXPENDITURE IN THE EUROPEAN UNION

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Abstract

Healthcare spending lies at the heart of social policy and long-term economic performance, making it a critical issue for governments across the European Union. This study investigates the determinants of public healthcare expenditure in EU countries during the period 2014–2023. Employing a fixed-effects linear regression model, we assess the influence of key macroeconomic and demographic factors. The analysis reveals that population size, inflation, the share of the young population, public debt, and the COVID-19 pandemic significantly increase healthcare expenditure, while the unemployment rate exerts a negative effect. Unexpectedly, GDP per capita shows no significant relationship with public healthcare spending, challenging conventional economic assumptions. These findings suggest that beyond economic growth, macro-level financial performance and demographic pressures play a decisive role in shaping healthcare budgets. Ensuring the sustainability of healthcare systems thus requires efficient resource allocation and adaptive public policies capable of responding to both structural and unforeseen challenges.

Keywords: *healthcare; public expenditure; EU countries, demographic factors, economic factors.*

JEL Classification: H51; H60; I18

1. INTRODUCTION

Healthcare systems form the cornerstone of societal well-being and prosperity in the European Union, and the management of public spending in this sector poses a major challenge for national authorities. The history of financial regulation in the healthcare sector reveals a strong interdependence between economic policies and the financing structure of healthcare systems. The measures adopted by EU Member States have been shaped by factors such as economic crises and internal political priorities.

This paper aims to analyze the trends in public healthcare expenditure and the economic and demographic factors that shaped them in the European Union countries. Using a multiple linear regression model, the study examines variables affecting public health spending during the 2014–2023 period, highlighting the impact of factors such as GDP per capita, unemployment rate, inflation, demographic structures, and public debt on the financing of healthcare systems.

The structure of the study comprises a review of the relevant literature, the presentation of the model and selected variables, and the analysis and interpretation of results derived from both the examination of trends in public healthcare systems and the econometric estimations. The concluding section synthesizes the main findings, highlighting the influence of economic and demographic factors on the financial sustainability of healthcare systems in the EU, and offers policy recommendations to enhance their resilience and efficiency.

2. LITERATURE REVIEW

Public healthcare expenditure represents one of the most regulated and closely monitored components of public finance, reflecting the essential role of healthcare systems in ensuring social well-being. In the European Union, governments have long sought to balance sustainability in healthcare financing with the principles of equitable and efficient access to medical services. Policy interventions have ranged from legislation on fund allocation and reimbursement mechanisms to regulations on health insurance contributions, the introduction of expenditure ceilings, and the monitoring of resource efficiency. While these measures aim to secure stable financing, the actual level of public healthcare expenditure is also shaped by broader economic and demographic determinants. Understanding these underlying drivers is therefore crucial for assessing the sustainability and adaptability of healthcare systems across the EU.

Previous literature emphasizes that the level of public health spending is influenced by a variety of economic and demographic factors. Getzen (2000a, 200b) argues that national income and demographic structures, especially the proportion of the elderly population, are key determinants of healthcare expenditure. In a comprehensive study covering 167 countries over the period 1993–2013, Younsi *et al.* (2016) demonstrate that in high-income economies, both GDP per capita growth and increases in general government expenditure positively affect public health spending.

In contrast, a study by Reeves *et al.* (2014), focusing on the 27 EU Member States over the period 1995–2011, found that variations in GDP and the ratio of public debt to GDP are not statistically significant factors in explaining changes in healthcare expenditures. The authors emphasize that declines in such expenditures are more closely associated with factors like borrowing from international financial institutions, reduced tax revenues, and cuts in general government spending.

Throughout the 2000s, public healthcare expenditure in the EU has been heavily influenced by economic crises and the policy responses adopted by some Member States. Research has shown that budget cuts have negatively affected access to healthcare and have led to growing health inequalities. The study by Reeves *et al.* (2014) reveals that during the 2008–2010 financial crisis, countries that implemented drastic reductions in healthcare spending experienced a deterioration in public health indicators. Paes-Sousa (2019) argues that in developing countries such as Brazil, healthcare expenditure is more vulnerable to economic downturns than in developed economies. Keegan *et al.* (2013) concludes that although public health spending may appear resilient at the onset of a recession, a severe economic crisis will inevitably undermine it.

A major factor in the evolution of public healthcare expenditure is demographic dynamics. Population aging, as reflected in the increase in life expectancy in the EU from 77 years in 2000 to 81 years in 2023 (Eurostat, 2025b), has led to rising demand for healthcare services, particularly for the treatment of chronic and age-related diseases, such as cancer, cardiovascular conditions, arthritis, and kidney failure. However, the study by Zweifel *et al.* (2004) highlights the complexity of the relationship between aging and healthcare spending, noting that it is also shaped by other variables, such as proximity to death. Medical costs tend to rise significantly in the final years of life, but are often lower for older patients compared to younger ones.

The study by Joumard *et al.* (2010) underscores the importance of efficient resource use, showing that it is not merely the level of expenditure that determines health outcomes, but also how funds are allocated. Investments in prevention and primary care can reduce long-term costs by helping to prevent chronic illnesses. Thus, spending on prevention and primary healthcare services plays a crucial role in decreasing the incidence of chronic diseases and minimizing long-term healthcare costs. Similarly, Moreno-Serra and Smith (2012) show that sustained increases in public health spending positively affect both life expectancy and the quality of healthcare services. Their study highlights a strong positive relationship between adequate healthcare funding and lower rates of avoidable mortality.

