TERRITORIAL DISPARITIES RELATED TO DEMOGRAPHIC FEATURES AND HEALTHCARE INFRASTRUCTURE DYNAMICS IN ROMANIA

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In Romania, the state of healthcare infrastructure and health state of the population are influenced by the evolution of the economy, which represents a key element in the development of the Romanian society, both from a social, as well as from an economic point of view. Although the health situation has improved over the years through the introduction of new technologies, the improvement of the medical system and access to information in the medical field, the emergence of private healthcare services, Romania is still lagging behind other countries, due to the fact that it inherited a system in which the health education process was not paid the necessary attention, and new risks arose during the transition to a market economy. The study relies on the Local Administrative Units (LAU) level database provided by the Population and Housing Census (2002 and 2011) and the TEMPO Online time series (year 2020) published by the National Institute of Statistics. The authors computed different indexes (*e.g.*, Natality Rate, Fertility Rate, Natural balance, Life expectancy, Mortality Rate, Infant Mortality Rate) which outlined the changes in the demographic features. The indicators are used in order to characterize healthcare pertain to physicians and hospital infrastructure. Regarding demographic features dynamic during 2002 and 2020, the mix between the trends of decrease and/or decrease registered by natality, mortality, natural balance shows, in general, a decrease in the number of inhabitants in most of the country's counties. Regarding the healthcare system, there are differences in the two environments, urban and rural, both in terms of the number of physicians and in the number of medical units being found in large urban centres. These differences in the distribution of medical staff and hospitals lead to a reduced supply of medical services in rural areas or in cities with a small population. National priorities in the health sector include: improving the infrastructure of the healthcare system, developing the healthcare infrastructure at all levels so as to cut down on the inequalities in terms of access to healthcare, and improving maternal and new-born health.

Keywords: demographic features, healthcare infrastructure, county, Romania.

INTRODUCTION

Even though the progress in ameliorating the social and economic inequities and disparities impacting the demographic dynamic and health has been slow[1], the academics have studied and understood the links between the social and economic determinants of demographic and healthcare characteristics. The changes in terms of demographic features induced changes in the potential needs of healthcare infrastructure, these transformations being emphasised by different studies. For example,[2–4] show that changes in demographic trends in terms of birth, fertility,

mortality, immigration and emigration, population age structure are key issue for healthcare system and also for educational one. At regional level, [5] shows the link between the poor social and economic opportunities and a low level of the healthcare system development, therefore the loss of health policy efficiency, marginalising of some groups and reinforcing existing inequalities.

As it is mentioned in the *International Encyclopedia of Public Health* [6], natality is a crucial determinant of population dynamic (for both, growth, and decline). Also, it has implica-tions on the age structure of population, and, in its turn, it has social and economic effects. Natality reflects the changes in a population's total fertility

rate, which, at its turn, mirrors many social factors, including those regarding the range of opportunities and resources afforded to women. Fertility declines as populations develop[7], high levels of education and of participation on labour market among females leading to delays in or avoidance of marriage and childbearing. In this way, the birth rate decrease[8]. Thus, a decreasing natality is a sign for issues linked to the social and economic factors that are the driving forces of demographic dynamics, but also for the health status of population and for healthcare infrastructure[9]. Using a statistical model for evaluate the impact of a decreasing natality on demographic decline and ageing process and for confirm it[10], subscribe to the general opinion that nothing but increasing fertility, respectively natality of the population, for long periods of time, can significantly contribute to the rehabilitation of the age structure of the population. The increase of ageing population keeps under financial pressure the health and social security systems (*e.g.* pensions budget), because elderly population requires support in the form of pensions, healthcare and long-term care[11]. In an OECD report[12] dedicated to determinants of life expectancy gains, among these determinants of health and life expectancy are mentioned income, education, working and living conditions. Across all OECD countries, life expectancy is lower amongst individuals with lower levels of education as it is revealed by[13]. The reverse situation is true: health spending, a good healthcare infrastructure and high levels of income and education have significant beneficial impacts on population health[14]. The effects of different components of demographic phenomena are not visible only in terms of population dimension and structures, but also in economic area of public expenditure, because exists evidence showing that a higher state spending on social and public health services induce lower rates of teenage births[15].

The healthcare infrastructure plays an important role for the population's health[16,17], being a category of soft infrastructure. This infrastructure encompasses the social networks and systems (*i.e.* culture, governance, education, health) which make the hard infrastructure (*i.e.* functional networks with physical elements providing goods or services) work[18, 19]. Also, the social networks, the health infrastructure included, can help to diminish of social issues such as the inequalities and polarisation[20]. The state of healthcare system

and of the population health state often mirrors the economic and social situation of a country, the interest that this country pays to health, through health, social and economic policies and finally the way of life of its inhabitants[21].

