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NATIONAL PUBLIC HEALTH SITUATION BEFORE AND AFTER THE COVID-19 PANDEMIC: A COMPARATIVE ANALYSIS BETWEEN ROMANIA AND HUNGARY

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Rezumat: *În ultimii ani, am fost martorii unui eveniment istoric crucial, și anume pandemia globală de COVID-19, care a zguduit sistemele de sănătate publică existente la nivel național. Scopul studiului nostru este evaluarea și compararea situației sănătății publice din România și Ungaria în perioadele de dinainte și de după pandemia de COVID-19. Evaluarea situației sănătății publice la nivel național a fost realizată prin caracterizarea stării generale de sănătate a populației și analiza funcționării sistemului de sănătate publică. Pentru a descrie situația sănătății publice, au fost analizați o serie de indicatori, care pot caracteriza situația demografică a populației și starea sănătății generale, performanța sistemului de sănătate, precum și situația cu privire la bolile infecțioase. Rezultatele au evidențiat faptul că atât România, cât și Ungaria sunt semnificativ în urma mediei Uniunii Europene, în principal din cauza subfinanțării și a consecințelor acesteia. Nu s-au observat schimbări semnificative în niciun indicator între perioadele de dinainte și de după pandemia de COVID-19, iar punctele minime sau maxime din anii 2020-2021 revin treptat la nivelurile de dinaintea pandemiei.*

Cuvinte cheie: *Sănătate publică, România, Ungaria, speranță de viață, mortalitate, PIB pe cap de locuitor*.

Abstract: *In recent years, we have witnessed a pivotal historical event, namely the COVID-19 global pandemic, which has shaken the existing national healthcare systems. The aim of our study is to assess and compare the public health situation in Romania and Hungary during the periods before and after the COVID-19 pandemic. The evaluation of the national public health situation was conducted by characterizing the general health status of the population and analyzing the functioning of the healthcare system. To describe the public health situation, we examined several indicators, which are most suitable for characterizing demographic and general health conditions, the performance of the healthcare system, and the infectious diseases situation. The results revealed that both Romania and Hungary lag significantly behind the European Union average, primarily due to underfunding and its consequences. No significant changes were observed in any indicator between the periods before and after the COVID-19 pandemic, with the low points or peaks of 2020-2021 gradually returning to pre-pandemic levels.*

Keywords: *Public health, Romania, Hungary, life expectancy, infant mortality, GDP per capita*

JEL Classification: I15, I18

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1. INTRODUCTION

The World Health Organization (WHO) defines health not merely as the absence of disease, but as "a state of complete physical, mental, and social well-being" (WHO, 2024). Healthcare is an extremely complex domain that deserves special attention, as it significantly influences the existence of society.

Since ancient times, humanity has recognized that health is an invaluable asset—its presence feels natural, but its absence is immediately noticeable to every individual. Maintaining health depends on many factors, including genetic predispositions, lifestyle, race, place of residence, and more. Health can be likened to an egg: if handled with care, it remains intact, but if not, it can quickly "break." Today, numerous factors influence the preservation and restoration of health. It is a highly complex system involving multiple disciplines, including healthcare, the economy, information technology, gastronomy, and more.

The functioning of any country's healthcare system, including those of Romania and Hungary, depends on the country's level of development, economic status, and political condition. It is challenging to be a good doctor, treat complex diseases, reduce mortality rates, or increase life expectancy in a country lacking proper equipment, hygiene, education, and other essential factors.

In recent years, a pivotal historical event has emerged: the COVID-19 pandemic. The world faced an unprecedented challenge, with thousands losing their lives due to viral infections. This pandemic disrupted not only global healthcare policies but also the economy.

The purpose of this study is to conduct a comparative analysis of the public health conditions in Romania and Hungary before and after the COVID-19 pandemic.

2. BRIEF LITERATURE REVIEW

The analysis and evaluation of the public health situation in Hungary and Romania are covered in the literature, reflecting a sustained interest in this topic. Laczkó (2010) assessed the health status of Hungary's population during the period 1960–2004, using indicators that best characterize health conditions, such as mortality rates, lifestyle-related indicators (e.g., alcohol and tobacco consumption), GDP per capita, and the resources available in the healthcare system. The study highlighted that the health status of Hungary's population had declined compared to that of Austria.

Another study by Bíró, Branyiczki, and Kollányi (2019) pointed out that in Hungary, the health status of individuals with low educational attainment and those not in employment falls significantly behind the European Union average.