Although increasing public health expenditure can contribute to better healthcare outcomes, the efficient and strategic use of financial resources is essential to prevent waste and ensure long-term sustainability. The report published by the European Commission Expert Group on Health Systems Performance Assessment & European Observatory on Health Systems and Policies (2021) reinforces this perspective, highlighting the importance of prudent governance and results-oriented management in the public health sector. To ensure the sustainability of healthcare systems, the OECD (2020, 2022) recommends a range of cost-containment measures, such as setting budgetary caps, negotiating drug prices, and promoting the digitalization of healthcare services. E-health initiatives implemented in countries like Estonia and Denmark

have helped reduce administrative costs while improving patient access to healthcare services.

3. DATA, VARIABLES, AND METHOD

To gain a deeper understanding of the determinants of public healthcare expenditure, we constructed a multiple linear regression econometric model applied to a panel dataset. The model's structure is grounded in the relevant academic literature that explores the determinants of healthcare financing in an international context, with a focus on the influence of economic and demographic factors on the level of public health spending.

The model was estimated using data for the 27 EU Member States over a 10-year period (2014–2023). Data was sourced from Eurostat. This time frame is characterized by several significant economic and social events, including the post-sovereign debt crisis in the euro area and the COVID-19 health crisis, both of which had direct and indirect effects on healthcare expenditure.

Table 1. Dependent and explanatory variables: explanation and measurement

Variable symbol	Explanation	Unit of measurement
Dependent variable		
health_exp	Public healthcare expenditures	% of GDP
Independent variables		
lngdpc	GDP per capita (<i>logarithmic</i>)	EUR
lnpop	Total population (<i>logarithmic</i>)	persons
unemp	Unemployment rate	% of total working-age population
age1	Share of population aged 0–14	% of total population
age2	Share of population aged 15–64	% of total population
age3	Share of population aged 65 and over	% of total population
inflation	Inflation rate	annual average rate of change (%)
debt	Public debt	% of GDP
pandemic	dummy variable for the pandemic period	value 1 for years 2020 and 2021, 0 otherwise

Source: own elaboration

The model is specified as in equation 1.

$$health_exp_{it} = \beta_1 \cdot lngdpc_{it} + \beta_2 \cdot lnpop_{it} + \beta_3 \cdot unemp_{it} + \beta_4 \cdot inflation_{it} + \beta_5 \cdot age1_{it} + \beta_6 \cdot age2_{it} + \beta_7 \cdot age3_{it} + \beta_8 \cdot debt_{it} + \beta_9 \cdot pandemic + \alpha_i + \epsilon_{it} \quad (1)$$

where: dependent and independent variables are as defined in Table 1; β are the coefficients of explanatory variables; α_i is the individual fixed effect specific to unit i (country-specific unobserved heterogeneity); ϵ_{it} is the idiosyncratic error term for unit i at time t .

The econometric model is a panel data fixed-effects regression model, estimated in Stata, designed to analyze the impact of multiple independent variables on a dependent variable (*health_exp* – public health expenditure). The fixed-effects model controls for unobserved heterogeneity by allowing each cross-sectional unit (country) to have its own intercept.

4. RESULTS AND DISCUSSIONS

4.1. Recent trends in government healthcare expenditure in the EU

Public health expenditure, expressed as a percentage of gross domestic product (GDP), serves as an indicator of a country's commitment to safeguarding the health of its population. It also reflects both the level of economic development and the institutional model of the healthcare system.

Within the European Union, public health expenditure showed a fluctuating trend over the period 2014–2023, shaped by both structural and cyclical factors, such as the organization of national healthcare systems and the public health crisis caused by the COVID-19 pandemic. Notably, the pandemic led to a sharp increase in healthcare spending across all Member States in 2020 and 2021, followed by a modest decline or stabilization in the subsequent years (see Table 2).

Table 2. Public healthcare expenditure in the EU Member States, 2014–2023 (% of GDP)

Country	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Austria	8.2	8.3	8.3	8.3	8.3	8.4	9.2	10.1	9.4	9.1
Belgium	8.0	7.8	7.6	7.6	7.6	7.5	8.6	8.4	7.8	7.9
Bulgaria	5.5	5.3	5.0	4.9	5.0	4.6	5.8	5.8	5.6	5.5
Croatia	6.5	6.8	6.6	6.8	6.9	7.3	8.7	8.4	7.8	7.8
Cyprus	2.7	2.5	2.5	2.5	2.6	3.5	5.8	6.4	5.8	6.1
Czechia	7.5	7.5	7.4	7.3	7.4	7.4	9.2	9.5	8.8	8.9
Denmark	9.0	8.9	8.8	8.7	8.7	8.7	9.3	9.3	8.3	8.2
Estonia	5.2	5.6	5.3	5.1	5.3	5.5	6.5	6.5	5.9	6.5
Finland	7.9	7.3	7.2	7.1	7.1	7.2	7.7	7.8	7.5	7.6
France	8.2	8.1	8.1	8.1	8.1	8.1	9.0	9.4	9.1	8.9
Germany	7.0	7.0	7.1	7.0	7.0	7.2	8.3	8.5	8.4	7.5
Greece	4.8	5.0	5.3	5.5	5.5	5.7	6.6	6.6	6.0	5.8
Hungary	4.8	5.1	4.7	4.7	4.6	4.5	6.3	5.6	4.4	4.1
Ireland	6.5	5.0	5.1	4.8	4.7	4.7	5.4	5.0	4.7	5.2
Italy	7.0	7.0	6.8	6.8	6.7	6.7	7.8	7.4	6.8	6.5
Latvia	3.9	3.9	3.8	3.6	4.2	4.3	4.8	6.5	5.6	5.3
Lithuania	4.5	4.7	4.8	4.6	4.7	5.0	5.9	5.8	5.2	5.3
Luxembourg	5.1	4.9	4.8	5.0	5.1	5.2	5.8	5.4	5.4	5.6
Malta	5.5	5.4	5.2	4.9	4.9	5.1	6.6	6.1	5.4	5.1
Netherlands	7.9	7.6	7.1	7.2	7.2	7.2	8.1	8.3	7.2	7.0
Poland	4.7	4.6	4.6	4.7	4.7	4.8	5.3	5.7	5.2	5.7
Portugal	6.3	6.2	6.1	6.3	6.5	6.5	7.4	7.6	7.1	6.7
Romania	4.0	4.2	4.1	4.4	4.6	5.0	5.4	5.4	4.9	4.7