According to the definition provided by the World Health Organization, the health of population represents physical as well as mental and social well-being[22, 23]. At present, the state of health of the population ought to be perceived in a broader context, being influenced by both socio-economic and spatial factors. The health care infrastructure and the medical stuff are factors which influence the health status of the population using primary medical services (*e.g.* number of family physicians, number of dentists, number of hospital beds). Also, the demographic factors such as age, sex, ethnicity, the socio-economic ones (*e.g.* marital and professional status, level of education, career, working conditions etc.), as well as the living conditions (*e.g.* access to drinking water, indoor heating facilities) form a general context which influences the health status of population and the healthcare system and it is influenced by them.

In Romania, the health care infrastructure and health status of population are influenced by the recent historic context and economic dynamic.

Our country inherited from Communist period a precarious healthcare system and a poor status of population health. The reformation of the healthcare system began only post-1989 by correcting several shortcomings. Although the health situation has improved over the years by introducing new technologies, improving the medical system and the access to information in the medical field, as well as by the emergence of private health services[24, 25], Romania is still lagging behind other countries due to the fact that it inherited an education system that did not pay the necessary attention to the specific health education process, while during the transition to a market economy, new risks such as tobacco, alcohol, drugs, the increased consumption of fast food, especially among young people, all of which had a negative influence on the health of the population.

The current study aims to identify the territorial disparities in terms of demographic features and healthcare infrastructure dynamics in Romania over the 2002–2020 period at NUTS3 level (counties). The study outlines the changes in the demographic features by analyzing different indexes (*e.g.* Natality Rate, Fertility Rate, Natural Balance, Life expectancy, Mortality Rate, Infant

Mortality Rate) and the healthcare infrastructure having in view the medical stuff with higher education (*e.g.* physicians) who assure healthcare services using and valorizing medical infrastructure (*e.g.* beds in hospitals).

METHODOLOGY AND DATA

The study relies on the Local Administrative Units (LAU) level database provided by the Population and Housing Census (2002 and 2011) and TEMPO Online time series published by the National Institute of Statistics[26].

These databases offer the possibility to analyse the changes in the population distribution, and healthcare systems. The authors computed different indexes (*e.g.*, Natality Rate, Fertility rate, Natural increase, Life expectancy, Mortality Rate, Infant Mortality Rate) which outlined the changes in the demographic features. The indicators used in order to characterize healthcare pertain to physicians and hospitals infrastructure.

The main analysed indicators, referring to the dynamics of population change, the natural increase and the healthcare system regarded the following aspects:

a. *Population dynamics*, indicating the percentage of population growth over the 2002–2020 period;

b. Natality depicts the frequency or intensity of births in a population located within a certain territory and over a certain period of time. The *Natality Rate* represents the ratio between the number of live-births in the respective year and multiplied by 1000;

c. The *Fertility Rate* represents the average number of children that are born to a woman during her fertile lifetime, conforming to the fertility rates of a given year. The Fertility rate is computed from the live-births numbers per 1000 women aged 15 to 45;

d. Population structure by large age groups (0–14, 15–64, 65 and over); the population being divided into three categories: young, adult and the elderly;

e. *Natural Balance* is the balance between the number of live-births and the number of deaths in the year of reference. The natural increase is calculated as the difference between the live-births and the deaths in that reference year;

f. The *Life expectancy* represents the average number of years an infant lives, if they lived their entire life, under the conditions of mortality by age in the reference period. Life expectancy is calculated based on the number of permanent resident population, the number of deaths and internal migration as a result of a change in residence;

g. The *Mortality Rate* is the ratio between the number of deaths in a year and the population of the respective year, and is expressed by the number of deaths per 1000 inhabitants;

h. The *Infant Mortality Rate* is the ratio between the number of deaths under the age of 1 over a period of a year and 1000 live-births within the same timeframe, and is expressed by the number of deaths under the age of 1 per 1000 live-births within the same year;

i. The number of physicians per 1,000 inhabitants;

j. The number of hospital beds per 1,000 inhabitants.

RESULTS

POPULATION DYNAMICS AND NATURAL BALANCE INDICATORS

Population dynamics

After a long period (*i.e.* during the previous century) in which the population of Romania has registered a continuous increase, except for the periods of the two World Wars, in the last decade of XX century, namely between 1992–2002, the country's population decreased by 1.1 million people and the natural balance became negative. The economic and social factors were decisive for this demographic dynamic[27–29]. After 2002, Romania's population continued to decline, because of the annual decrease in birth rates and the persistence of relatively high values in terms of mortality rate. There is a general tendency to reduce the size of the family, both in urban and rural areas, by limiting the number of children a couple has.