The health status of Romania’s population was examined by Niculcea and Tudose (2007) using indicators such as life expectancy, mortality rates, and healthcare expenditure. Clichici (2017) analyzed Romania's healthcare system before the COVID-19 pandemic based on three main aspects: the efficiency of the national public health system, the system’s development and adaptability, and access to healthcare services. To evaluate these aspects, the study used indicators such as life expectancy at birth, infant mortality, healthcare expenditure, the number of healthcare workers, and more. The study revealed that Romania's public health system in the 2010s was inefficient and underfunded, with significant emigration of healthcare workers (especially doctors) and limited access to public health services for the population.

3. METHODOLOGY

The evaluation of the national public health situation can be done by characterizing the general health status of the population and analyzing the functioning of the healthcare system. This can be achieved by examining various health indicators and statistical data. To characterize

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the public health situation, we examined several indicators recognized and used in the literature, which are most suitable for describing the demographic and general health status, the performance of the healthcare system, and infectious diseases (Table no. 1).

Table no. 1 – Indicators characterizing the public health situation

No.	Category name	Applied indicators	Sources
1.	Demographic and general health status	Population change and composition Life expectancy at birth Infant mortality Death rate Most frequently occurring fatal diseases	Romanian and Hungarian Statistical Institute database Eurostat database
2.	Health system performance	Number of available hospital beds Health expenditure in proportion to GDP	Eurostat database
3.	Condition related to infectious diseases	HIV_AIDS diseases Vaccination coverage (COVID-19 vaccines)	ECDC data Eurostat database

Source:authors own editing

The above indicators were presented and analyzed, depending on the available data, for a period of 10-20 years. We examined the evolution of the indicators over time and their relative changes compared to the previous year. We also made a comparative analysis between the indicators of Romania and Hungary, and for an even more realistic assessment, we also compared the data to the European Union average.

4. PRESENTING THE RESEARCH FINDINGS

We started the examination of the public health situation of the two countries with demographic and general health indicators, continued with indicators measuring the performance of the health system and concluded with vaccination coverage.

4.1. Demographic and General Health Status

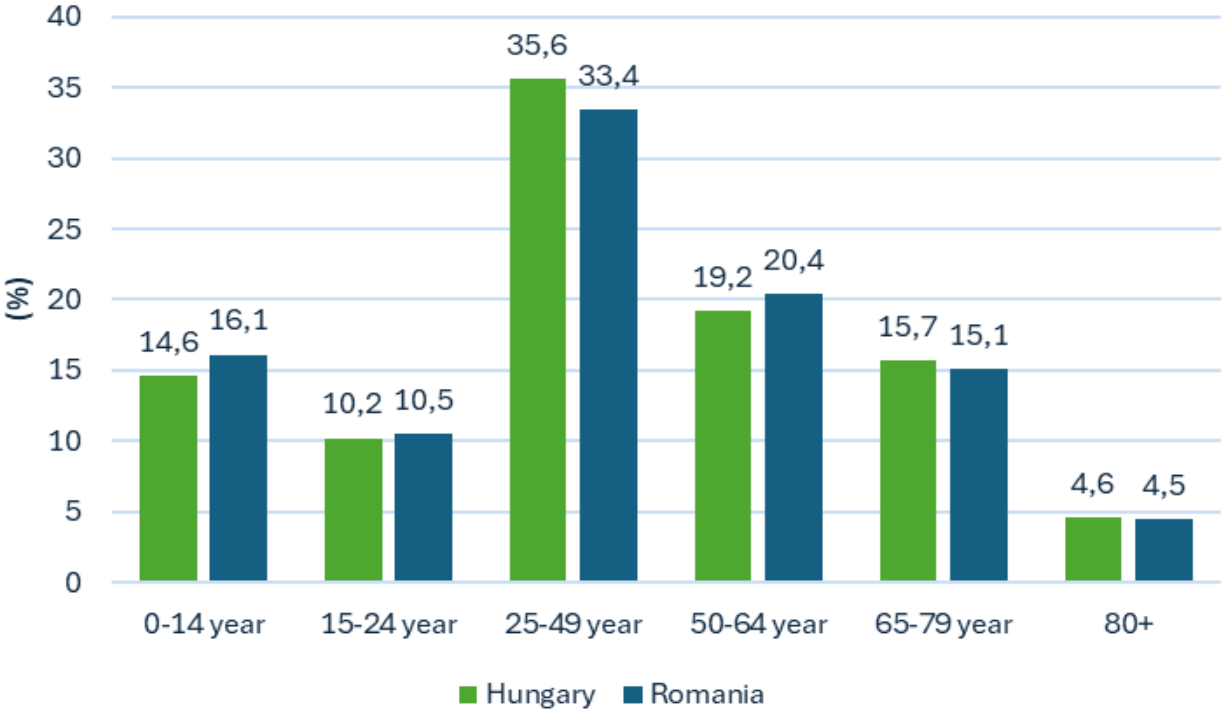
4.1.1. Population Change and Composition

From demographic perspective, a significant population decline is observed both in Romania and Hungary: Romania's population decreased from 21,680,974 (2002) to 19,053,815 (2021), representing a negative change of more than 10%. In Hungary, a decrease of nearly 6% is also evident, with the population dropping from 10,198,315 in 2001 to 9,603,634 in 2022. In both cases, the causes include emigration, a decline in childbirth rates (low birth rates), the impact of health pandemics, and natural population loss (World Bank, 2018; Andrei et al., 2022; Szántó, 2021).