Country	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Slovakia	5.7	5.5	5.7	5.6	5.4	5.8	6.2	6.5	6.8	6.6
Slovenia	6.5	6.7	6.8	6.6	6.6	6.7	8.0	8.3	7.7	7.4
Spain	6.1	6.1	6.0	5.9	6.0	6.1	7.6	7.2	6.8	6.6
Sweden	7.1	7.0	7.0	7.1	7.2	7.1	7.5	7.5	7.1	7.3

Source: (Eurostat, 2025a)

In the Nordic countries, the situation has remained quite stable. Denmark and Sweden, for example, have maintained consistently high levels of public health spending, around 8–9% of GDP, regardless of economic or health-related circumstances. In Denmark, the share remained constantly high, peaking during the pandemic at 9.3% of GDP, and then slightly declining to 8.2% in 2023. Sweden followed a similar trajectory. What is particularly notable is that these countries did not resort to abrupt changes, as healthcare has always been a priority. They did not wait for a crisis to increase their budgets, nor did they rush to cut them afterward.

Austria and France, although not Nordic countries, show a similar pattern. Austria increased public healthcare spending from 8.2% of GDP in 2014 to over 10% in 2021, then slightly decreased to 9.1% in 2023 (which is still a relatively high level). France consistently kept healthcare spending above 8% of GDP throughout the entire period, with an increase during the pandemic years. The French and Austrian healthcare systems are well-developed, and the authorities understand that public health requires stable and substantial funding, not just during crises. Germany, although following a similar Bismarckian model, showed a different trend: after peaking at 8.5% of GDP in 2021, expenditures fell to 7.5% in 2023, indicating a tendency toward budgetary consolidation and reduced fiscal pressure post-pandemic.

In the group of countries with mixed or liberal healthcare models, such as Ireland, the Netherlands, and Cyprus, public healthcare expenditure was significantly lower. Ireland, despite having one of the EU's strongest economies, reduced public health spending from 6.5% in 2014 to just 4.7% in 2022, raising concerns about the long-term sustainability of its public healthcare system. The Netherlands represents a special case due to the dominant role of regulated private insurance. Spending remained relatively stable, between 7% and 7.9%, with a slight decline after the pandemic. Cyprus, on the other hand, experienced a remarkable increase from 2.5% in 2015 to 6.1% in 2023, following the introduction of the GESY system, which significantly expanded public access to healthcare services.

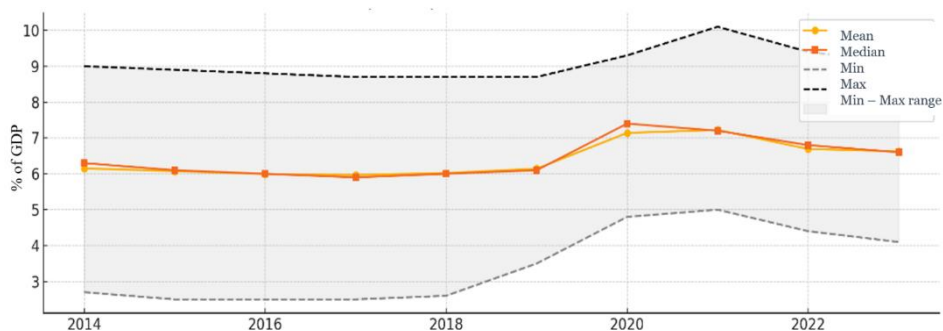
Central and Eastern Europe is the most fragmented region in the EU when it comes to healthcare financing. Romania, Bulgaria, and Hungary all remained below the 5.5% of GDP threshold, even during the pandemic. Romania slightly increased its spending to 5.4% in 2020 and 2021, only to fall back to 4.7% in 2023.

Bulgaria followed a similar path, fluctuating between 4.6% and 5.8%. Hungary experienced a sharp increase to 6.3% in 2020, but this was followed by a steep decline to only 4.1% in 2023.

However, not all Eastern European countries followed this path. Slovenia stands out as a positive example, increasing its public healthcare expenditure from 6.5% in 2014 to 8.3% in 2021 and maintaining levels above 7% thereafter. Croatia also showed a favorable evolution, peaking at 8.7% in 2020 and remaining at a high level. These countries appear to have gradually aligned with Western European practices, either through internal reforms or with external support. The Czech Republic is another noteworthy case, with a significant increase during the pandemic and continued effort afterward, reaching nearly 9% in 2023. Slovakia, by contrast, showed only a modest increase, of just one percentage point over the past decade.

Looking at the broader picture, it's clear that economic welfare alone doesn't explain for everything; after all, Ireland is wealthy but allocates relatively little to healthcare. Political will and the structural model of the healthcare system play a major role as well. Countries that have prioritized public healthcare systems, whether in the North, West, or East, tend to allocate more through public budgets. Those that rely more heavily on the private sector or market mechanisms, even if economically advanced, tend to allocate less publicly. The pandemic served as a stress test for all countries, and, in many ways, it revealed how prepared or unprepared their systems were. Some used the opportunity to boost long-term investment, while others treated it merely as a temporary emergency.

Differences remain, and the gaps between East and West or North and South are evident in the data. But they're also visible in political decisions, in national priorities, and in how each state chooses to address the healthcare needs of its citizens.