During the previous census, Romania's population numbered 20.1 million inhabitants, registering a decrease of 1.55 million people compared to 2002, and a more pronounced decrease in rural areas[30] (9.6%, compared to a 5% reduction in urban areas). Out of the total population losses, 2/3 represents a negative natural increase and only 1/3 emigration.

2020 official statistics show us that the population of Romania numbers 22,046,917 inhabitants, of

which 12,416,732 live in urban areas (56.31%) and 9,630,185 are found in rural areas (43.69%).

Population dynamics in the 2002–2020 period show, in general, a decrease in the number of inhabitants in most of the country's counties, with natural decrease being the most common cause, followed by the decrease due to temporary external migration. The highest losses were recorded in the southern counties of Olt and Teleorman (Fig. 1), which are known as having an aging population and a high rate of external migration of the young population in search of a better life, or irreversible internal migration, especially to the capital and to Ilfov County. Large population losses were also registered in the counties of Mehedinți, Hunedoara and Brăila, with causes being both the natural decrease and the migration of the population as a result of the restructuring of the economic activities in the respective counties. In all these counties, the population losses were between -0.11 and -0.18%. A number of 25 counties had population losses in the range of -0.02 – -0.10%, some of them comprising of the mountainous area with its isolated settlements that are faced with the depopulation and demographic aging phenomena[31–33].
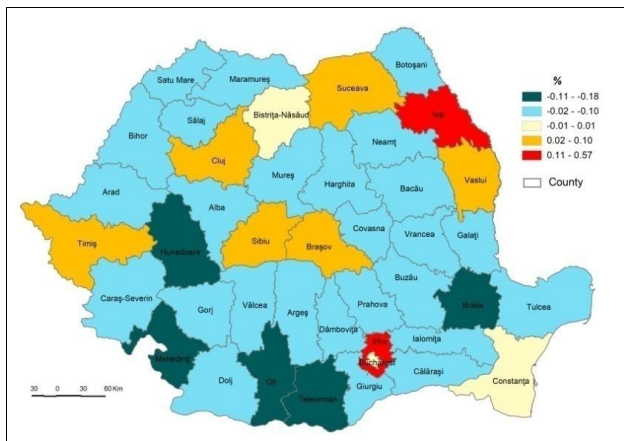

Figure 1. Changes in the total population numbers between 2002 and 2020.

The following category in terms of population dynamics is that of Bistrița-Năsăud, Constanța and Bucharest counties, which had a dynamic between -0.01 and 0.01% in the analysed interval, with Constanța and Bucharest having a more intense economic development. At the same time, Constanța County, which has a developed economy due to the port activity, is both the main economic centre of the South-East Development

Region as well as home to a large percentage of the urban population[30, 34].

The most significant population increases were registered in Ilfov and Iași counties. In Ilfov County, the population dynamics is due to the migration of the population to the cities and communes on the outskirts of Bucharest, given the lower housing prices and relatively short distances from the Capital, where most of the population has a job. Additionally, Iași County, compared to the other counties in the region, has a more diversified industry, with the city being the main growth centre of the region.

Natality

The Natality Rate is a complex demographic phenomenon of biological, economic, social, political, cultural, health and legislative importance. The natality rate is marked by increases and decreases over time, as a result of the evolution of influencing factors (social, economic and political), as well as changes in demographic legislation.

Since 1990, the natality rate has constantly been on the fall as this trend persists to this very day[35] (Fig. 2). From the 1990s up to 2012, the dynamics of the Natality Rate display a downward trend, followed by a slight increase that continues until 2020. This situation is also seen in the two living environments. The territorial distribution suggests a correlation of the Natality Rate dynamic with the measures to stimulate it adopted in first decade of our century years, such as those that favour working mothers, the counties with higher values of the indicator being those with a higher share of wage labour. The decline in the Natality rate in 2020 is owed to the pandemic caused by the SARS-CoV-2 virus, as many families postponed the decision to have a child, on the one hand due to the issue caused by this health crisis and, on the other hand, from the point of view of household income, as many families faced diminishing incomes caused by temporarily losing their jobs or by entering technical unemployment for a certain period of time.