In terms of population composition (Fig. no. 1), the proportion of children is close to the EU average (about 15%), with Hungary having a slightly lower share of children aged 0-14 years (a consequence of the lower birth rate). The proportion of the working-age population (15-64

years) is 64-65% in both countries, while the proportion of elderly individuals (aged 65 and above) is slightly higher in Hungary.

Figure no.1 – Population composition by age group (2021)



Source: own editing, based on the Romanian and Hungarian Statistical Institutes data

4.1.2. Life Expectancy at Birth

Life expectancy at birth is an indicator of a society's general health status, standard of living, and the effectiveness of welfare systems. It also reflects the quality of healthcare systems, as well as the availability and effectiveness of medical care. Figure no. 2 clearly illustrates the situation in Romania and Hungary, comparing them to each other and to the EU average: in recent years, life expectancy in Romania has been lower, but after a significant decline in 2021, both countries have experienced an increase. This increase is more pronounced in Romania, which nearly caught up with Hungary by 2023. Unfortunately, both countries are far below the EU average. A higher life expectancy in the EU indicates better nutritional habits, a cleaner environment, lower infant mortality, and more developed healthcare services.

Fig.no 2 clearly show that the Romanian and Hungarian populations were more severely affected by the COVID-19 health pandemic. During this period, life expectancy at birth significantly decreased: the highest life expectancy in 2019 (75.6 years in Romania and 76.5 years in Hungary) steadily declined during 2020 and 2021, reaching a low point of 72.8 and 74.1 years, respectively, representing a relative change of -1.89% and -1.85%. The life expectancy in EU countries also decreased in 2020, but not as significantly, and by 2021, it had only decreased by -0.37%.

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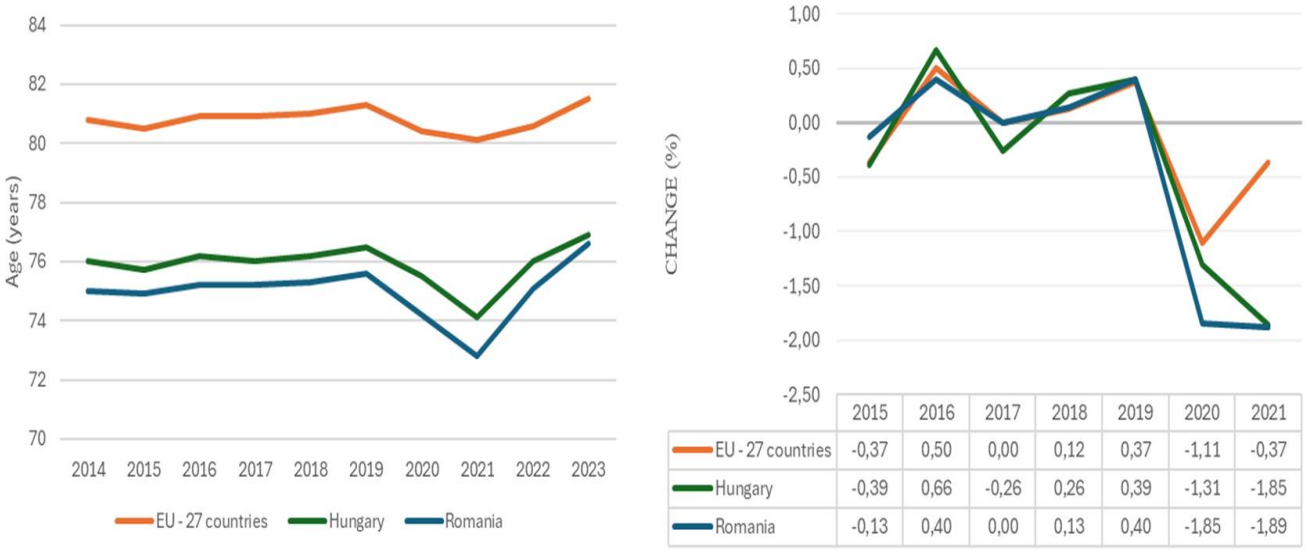
Figure no.2 – Life expectancy at birth (years) and its relative change (%) compared to the previous year