Source: own elaboration based on Eurostat (2025a)

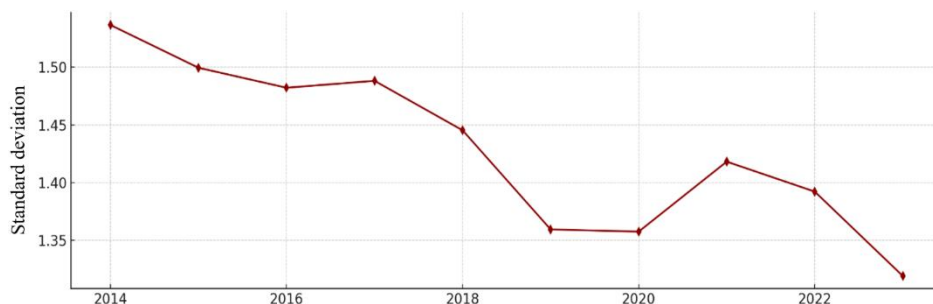
Figure 1. Descriptive analysis of public healthcare expenditures in EU Member States, 2014–2023 (% of GDP)

Analyzing the descriptive statistics of our dependent variable (Figure 1), we see that during the period 2014–2019, the average public healthcare expenditure, expressed as a percentage of GDP, remained relatively stable, fluctuating around 6%. This stability indicates that the budgetary policies of the EU Member States did not undergo significant changes regarding public health financing. A marked increase in the average expenditure is evident in 2020, surpassing the 7% of GDP threshold. This evolution is directly correlated with the outbreak of the COVID-19 pandemic. The rise in public allocations was driven by the necessity to cover additional costs associated with crisis management: procurement of protective equipment, expansion of hospital infrastructure, financing testing and vaccination campaigns, and other emergency measures. This increase reflects a coordinated effort at the EU level to address the pandemic crisis. In 2021 and 2023, a slight decrease in the average expenditure is observed; however, it remains above the pre-pandemic levels.

The median, as a measure of central tendency less influenced by extreme values than the mean, more accurately reflects the “typical” behavior of Member States. Between 2014 and 2019, the median public healthcare expenditure remained stable, hovering around 6% of GDP. Consequently, half of the EU Member States recorded public healthcare expenditure below this threshold, while the other half spent above it. Similarly to the mean, the median increased to 7.4% in 2020, demonstrating the widespread nature of the increase in public health spending across the European Union. The proximity of the two indicators even in this context suggests that the expenditure surge was not driven by a few outliers but was a broad-based phenomenon affecting the majority of countries. Hence, the small gap between the mean and median signals a collective and relatively uniform EU response to the pandemic crisis. In 2021 and 2023, the median public health expenditure slightly declined compared to 2020 but remained above pre-pandemic levels. For most Member States, budgetary allocations to health continued to be elevated even after the immediate effects of the pandemic subsided. Concurrently, the mean remained slightly higher than the median due to a limited number of states maintaining significantly higher shares of GDP allocated to health, thereby exerting an upward influence on the average.

During 2014–2019, the range between minimum and maximum values stayed relatively constant, indicating a stable yet unequal distribution of health expenditures across Member States. Despite balanced central measures (mean and median), disparities persisted between countries with the lowest and highest investments in health, reflecting differences in economic structure, national priorities, and health system development levels. The year 2020 marked a significant widening of the range between extreme values, primarily due to substantial increases in the upper tail of the distribution. Within the pandemic context, some countries increased health expenditures to a much greater extent than others. In 2021 and 2023, the range remained broad but showed a tendency

to narrow compared to the pandemic year, signaling a gradual rebalancing of fiscal policies in the health sector.



Source: own elaboration based on Eurostat (2025a)

Figure 2. Evolution of the standard deviation of public healthcare expenditure over the period 2014–2023

Analyzing the evolution of the standard deviation of public healthcare expenditure expressed as a percentage of GDP, during the period 2014–2023 (Figure 2), we observe notable disparities between countries in terms of resource allocation to the healthcare sector. These differences stem from varying fiscal priorities and unequal economic capacities. The decline observed in the 2019–2020 period indicates a temporary convergence of expenditure levels, driven by the coordinated response to the COVID-19 pandemic, which prompted similar emergency measures and joint investments in healthcare infrastructure. Subsequently, between 2021 and 2023, there is a slight increase in the standard deviation, reflecting the differentiated approaches adopted by countries in managing the post-pandemic transition, influenced by national economic contexts and government priorities.

The share of public health expenditure in total public expenditure is another indicator used to assess the priority given to this sector within the general government budget (see Table 3).

Table 3. Share of public healthcare expenditure in total public expenditure (%)

Country	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<i>Austria</i>	15.6	16.2	16.3	16.6	17.0	17.1	16.1	18.0	17.7	17.3
<i>Belgium</i>	14.4	14.5	14.3	14.5	14.4	14.4	14.6	15.3	14.9	14.8
<i>Bulgaria</i>	12.6	13.1	14.2	13.9	13.4	12.7	14.1	14.0	13.5	14.2
<i>Croatia</i>	13.3	14.4	14.4	15.3	15.4	15.7	16.3	17.4	17.3	16.8
<i>Cyprus</i>	5.1	5.9	6.3	6.5	5.9	8.6	12.7	15.0	15.4	14.5
<i>Czechia</i>	17.7	18.0	18.7	19.0	18.5	18.4	19.8	21.2	20.4	20.3
<i>Denmark</i>	16.2	16.4	16.8	17.1	17.1	17.5	17.4	18.9	18.4	17.6
<i>Estonia</i>	13.9	14.2	13.6	13.2	13.7	14.2	14.4	15.4	14.8	15.1