In 2000, the lowest Natality Rates were registered in Bucharest (10.3‰) and in the counties of Arad (11.4‰), Teleorman (11.8‰), Timiș (12‰), Brașov (12‰), Ilfov (12.1‰), Caraș-Severin (12.2‰) and Prahova (12.2‰). At the other end of the spectrum, high natality rates were recorded in the counties of: Satu Mare (15.1‰), Neamț (15.2‰), Maramureș (15.8‰), Bistrița-Năsăud (16.3‰), Iași (16.4‰), Bacău

(16.5‰), Botoșani (16.7‰), Suceava (16.8‰) and Vaslui (17.3‰). Worth mentioning is that all these counties were known before the 1990s for their high natality rates, most being located in Moldova. According to the National Institute of Statistics, the year 2000 was the year with the lowest number of live-births from 1930 to present-day[26].
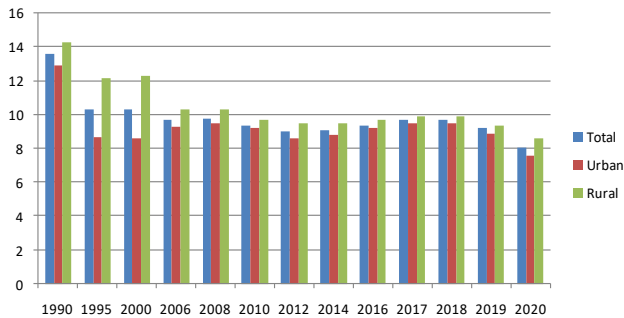

Figure 2. The dynamic of the Natality Rate (‰)
at the national level.

In general, the decrease in the number of counties with high Natality Rates happened on an eastward trajectory, capturing the advancement of the demographic transition in Romania to low Natality Rates. The distribution of the Natality Rates over the territorial profile is a testament to the non-uniformity of this indicator. Thus, at the 2020 level, the lowest Natality Rate was registered in the counties of Caraș-Severin (6.1‰), Brăila (6.2‰), Teleorman (6.3‰), Vâlcea (6.3‰) and Hunedoara (6.4‰), under-developed counties from an economic point of view, but also with a higher percentage of rural population. They are counties which also exhibit the phenomenon of demographic aging. Adversely, the counties with the highest Natality Rate values, in excess of 9‰, are: Cluj (9‰), Brașov (9.1‰), Iași (9.1‰), Mureș (9.2‰), Bistrița (9.3‰), Ilfov (9.8‰), Suceava (9.9‰) and Sălaj (10‰), some of these counties being economically developed such as the counties of Cluj, Brașov, or Iași, while others have, by tradition, a larger number of children in a family, as is the case of Moldovan counties. In 2020, the city of Bucharest registered a Natality Rate of 8.9‰ (Fig. 3).

The case of Ilfov County is quite interesting. Thus, when speaking of the 2000s, Ilfov County was among the counties with the lowest natality rate (12.1‰). However, twenty years later, the same county is among those with the highest Natality Rates (9.8‰), much lower than in 2000, lower in percentage terms. The high Natality Rate recorded by this county is explained by the fact that, in the last decade of XX century, many young families have bought houses in the towns immediately bordering the Capital, as they were drawn in by the lower prices for land and property (compared to Bucharest) and the advantage of a short commute to the workplace, which is often within the Capital bounds[36].
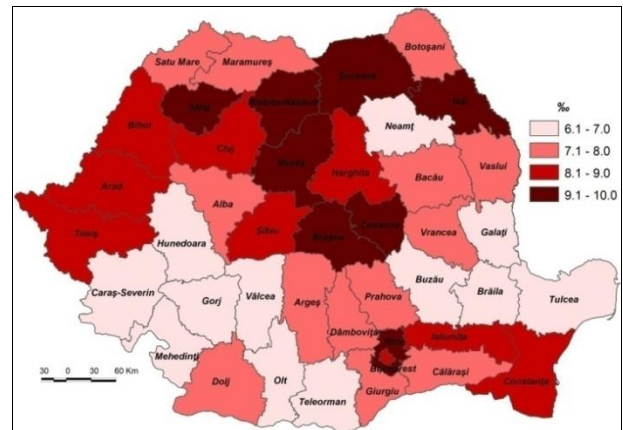

Figure 3. The Natality Rate (2020).

Fertility

In terms of Fertility rate dynamic (Table 1), it has decreased at the national level, from 56.2‰ in 1990 to 34‰ in 2020, due to, on the one hand, the emancipation of women and the desire to have a certain career and to gain a certain position in society, and, on the other hand, the years of economic crisis and implicitly the socio-economic situation that has made some families, especially those with lower incomes, to give up on expanding their families. Added to all this is the issue of young people's migration and lack of confidence in today's society. There are differences on the two environments in terms of this indicator, as well. In the rural area, this rate is much higher compared to the urban area. Thus, for rural areas the fertility rate decreased from 68.9‰, as recorded in 1990, to 37.3‰ in 2020, and in urban areas the fertility rate decreased from 46.7‰ in 1990 to 31.5‰ in 2020.

The difference in fertility between the rural and urban, industrialized areas can be justified by the difference in socio-cultural level. Thus, the study of the level of fertility of couples according to the level of education of women shows a decline in fertility as the woman's education level increases. Consequently, the fertility of women lacking education significantly exceeds that of educated women.