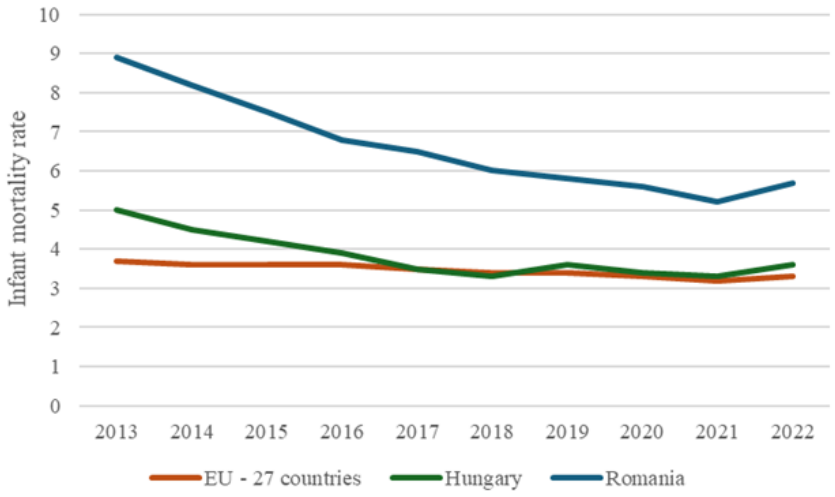
	2015	2016	2017	2018	2019	2020	2021
EU - 27 countries	-0,37	0,50	0,00	0,12	0,37	-1,11	-0,37
Hungary	-0,39	0,66	-0,26	0,26	0,39	-1,31	-1,85
Romania	-0,13	0,40	0,00	0,13	0,40	-1,85	-1,89

Source: authors own editing, based on Eurostat database

4.1.3. Infant Mortality

Infant mortality is also a key indicator for characterizing the overall public health situation. Figure no. 3 illustrates the trends in infant mortality for Romania, Hungary, and the EU average from 2013 to 2022.

Figure no.3 – Infant mortality rate (measured in per thousand)



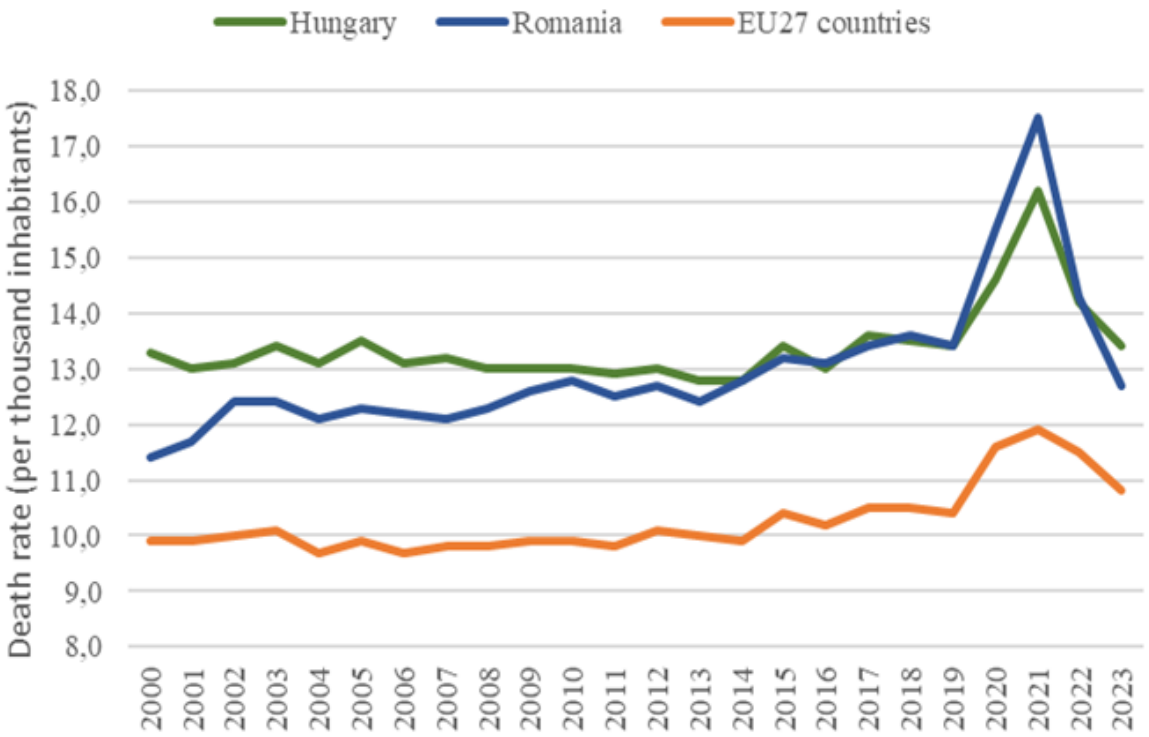
Source: authors own editing, based on Eurostat data

Romania's infant mortality rate significantly exceeds both Hungary's and the EU average levels, despite noticeable improvement compared to the 2013 situation: the nearly 9‰ rate decreased to 5.2‰ by 2021, before rising again to 5.7‰ in 2022. Even the lowest value is still much higher than Hungary's infant mortality rate and the EU average. In Romania, this high infant mortality rate indicates deficiencies within the healthcare system, such as inadequate hospital infrastructure or a lack of essential medications.