Country	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<i>Finland</i>	13.6	13.1	13.1	13.4	13.6	13.7	13.7	14.2	14.3	13.6
<i>France</i>	14.3	14.2	14.3	14.4	14.4	14.7	14.5	15.7	15.6	15.6
<i>Germany</i>	15.7	15.8	15.8	15.7	15.7	15.7	16.3	16.8	17.1	15.6
<i>Greece</i>	9.4	9.1	10.6	11.2	11.4	11.9	11.2	11.6	11.3	11.7
<i>Hungary</i>	9.6	10.2	10.1	10.0	10.1	9.8	12.4	11.7	9.1	8.2
<i>Ireland</i>	17.9	17.9	18.6	19.0	19.1	19.6	20.2	21.4	22.6	22.8
<i>Italy</i>	13.9	13.9	14.0	13.9	13.9	13.9	13.7	13.2	12.5	12.1
<i>Latvia</i>	9.8	9.6	9.8	9.2	10.2	10.9	10.9	14.0	12.8	12.1
<i>Lithuania</i>	12.7	13.4	13.8	13.7	14.0	14.5	13.8	15.6	14.2	14.1
<i>Luxembourg</i>	12.5	12.2	11.9	12.1	12.1	12.0	12.3	12.7	12.2	11.7
<i>Malta</i>	13.9	14.1	14.7	15.1	14.3	14.6	15.7	15.4	14.3	14.1
<i>Netherland</i>	16.9	16.8	16.2	16.8	17.0	17.1	17.0	18.0	16.6	16.2
<i>Poland</i>	10.9	11.2	11.3	11.3	11.6	11.7	11.1	13.1	12.1	12.2
<i>Portugal</i>	12.2	12.8	13.6	13.8	14.9	15.3	15.1	16.0	16.2	15.9
<i>Romania</i>	11.3	11.7	11.8	13.0	13.4	13.8	13.1	13.6	12.2	11.7
<i>Slovakia</i>	13.6	12.5	13.9	14.2	13.7	14.3	13.9	14.5	15.9	13.6
<i>Slovenia</i>	12.9	13.6	14.4	14.8	15.0	15.3	15.5	16.7	16.1	15.9
<i>Spain</i>	13.6	14.0	14.3	14.4	14.3	14.4	14.7	14.5	14.6	14.5
<i>Sweden</i>	13.8	14.0	14.0	14.1	14.2	14.4	14.2	14.9	14.6	14.9

Source: (Eurostat, 2025a)

Analyzing the data in Table 3, we note that the highest share of public healthcare expenditure in overall public expenditure is recorded in Ireland, at 22.8%, followed by the Czech Republic (20.3%) and Denmark (17.6%). These shares indicate a high level of priority given to financing healthcare services from public resources, being influenced both by national social protection policies and by the expansion of universal health coverage. In Ireland and Denmark, healthcare systems are predominantly funded through public resources, with limited involvement of the private sector, which justifies the higher share.

At the opposite end of the spectrum, the lowest shares are recorded in Hungary (8.2%) and Luxembourg (11.7%). These lower levels are attributable, in some cases, to a higher degree of private sector involvement in the provision of healthcare services (as in Luxembourg, where a significant portion of health expenditure is covered by private funds and supplementary insurance), and in others to budgetary constraints and systemic underfunding (as in Hungary, where the public sector remains affected by chronic underfunding and the migration of medical personnel).

The data on average public healthcare expenditure per capita (see Table 4) for the most recent year analyzed highlight significant disparities among EU countries. The highest values are recorded in Luxembourg (€6,882 per capita), Ireland (€6,237 per capita), and Sweden (€5,678 per capita). These levels reflect, on the one hand, a high degree of economic development and substantial budget revenues, and, on the other hand, a well-funded public healthcare system oriented

toward the provision of high-quality medical services, with a lower degree of direct out-of-pocket payments by patients.

Table 4. Average public healthcare expenditure per capita (EUR)

Country	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<i>Austria</i>	4,041	4,129	4,237	4,359	4,510	4,690	4,833	5,498	5,518	5,725
<i>Belgium</i>	3,814	3,990	4,096	4,225	4,372	4,482	4,498	4,843	5,104	4,589
<i>Bulgaria</i>	467	484	527	578	614	659	797	941	1,017	858
<i>Croatia</i>	692	728	775	822	892	957	995	1,217	1,279	1,141
<i>Cyprus</i>	1,408	1,413	1,459	1,538	1,672	1,827	2,129	2,561	2,622	2,431
<i>Czechia</i>	1,138	1,179	1,241	1,344	1,480	1,609	1,847	2,143	2,277	2,405
<i>Denmark</i>	4,854	4,969	5,066	5,164	5,269	5,404	5,722	6,293	6,109	5,933
<i>Estonia</i>	970	1,041	1,107	1,193	1,312	1,426	1,565	1,766	1,874	2,078
<i>Finland</i>	3,705	3,720	3,712	3,749	3,827	3,984	4,146	4,448	4,666	3,705
<i>France</i>	3,736	3,779	3,847	3,903	3,944	4,015	4,139	4,533	4,598	3,736
<i>Germany</i>	3,985	4,145	4,279	4,476	4,657	4,898	5,194	5,609	5,875	5,838
<i>Greece</i>	1,284	1,339	1,368	1,338	1,358	1,401	1,469	1,577	1,682	1,501
<i>Hungary</i>	761	789	832	880	922	949	1,038	1,180	1,176	1,302
<i>Ireland</i>	3,984	4,102	4,237	4,394	4,585	4,808	5,259	5,602	5,943	6,237
<i>Italy</i>	2,392	2,434	2,461	2,511	2,556	2,603	2,690	2,879	2,977	2,986
<i>Latvia</i>	647	702	794	828	936	1,060	1,154	1,612	1,556	1,642
<i>Lithuania</i>	771	832	897	961	1,054	1,2164	1,326	1,560	1,724	1,830
<i>Luxembourg</i>	4,869	4,829	4,897	5,009	5,221	5,502	5,900	6,399	6,590	6,882
<i>Malta</i>	1,834	2,002	2,079	2,231	2,293	2,575	2,746	3,066	3,127	2,846
<i>Netherland</i>	4,207	4,205	4,281	4,355	4,500	4,753	5,125	5,523	5,469	4,921
<i>Poland</i>	675	718	731	807	829	906	911	1,003	1,137	1,430
<i>Portugal</i>	1,551	1,612	1,691	1,763	1,868	1,969	2,036	2,309	2,423	2,510
<i>Romania</i>	380	399	431	493	583	661	712	817	857	766
<i>Slovakia</i>	970	998	1,043	1,051	1,099	1,198	1,219	1,427	1,560	1,394
<i>Slovenia</i>	1,551	1,603	1,660	1,703	1,830	1,975	2,109	2,351	2,593	2,800
<i>Spain</i>	2,019	2,118	2,146	2,233	2,315	2,414	2,535	2,655	2,743	2,471
<i>Sweden</i>	4,954	5,022	5,099	5,147	5,060	5,025	5,260	5,763	5,636	5,678