Table 1

The dynamic of Fertility Rates (‰)

	1990	1995	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020
Total	56.2	40.6	39.7	35.5	36.3	37.3	38.4	37.2	35.6	36.1	37.5	39.6	34.0
Urban	46.7	30.7	29.1	26.4	29.3	32.3	33.9	33.8	32	33.2	35.2	38	31.5
Rural	69.8	58.2	57.8	50.8	48.8	46	45.7	42.5	41.1	40.2	40.7	41.8	37.3

At the county level, fertility rates are unevenly distributed. Thus, for 2020, the lowest fertility rates were registered in the counties of Caraș-Severin, Brăila, Galați, Vâlcea, Hunedoara, Gorj, Neamț, Tulcea, Mehedinți and Bacău, each county having values below 30‰. The counties of Alba, Botoșani, Satu Mare, Dolj, Maramureș, Argeș and Dâmbovița are close to the national average, having a value between 32 and 37‰. There is a number of 19 counties (Constanța, Arad, Sibiu, Giurgiu, Călărași, Ialomița, Timiș, Bucharest, Iași, Harghita, Bihor, Ilfov, Cluj, Covasna, Brașov, Bistrița-Năsăud, Mureș, Suceava and Sălaj) above the national average (34‰), the value of the fertility rate ranging between 34.4‰ and 43.6‰.

Romania's demographic outlook is deeply rooted in the post-1989 demographic decline and especially in the low level of fertility during this period. The persistence of low fertility will further aggravate the country's demographic status after the 2025–2030 interval, when the younger generations, born after 1990, will make up the entire fertile population from which future children will come. A recovery in fertility could slow the rate of deterioration only towards the second half of the century[29].
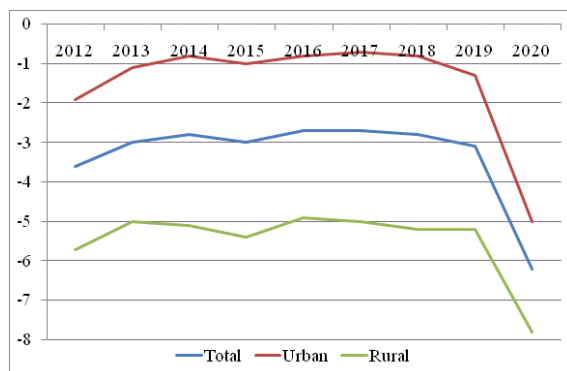
Natural balance

Throughout the years, the natural movement of the population has evolved towards an ever lower natural balance, even reaching a negative value (-0.2‰ in 1992), and for 2020 the value of the natural balance registered a value of -6.2‰, (5‰ in urban areas and 7.8‰ in rural areas). We note that the highest values were registered in 2020, this year being the first year marked by the SARS-CoV2 virus pandemic (Fig. 4).

The highest values of the natural balance were registered in the poorly developed ones (Teleorman -13.4‰, Brăila -11.9‰, Olt and Hunedoara, each with -10.9‰, Giurgiu -10.4‰)[34].

Contrastingly, below the national average are the counties that maintain their positions in terms of economic development (Iași -1.7‰, Timiș -2.8‰, Brașov -3.2‰, Bucharest -3.3‰, Suceava -3.5‰, Cluj -3.7‰) (Fig. 5). A positive situation is registered in Ilfov county, where this indicator records a natural balance of -1‰, a situation due to the fact that in this county, which finds itself in the immediate vicinity of Bucharest, in recent years, in the towns it comprises, many young families have purchased property, enticed by the lower prices compared to those in the Capital.

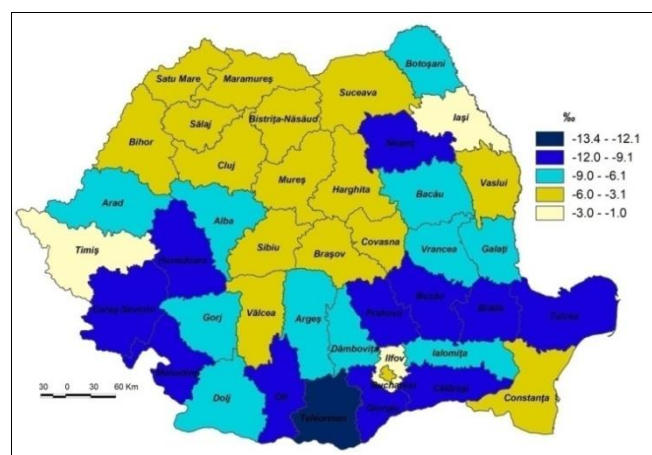Figure 4. The dynamic of the natural balance rate (‰) at the national level.

Figure 5. The Natural Balance (2020).