4.1.4. Mortality Rate

Both Romania and Hungary have high mortality rates, significantly exceeding the European Union average. The exceptionally high levels in 2021 clearly reflect the impact of the COVID-19 pandemic (Fig. no. 4). By 2023, improvements are evident in both countries: mortality rates have returned to pre-pandemic levels. However, even this level remains far below that of more developed countries. The high mortality rates primarily indicate poorer health conditions among the population and deficiencies within the healthcare systems (Kruk et al., 2018; World Health Organization, 2018).

Figure no.4 –Mortality rate (per thousand inhabitants)



Source: authors own editing, based on Hungarian Statistical Institution data

According to Eurostat data, in Europe, the most common causes of death in 2021 were circulatory diseases, which include conditions related to high blood pressure, heart disease, and diseases of the veins and arteries, followed by cancer and COVID-19. Figure no. 5 illustrates the number of deaths per 100,000 inhabitants.

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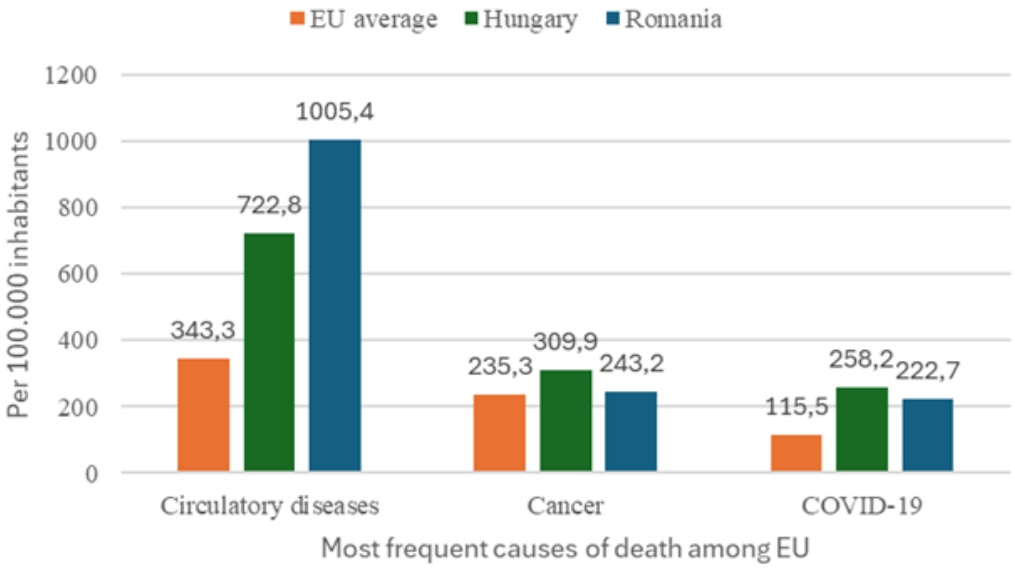
Figure no. 5 – The most frequent causes of death among EU



Source: authors own editing, based on Eurostat data

The data shows the situation of Romania and Hungary compared to the EU average: in the case of blood pressure and heart problems, Romania far exceeds the EU average, but the situation is much worse compared to Hungary. In the case of cancer and COVID diseases, the differences are not so significant, but it can be seen that the population of Hungary is burdened more significantly by these diseases.

4.2. Performance of the Healthcare System

To assess the performance of the healthcare system, we utilized economic indicators: the number of available hospital beds, per capita healthcare expenditure, and healthcare expenditure as a percentage of GDP.