Source: (Eurostat, 2025a)

In contrast, the lowest average per capita expenditures are found in Romania (€766 per capita) and Bulgaria (€858 per capita), followed by Hungary (€1,302 per capita). These modest values indicate a limited capacity for public healthcare financing, often reflected in undersized medical infrastructure, low remuneration of medical personnel, and a higher share of direct private contributions (out-of-pocket) to meet healthcare needs.

When analyzing these figures in correlation with GDP per capita, it can be noted that the countries with high levels of public healthcare expenditure per person - such as Luxembourg, Ireland, Sweden, or Denmark - are generally also those with the highest GDP per capita in the European Union. This demonstrates that a developed economy provides a more generous resources for investments in

healthcare and for maintaining high-quality public systems. Conversely, countries with lower values, such as Romania, Bulgaria, and Hungary, also record lower GDP per capita, which constrains the public resources available for the healthcare sector.

The long-term trend, however, shows a general increase in average public healthcare expenditure per capita in almost all EU countries, especially after 2020. This phenomenon can be explained by the impact of the COVID-19 pandemic, which forced governments to allocate additional resources to support healthcare systems, modernize infrastructure, and increase the remuneration of medical personnel.

4.2. Determinants of public healthcare expenditure – results of the regression analysis

Testing the influence of economic and demographic indicators on public healthcare expenditure yielded the results presented in Table 5.

Table 5. Results of the regression analysis

Variable	Coef.	Std. Err.	t	P>[t]
<i>lngdpc</i>	-0.730354	0.704957	-1.04	0.301
<i>lnpop</i>	2.730679	1.10399	2.47	0.014
<i>unemp</i>	-0.082509	0.020816	-3.96	0.000
<i>inflation</i>	0.046379	0.012503	3.71	0.000
<i>age1</i>	0.147821	0.065594	2.25	0.025
<i>age2</i>	-0.008851	0.011454	-0.77	0.440
<i>age3</i>	0.012237	0.065025	0.19	0.851
<i>debt</i>	0.017032	0.005765	2.95	0.003
<i>pandemic</i>	0.856074	0.095438	8.97	0.000
<i>cons</i>	-32.1119	18.93585	-1.70	0.091
<i>No of obs</i>	270			
<i>R-sq within</i>	0.5854			
<i>R-sq between</i>	0.1393			
<i>R-sq overall</i>	0.1406			
<i>F(9,234)</i>	36.71			
<i>Prob>F</i>	0.0000			

Source: own elaboration using Stata

The estimated econometric model generated three distinct types of R-squared coefficients: within, between, and overall, each explaining the regression according to the structure of the panel data.

The within R², with a value of 0.5854, is the most relevant in the context of the fixed effects model, as it reflects the proportion of variation in healthcare expenditure explained by the explanatory variables within each country over time. This value indicates that approximately 58.5% of the temporal variation in

healthcare expenditure in each country is explained by the following factors: GDP per capita, population, unemployment rate, inflation, age structure of the population, and public debt.

The between R^2 , with a lower value, reflects the model's ability to explain the average differences in healthcare expenditure between countries. This coefficient shows how much of the variation across countries can be explained by the average values of the predictors. Although in fixed effects models this measure is of secondary importance (since fixed effects remove variation across units), it still demonstrates the model's explanatory potential regarding structural differences between states.

The overall R^2 globally estimates the proportion of total variation explained by the model, combining both the internal variation over time (within) and the variation between countries (between). In the context of our model, this indicator plays an informative, albeit less rigorous, role, as it does not account for how fixed effects influence the internal structure of the regression.

The results highlight several statistically significant coefficients that influence public healthcare expenditure. Among these, the most notable effects are associated with: population, unemployment rate, inflation rate, the share of the population aged 0–14 years, the COVID-19 pandemic, and public debt.

The variable *lnpop* has a positive and statistically significant coefficient, suggesting that a 1% increase in population leads, on average, to an increase of approximately 2.73 percentage points in healthcare expenditure within a country. A larger population exerts greater pressure on the healthcare system, prompting governments to allocate higher budgetary resources to ensure adequate access to medical services (specifically, the expansion of health infrastructure, the hiring of additional medical personnel, and the provision of services to meet the needs of the population). This result is consistent with Getzen (2000a, 2000b), who emphasizes the association between demographic indicators and the level of healthcare expenditure.

The variable *unemp*, which reflects the unemployment rate, has an estimated coefficient of -0.0825 . This coefficient indicates a negative and statistically significant relationship between the unemployment rate and the level of public healthcare expenditure. Thus, a one-percentage-point increase in the unemployment rate is associated, on average, with a decrease of approximately 0.0825 percentage points in public healthcare expenditure within a country, assuming that the other variables in the model remain constant. This relationship is supported by the findings of Reeves *et al.* (2014), who show that, during periods of economic crisis, declining fiscal revenues and budgetary constraints lead to cuts in health spending. Furthermore, Keegan *et al.* (2013) observes that, although health expenditure may initially appear resilient to economic shocks, severe crises inevitably result in reductions.