If for 2020, all the counties registered a negative natural balance, between -1‰ in Ilfov county and -13.4‰ in Teleorman county, for 2000, out of the 40 counties plus the municipality of Bucharest, 13 counties registered positive values, between 0.1‰ in Harghita county and 4‰ in Ilfov county. The remaining 28 counties registered negative values that year, between -0.1‰ in Gorj county and -6.7‰ in Teleorman county, much lower values compared to those of the previous analysed year (2020).

In the country, for decades, the natural balance was higher in the counties form Norther and Eastern parts (Moldova) and lower in those from Western part (Banat), mainly due to obvious differences in the number of children/family. However, over time, the counties of Moldova and those in northern Transylvania also registered a negative natural balance. Between 1990–2020, the number of counties with a negative natural balance permanently increased, going from 3 counties in 1990, to 28 in 2000, to 36 in 2011, and all counties in 2020, including Bucharest. All of them registered a negative natural balance, while, at the same time, there is a rise in the values of the natural balance for the counties in the south of the country.

Life expectancy

Life expectancy places Romania among the last countries in the European Union, with a value of 75.3 years registered in 2020, about 6 years fewer than the average level recorded by the EU, with women having a longer life expectancy compared to men. This is because men have more demanding jobs than women, and on the other hand, because women have a healthier lifestyle and diet than men.

At the level of the country, the life expectancy has constantly increased, from 69.56 years in 1990, to 70.53 in 2000, to 76.11 in 2020, with differentiations being made both according to the two residential environments, as well as to sex. Thus, for the female population, life expectancy increased from 72.65 years in 1990 to 74.2 years in 2000 and reached a value of 79.75 years in 2020, which is on average 6 years more than men. For the male population, the increase was from 66.56 years in 1990, to 67.03 in 2000 and to 72.54 years in the previous analysed year – 2020. We can see that the largest increases were in the last 20 years, between 2000–2020, both by total population and by both sexes (Table 2). There is also an increase in life expectancy in the two residential environments, from 71.31 years in 2000 to 77.44 years in 2020 for the urban environment, and from 69.53 years in 2000 to 74.41 years in 2020 for the rural environment, the life expectancy being higher in the urban environment, where a higher standard of living is registered and where there is a better access to health services, as well as higher incomes, compared to the rural environment.

At county level, the highest value of life expectancy was recorded in 2020 in Vâlcea County (81.22 years), followed by Bucharest (78.44 years) and the counties of: Cluj, Brașov, Sibiu, Timiș, Alba, Iași and Bistrița Năsăud, Suceava, Gorj, Ilfov, Argeș and Harghita, where life expectancy exceeds 76 years (Fig. 6). With the lowest values of life expectancy, below the national average (76.11years), are the counties of Tulcea, Giurgiu (bouth registering values under 74 years), and Călărași, Satu Mare, Bacău, Olt, Ialomița, Brăila. In fact, in this category, Tulcea County has the lowest life expectancy, due to the fact that most of the county is covered by water, by the existence of the Danube Delta, and living conditions here are tougher compared to the rest of the counties in the country.
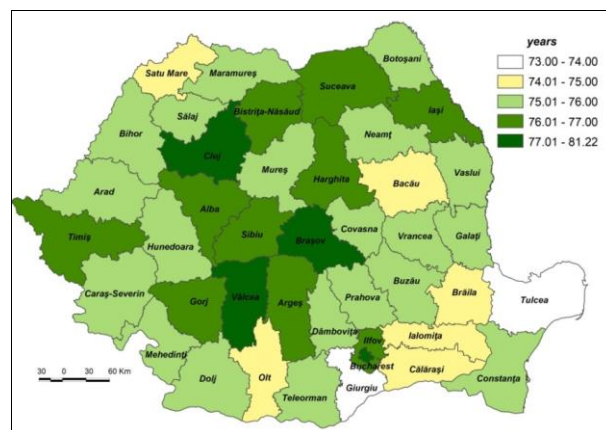

Figure 6. The Life Expectancy, 2020.

Mortality

The healthcare infrastructure and the state of health of the population are highlighted by the particularities of the morbidity and mortality model, which reflect the main health problems faced by the population[37]. The analysis of mortality and morbidity in Romania, compared to the states in the European Union, shows that our country has much higher values for these indicators, which requires a permanent improvement in the health of the population. This represents a major goal at the national level. These gaps between Romania and other countries are the result of economic and social difficulties, inherited from the communist period, which were, however, perpetuated and even exacerbated during the transition and post-transition period, which led to high mortality and morbidity rates.

Table 2

The evolution of the Life Expectancy (years)

Year	Total	Men	Women	Urban	Rural
1990	69.56	66.56	72.65	no data	no data
2000	70.53	67.03	74.2	71.31	69.53
2020	76.11	72.54	79.75	77.44	74.41

At county level, the general mortality remained high, the trend being an increasing one in most counties of the country, as the mortality rate is associated with the demographic aging phenomenon, more persistent in rural areas, as well as with the migration of young people.