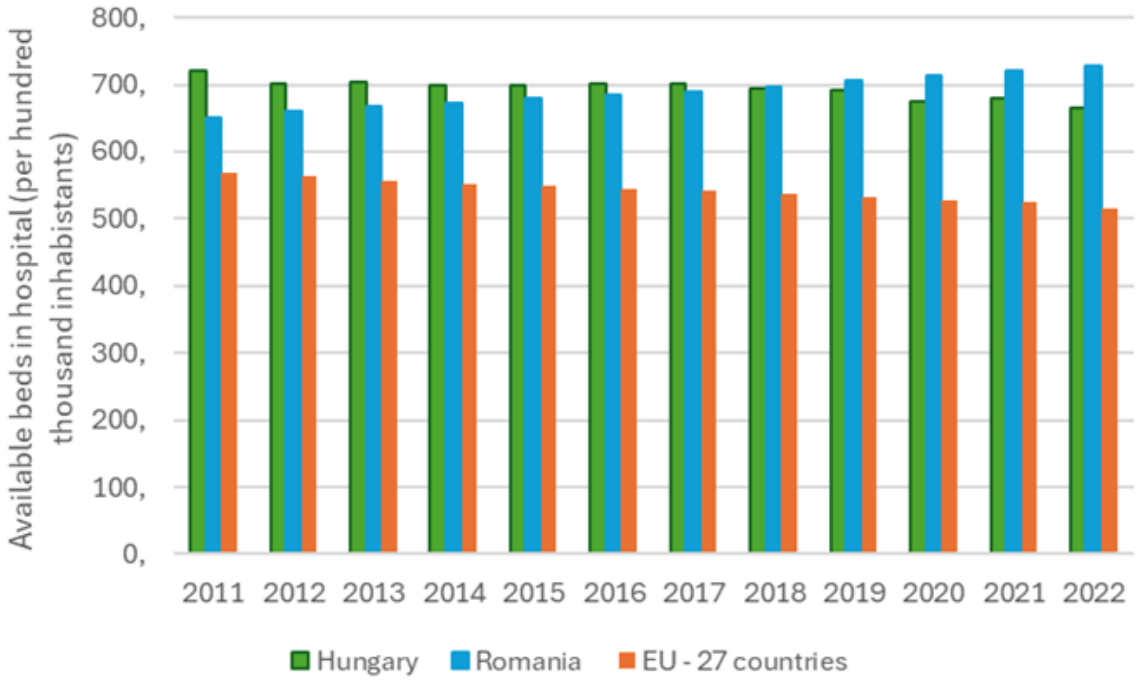
4.2.1 Number of Hospital Beds

The number of hospital beds is a fundamental indicator of healthcare infrastructure (Lai, et al., 2022; Jones, 2024). Figure no. 6 illustrates the number of hospital beds per 100,000 inhabitants in Romania, Hungary, and the European Union average. Compared to the EU average, Romania and Hungary have a higher number of available hospital beds. However, a lower indicator does not necessarily imply a weaker system, as alternative solutions (e.g., home care, outpatient care) may exist. Furthermore, the quality of care is far more important than its quantity. This is also supported by the number of deaths observed during the COVID-19 pandemic: Hungary was significantly affected by the pandemic despite having a higher number of available beds compared to the EU average.

Following the health pandemic, interestingly, the number of hospital beds in Romania increased (both in 2021 and 2022), alongside the per capita healthcare expenditure (Fig. no. 7).

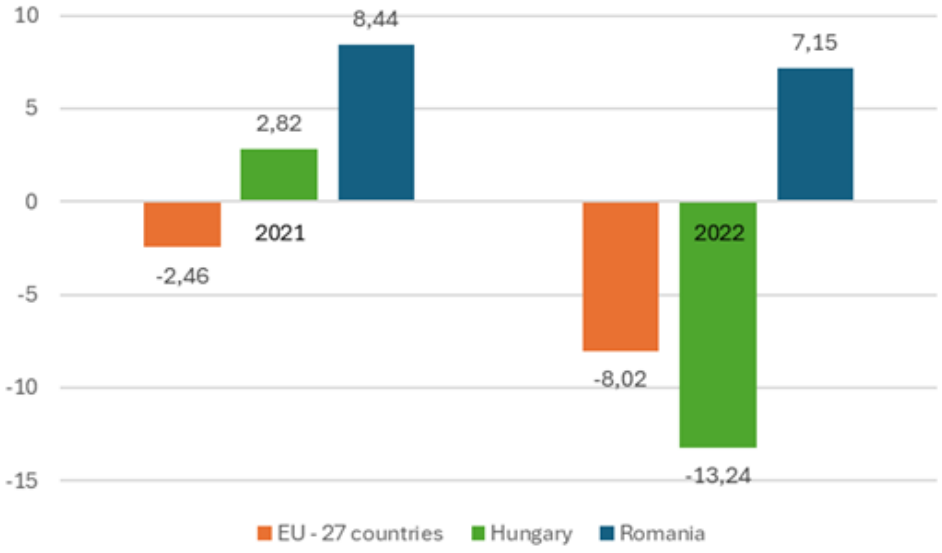
In contrast, Hungary experienced a significant decrease in the number of hospital beds in 2022 (-13.24%). The average number of beds in the European Union also showed a decline after the COVID-19 pandemic.