A higher unemployment rate signals a reduction in government revenues from taxes and social contributions, which constrains public budgets and diminishes the state's capacity to allocate funds to essential areas, including healthcare. Additionally, in times of high unemployment, governments are compelled to reallocate available resources toward social support policies and economic stimulus measures, often at the expense of public health investment. Finally, the decrease in public health spending associated with rising unemployment reflects a temporary political prioritization, in which healthcare is considered less urgent compared to addressing immediate economic crises.

Within the fixed effects regression model, the variable *inflation*, representing the inflation rate, indicates that a 1% increase in inflation is associated with an increase of approximately 0.0463 percentage points in public healthcare expenditure, holding all other variables constant. Inflation drives up prices across the economy, including in the healthcare sector. This results in higher costs for medical goods and services (medicines, equipment, salaries, etc.), necessitating budget adjustments to maintain the efficient functioning of the healthcare system. Consequently, part of the increase in expenditure reflects the authorities' effort to cover the higher costs generated by inflation without reducing the quality or accessibility of medical services.

Moreover, inflation indirectly influences public expenditure levels by altering the nominal value of government revenues. As inflation rises, revenues from taxes (particularly consumption taxes) may increase in nominal terms, providing the government with greater fiscal capacity to allocate funds to priority sectors, including healthcare. In this sense, inflation can act as a mechanism for fiscal expansion.

Demographic structures also partly influence healthcare expenditure. The share of the population aged 0–14 years (*age1*) has a positive and significant effect, indicating higher medical needs among children and adolescents. In contrast, the variables *age2* and *age3* do not show statistically significant effects, reflecting both the relative homogeneity of expenditure across adult and elderly population segments and the fact that these effects are indirectly captured by other variables. According to Zweifel *et al.* (2004), the impact of ageing on health expenditure is not directly proportional, being influenced more by proximity to death than by chronological age.

Public debt (*debt*) is significantly associated with higher healthcare expenditure, suggesting that governments resort to borrowing to sustain healthcare systems, particularly in contexts of fiscal pressure. A 1% increase in public debt is associated with an increase of 0.017 percentage points in healthcare expenditure within a country. This result differs from Reeves *et al.* (2014), who did not identify a significant relationship between public debt and health expenditure in EU member states, but is consistent with Paes-Sousa (2019), who shows that, in emerging economies, governments often rely on borrowing to

support healthcare systems during crises. Thus, public debt becomes a source of financing for health investments, ensuring the maintenance of essential services and meeting urgent public health needs, such as during health crises or pandemics. However, this relationship between public debt and health expenditure is not without risks. Excessive debt accumulation leads to long-term fiscal pressures through higher debt service payments (interest), which reduce governments' capacity to invest in other sectors.

The variable *pandemic* has the highest estimated coefficient (approximately 0.86) and is highly statistically significant. This result confirms the impact of the COVID-19 pandemic (2020–2021) on healthcare systems, which led to increased expenditure in all EU countries. Governments were compelled to invest substantial resources to address the health crisis, support healthcare systems, and meet urgent needs for vaccination, protective equipment, and treatments.

According to mainstream economic theory, an increase in GDP per capita should have a positive effect on government healthcare expenditure. This is based on the idea that, as an economy develops and GDP per capita grows, the government's available resources for spending, including on healthcare, increase, enabling governments to better finance healthcare systems to meet population needs.

However, in the estimated model, the variable *lngdpc* shows a negative and statistically insignificant coefficient. This result contradicts theoretical expectations and suggests that there is no clear and significant association between GDP per capita growth and the allocation of government resources to healthcare. The findings of Younsi *et al.* (2016) point in the opposite direction, showing a significant positive association between GDP per capita and public health expenditure in high-income economies. Nevertheless, Reeves *et al.* (2014) support the conclusions of our model, showing that variations in GDP are not significantly associated with changes in healthcare expenditure within the EU.

In a fixed effects model, country-specific variations are absorbed by the fixed terms, meaning that particular factors such as the economic structure of each nation, political priorities, or institutional differences are not captured by the *lngdpc* variable. Therefore, any potential relationship between GDP per capita and health expenditure may be masked by other variables linked to country-specific characteristics.

This result may also be influenced by interactions with other variables. For example, in an economy with rising GDP per capita, governments may prioritize other areas of spending, such as infrastructure or education, over healthcare. This may happen especially in developing economies or in those experiencing rapid economic expansion. In such cases, GDP growth may not immediately translate into a proportional increase in health expenditure, as governments may deem other investments more urgent.

Another important factor that may contribute to this result is the development of private healthcare systems. As economies grow and household incomes rise, demand for private medical services, perceived as faster, more efficient, and of higher quality compared to public services, also increases. In this context, part of the investment in healthcare shifts from the public to the private sphere, reducing the pressure on governments to increase public spending in this sector. Thus, even when GDP per capita rises, this evolution may not necessarily be reflected in government health budgets but may instead stimulate the expansion of the private healthcare sector.

It should also be noted that the level of development of public institutions and health policies plays a decisive role in determining how additional economic resources are distributed. In the absence of strong institutions and a well-established regulatory framework, GDP per capita growth does not automatically guarantee a greater allocation of public funds to the healthcare sector.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of our analysis highlight the factors that determine public healthcare expenditure in the EU countries. The model confirms that demographic and economic variables exert a significant influence on such expenditure, while the COVID-19 pandemic acted as a major exogenous shock, amplifying pressures on healthcare systems.