At the national level, a comparison between 2000 and 2020 highlights the fact that the general mortality rate increased from 11.2‰ in 2000 to 13.4‰ in 2020. The mortality rate in Romania (13.4‰), is much higher than the European mortality rate of 10.4‰[38, 39, 40].

Among the counties with the highest increases in the general mortality rate, with over 3 percent per thousand inhabitants are: Argeș, Bacău, Brăila, Buzău, Călărași, Constanța, Dâmbovița, Galați, Giurgiu, Hunedoara, Ialomița, Neamț, Olt, Prahova and Teleorman (Fig. 7). Only one county, namely Ilfov county, records a decrease in the mortality rate, from 11.7‰ to 10.5‰ over the same analysed period.

For 2020, the overall mortality rate has also risen in the context of the Covid-19 pandemic, with the majority of the causes of death being pneumonia[41].

Infant mortality

The general mortality rate is also influenced by the infant mortality rate, which for 2020 had a value of 6.1‰, compared to 2000, when it recorded a much higher value, of 18.6‰. This means that there is a continuous decreasing trend, this decrease being caused also by the decrease in the number of births after the year 2000. Despite the fact that in the past 20 years there has been a rather large decrease in the infant mortality rate, at European level, our country is above average (3.4‰).

For 2020, Bucharest was among the counties with the lowest infant mortality rate, followed by: Buzău, Vaslui, Vrancea, Iași, Dâmbovița, Timiș, Caraș-Severin, Giurgiu, Cluj, Teleorman, Argeș, Prahova, Ilfov, Neamț, Vâlcea. Contrastingly, the following counties have high infant mortality rates: Covasna, Mureș, Suceava, Olt, Tulcea and Satu Mare, which have values in excess of 8.7‰ (Fig. 8).

Among the main causes of death affecting the Romanian population we may mention: circulatory system diseases (54.8%), tumours (16.7%), respiratory system diseases (13%). The distribution according to the cause of deaths varies according to the residential environment, the structure of the population by age groups and sexes, as well as to socio-economic factors such as the standard of living, the income, and the level of education. At the same time, it was found that, regarding mortality in Romania, half of the number of deaths has as risk factors and behavioural factors smoking, obesity, among both adults and children, as well as alcohol consumption. Our country surpasses the European average for all these risk factors[42].

The evolution of the main demographic indicators, both in the previous century and at the beginning of the 21st century, shows an alignment of the Romanian population with the demographic trends manifested by most European countries, namely the decrease in birth and fertility rates, the increase in external migration, and a negative natural increase, together with several social issues such as rising divorce rates, unemployment and poverty. All these changes, occurring from a demographic and social point of view, highlight a sharp demographic decline, which will, in the long run, change the structure by age groups of the population and, implicitly, the aging of Romania's population[29].

The global economic crisis has also affected our country, having negative effects on both employment and income, both for employees in the public sector and for those in the private sector[43]. The effects of the crisis are felt both economically and socially, through declining incomes, declining living standards and the number of new-borns. The changes have caused some uncertainty in certain areas of social life such as health, education, or social protection.

Figure 7. The Mortality Rate (2020).

Figure 8. The Infant Mortality Rate (2020).

According to *Romania's National Sustainable Development Strategy 2013-2020-2030*, the main issues that need to be addressed in terms of population are: demographic decline, which in the long run has an effect on the aging population; the decrease of the natality rate, and as a result of the progressive reduction of the working population, the deterring of the migration of the population, especially of that benefitting from average and superior training. Without a remediation of these indicators, which are common to all countries of the European Union, there is a risk that in the coming decades our country will face a waning population, with a deterioration of employment and an increased aging.

THE HEALTHCARE INFRASTRUCTURE

The Romanian healthcare system is based on a model of social health insurance in which the state plays a significant role. The Ministry of Health is responsible for general governance, while the National Health Insurance House (CNAS) manages and regulates the system. Both the Ministry of Health and CNAS are represented at the local level by the county authorities in the field of public health and by the County Health Insurance Houses. Healthcare services are provided in 41 counties as well as in Bucharest, in accordance with the rules established at the central level.