Figure no. 6 – Available beds in hospital (per hundred thousand inhabitants)



Source: authors own editing, based on Eurostat data

Figure no – 7 Change in the Number of Hospital Beds in 2021 and 2022 (Compared to the Previous Year)



Source: authors own calculation, based on Eurostat data

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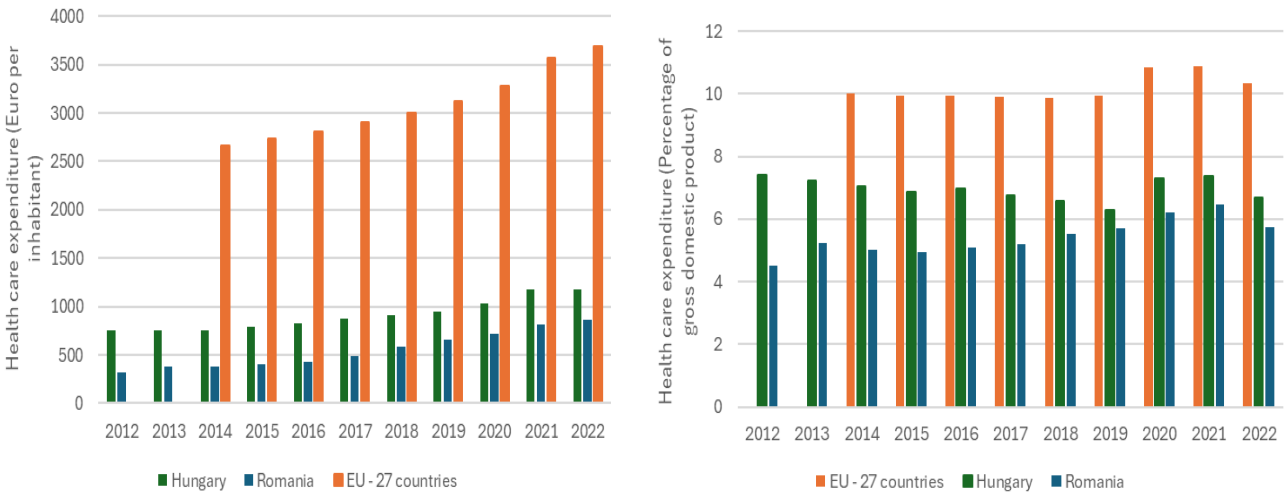
4.2.2 Health Expenditures (Per Capita and as a Percentage of GDP)

The quality of healthcare services is directly influenced by the amount of public funds allocated for this purpose. The per capita expenditure on healthcare (Fig. No. 8) is the lowest in Romania, while Hungary also falls significantly below the EU average. Although the expenditure has been steadily increasing, in 2022, Romania's per capita healthcare spending reached only 23.27% of the EU average (€857.66 per capita compared to the EU's €3,684.55 per capita). In Hungary, the per capita healthcare spending is somewhat higher, reaching 31.79% of the EU average. Unfortunately, this limited budget affects the quality of the healthcare system, which is reflected in indicators such as infant mortality, mortality rates, and other metrics.

The level of expenditures naturally depends on the resources available. In this regard, we analyze the proportion of health expenditures relative to GDP (Fig. no. 8). Romania allocates approximately 5% of its GDP to health expenditures, Hungary a higher share at 6–7%, while the EU average is around 10%. During the years 2020–2021, these ratios increased across the board, but by 2022 they had decreased again (to 5.75% in Romania, 6.7% in Hungary, and 10.36% for the EU average).

Figure no 8 - Per Capita (Euro) and Percentage of GDP Health Expenditure (%)