In particular, total population, the share of young people, inflation, and public debt are positively correlated with spending levels, indicating that increased healthcare needs, combined with the economic context, drive additional resource allocation. The unemployment rate has a negative effect, reflecting governments' reduced capacity to finance healthcare services during economic downturns. Notably, GDP per capita has no statistically significant effect, contradicting mainstream economic theories regarding the relationship between a nation's wealth and its level of public healthcare expenditure.

Therefore, the sustainability of healthcare financing in the EU depends not only on economic growth, but especially on the efficiency of resource allocation and the capacity of public policies to adapt swiftly to demographic changes and external shocks.

Public debt contributes to sustaining health expenditure, particularly during crises. However, excessive debt accumulation can have negative long-term effects on financial stability. In this regard, governments should explore alternative funding sources, such as public-private partnerships, access to EU funds, or taxes earmarked specifically for the health sector. Reducing dependence on borrowing and diversifying funding sources will help maintain a sustainable healthcare system in the long term.

Governments must establish and implement mechanisms to ensure the rapid allocation of resources in times of crisis, as well as the effective mobilization of

the private sector and other external sources. Additionally, it is important to create national healthcare reserve funds to improve preparedness for future crises.

The unemployment rate was identified as a significant determinant in the econometric model. Our results emphasized that higher unemployment leads to a reduction in funds allocated to healthcare, making economic stimulus measures a priority. Governments should implement economic policies that support job creation and reduce unemployment, such as investments in infrastructure and the development of new industries. Reducing unemployment not only improves fiscal stability, but also ensures a more stable and efficient funding stream for the healthcare sector.

Governments should also account for inflation in the budget planning process, periodically adjusting health budgets to offset rising costs. Implementing efficiency measures in expenditure, including price controls in the pharmaceutical and medical sectors, can help limit the negative effects of inflation.

Given the demographic structures that significantly influence healthcare expenditure, the econometric model suggests that investment in prevention significantly reduces the long-term financial pressure on healthcare systems. Preventive measures, particularly those targeting children and young adults, help reduce the incidence of chronic diseases and other costly conditions. Governments should allocate resources to health education, the promotion of healthy lifestyles, vaccination, and screening programs for the early detection of diseases.

In conclusion, the results of this econometric analysis underscore the importance of formulating public policies based on a thorough understanding of the economic and demographic determinants of healthcare expenditure. Integrating these findings into policy-making contributes to a more efficient allocation of public resources and allows for better anticipation of healthcare system vulnerabilities in the face of external shocks.

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References

1. European Commission Expert Group on Health Systems Performance Assessment & European Observatory on Health Systems and Policies (2021). *Improving access to healthcare through more powerful measurement tools*. Publications Office of the European Union. <https://doi.org/10.2875/776973>

2. Eurostat (2025a). *General government expenditure by function (COFOG)*. [online] Available at: <https://ec.europa.eu/eurostat/data/database> [Accessed 19.03.2025].
3. Eurostat (2025b). *Statistici privind mortalitatea și speranța de viață*. [online] Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Mortality_and_life_expectancy_statistics&action=statexp-seat&lang=ro [Accessed 07.04.2025].
4. Getzen, T. E. (2000a). Forecasting health expenditures: Short, medium, and long (long) term. *Journal of Health Care Finance*, 26(3), pp. 56–72.
5. Getzen, T. E. (2000b). Health care is an individual necessity and a national luxury: Applying multilevel decision models to the analysis of health care expenditures. *Journal of Health Economics*, 19(2), pp. 259–270. [https://doi.org/10.1016/S0167-6296\(99\)00032-6](https://doi.org/10.1016/S0167-6296(99)00032-6)
6. Joumard, I., André, C. and Nicq, C. (2010). *Health care systems: Efficiency and institutions* (OECD Economics Department Working Paper No. 769). OECD Publishing. <https://doi.org/10.1787/5kmfp51f5f9t-en>
7. Keegan, C., Thomas, S., Normand, C. and Portela, C. (2013). Measuring recession severity and its impact on healthcare expenditure. *International Journal of Health Care Finance and Economics*, 13(2), pp. 139–155. <https://doi.org/10.1007/s10754-012-9121-2>
8. Moreno-Serra, R. and Smith, P. C. (2012). Does progress towards universal health coverage improve population health? *The Lancet*, 380(9845), pp. 917–923. [https://doi.org/10.1016/S0140-6736\(12\)61039-3](https://doi.org/10.1016/S0140-6736(12)61039-3)
9. Organisation for Economic Co-operation and Development (OECD) (2020). *Health at a Glance: Europe 2020*. OECD Publishing.
10. Organisation for Economic Co-operation and Development (OECD) (2022). *Public Spending on Health: Control Mechanisms and Strategies*. OECD Publishing.
11. Paes-Sousa, R., Schramm, J. M. D. A. and Mendes, L. V. P. (2019). Fiscal austerity and the health sector: The cost of adjustments. *Ciência & Saúde Coletiva*, 24(12), pp. 4375–4384. <https://doi.org/10.1590/1413-812320182412.23232019>
12. Reeves, A., McKee, M., Basu, S. and Stuckler, D. (2014). The political economy of austerity and healthcare: Cross-national analysis of expenditure changes in 27 European nations 1995–2011. *Health Policy*, 115(1), pp. 1–8. <https://doi.org/10.1016/j.healthpol.2013.11.008>
13. Younsi, M., Chakroun, M. and Nafla, A. (2016). Robust analysis of the determinants of healthcare expenditure growth: Evidence from panel data for low-, middle- and high-income countries. *International Journal of Health Planning and Management*, 31(4), pp. 580–601. <https://doi.org/10.1002/hpm.2358>
14. Zweifel, P., Felder, S. and Werblow, A. (2004). Population ageing and healthcare expenditure: New evidence on the “red herring.” *The Geneva Papers on Risk and Insurance – Issues and Practice*, 29(4), pp. 652–666. <https://doi.org/10.1111/j.1468-0440.2004.00308.x>