Source: authors own editing, based on Eurostat data

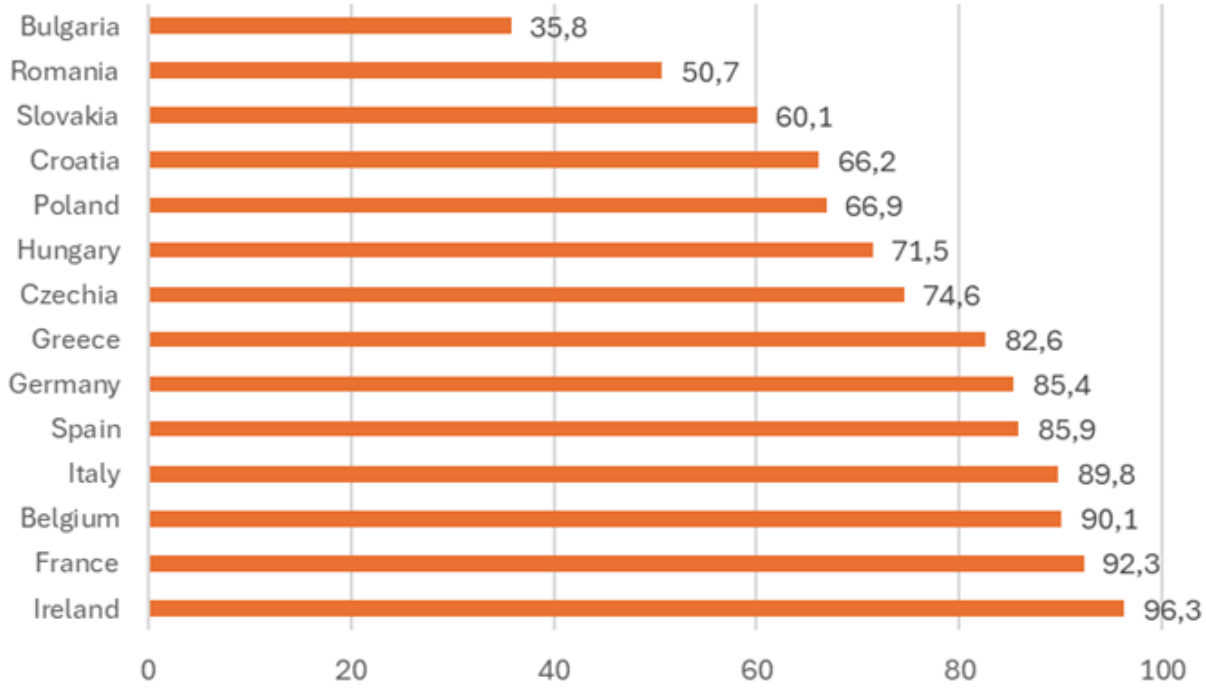
4.3. Infectious Diseases Situation

The prevalence of infectious diseases reflects the state of a society's healthcare system and infrastructure. The first HIV (Human Immunodeficiency Virus) case in Hungary was identified in 1985, and by 2000, the estimated number of cases was 879. It is important to note that even today, HIV cannot be completely cured. Numerous studies have been conducted, but since the virus reacts quickly to external threats by altering its genetic makeup, no attempt has achieved a 100% success rate so far. According to the European Centre for Disease Prevention and Control (ECDC), by 2022, a total of 4,685 HIV cases were reported, with 224 new cases

investigated. In Romania, however, by 2022, a total of 27,190 cases had been reported, and in 2022, 670 new cases were recorded (ECDC, 2023).

Regarding the COVID-19 vaccination, Figure no. 9 shows the vaccination rate of the adult population in several European Union countries as of January 17, 2023. According to an Ipsos study (2022), Romania is one of the most resistant countries regarding vaccination among its population. Hungary, on the other hand, has significantly better vaccination coverage, likely due to the more severe course of the pandemic and the population's greater openness to vaccination.

Figure no 9 - Percentage of fully vaccinated adults against COVID-19 (%)



Source: authors own editing, based on Statista data

In both countries, vaccination campaigns continue, but the increase in vaccination rates has significantly slowed down.

5. CONCLUSIONS AND SUGGESTIONS

Analyzing the most important indicators of public health status, it can be concluded that life expectancy at birth is one of the weakest and most sensitive indicators for both Romania and Hungary. The highest life expectancy before COVID-19 was 75.6 years in Romania and 76.5 years in Hungary. However, during 2020 and 2021, life expectancy continuously decreased, reaching a low point of 72.8 years in Romania and 74.1 years in Hungary. By 2023, Romania almost caught up with Hungary, with life expectancies of 76.6 and 76.9 years, respectively. In terms of infant mortality, Romania shows much worse results compared to both the EU average and Hungary (which is likely due to weaker hospital services and facilities).

Regarding healthcare expenditures, Romania's per capita healthcare spending is only 23.27% of the EU average, while Hungary's is 31.79%. These ratios speak for themselves, but

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naturally, it is not possible to compare the spending levels of two less developed, smaller economies with the EU average. When analyzing the proportion of the national GDP allocated to healthcare, unfortunately, both countries still fall short: while the EU average allocates more than 10% (10.36% in 2022) to healthcare, Romania allocates 5.75% and Hungary 6.70% (in 2022). This directly affects the quality of hospital services.

There is no significant change between the pre- and post-COVID-19 periods for any of the indicators, and the low points or peaks of 2020-2021 are slowly returning to pre-pandemic levels.

Overall, it can be said that, for all the indicators examined, both Romania and Hungary significantly lag behind the EU average. In our opinion, this is primarily due to underfunding of healthcare, but other factors also contribute, such as education level, food consumption, sports, health awareness, alcohol and tobacco consumption, etc.

Improving the national public health situation is essential through regular data monitoring and evaluation, strengthening preventive measures, and increasing public health awareness.

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