At national level, through the social health insurance system, Romania offers coverage for over 89% of the total population, with differences between urban and rural areas, as the per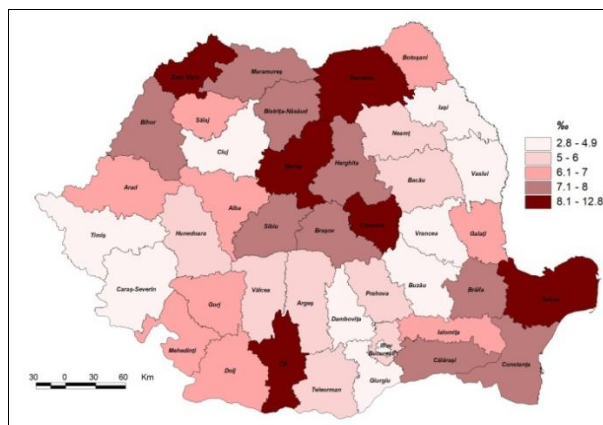centage in urban areas is generally 20% higher compared to that of rural areas[44]. Although the Social Health Insurance System offers a comprehensive package of services, part of the population remains uninsured and is only entitled to a minimum package of services. From this point of view, the main objective of the national health system is to remedy the imbalance between primary care and hospital health services and, on the other hand, to combat the growing shortage of health professionals (Cucu, 2021). Health spending in Romania is the lowest in the EU both per capita (EUR 1,029, the EU average being EUR 2,884) and as a percentage of GDP (5% compared to 9.8% in the EU) (Fig. 9).

Indicators on health services and health infrastructure play an important part in assessing the health of the population. What we refer to are the medical staff (physicians and nurses serving the population), as well as hospital infrastructure and the number of hospital beds. The health infrastructure and the medical personnel are important parts of the health system, as any medical activity is supported by and dependent upon them[21,45].

Physicians

Currently, at national level, our country is facing a shortage of medical staff, both physicians and nurses, the lack of staff being more pronounced in rural areas. The analysis of the data at national level shows that, the number of physicians/1,000 inhabitants is 2.9 compared to the EU average of 3.6. Regarding nurses, national averages 6.7 nurses/1,000 inhabitants, while at European level, the average is 8.5 nurses/1,000 inhabitants.
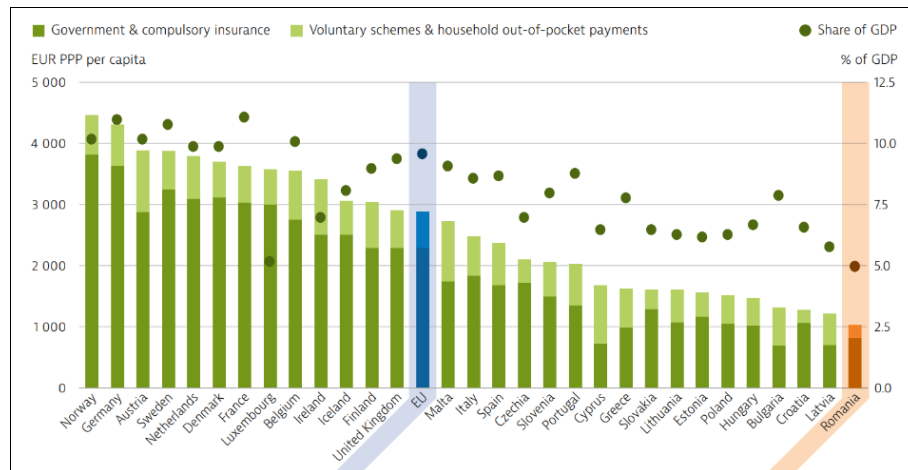
Source: OECD (2021)(data refer to 2017).

Figure 9. Health spending in Romania, as compared to other EU countries.

The geographical distribution of the number of physicians/1,000 inhabitants at county level highlights major differences. Thus, the number of registered physicians, ranking above the national average, is registered in the counties of: Bihor (3.14 physicians/1,000 inhabitants), Iași (3.61), Mureș (3.85), Dolj (4.09), Cluj (4.84),

Timiș (5.26). These counties also happen to be counties where the largest hospitals in the country are found, some of them being university centres. The municipality of Bucharest registers the highest value for this indicator, namely 5.96 physicians/1,000 inhabitants, most of the hospitals being in the Capital, with multiple specializations and, at the same time, a higher number of private medical centres compared to the rest of the counties (Fig. 10).

At the other end of the spectrum, the counties in the south, south-east and north-east of the country rank lowest in terms of number of physicians/1000 inhabitants, as they are generally under-developed counties from the economic point of view and with a higher percentage of the rural population: Călărași (0.98 physicians/1,000 inhabitants), Vaslui (1.10), Ialomița (1.11), Dâmbovița (1.12), Giurgiu (1.14), Suceava 1.26), Buzău (1.31), Botoșani (1.34) and Vrancea (1.35).

The territorial distribution in terms of the number of physicians, highlights differences between the northern and north-western part of the country, compared to the south and southeast. The small number of physicians/1,000 inhabitants has a negative impact on patients (a situation which is felt in Carpathian settlements, at high altitudes, in isolated villages, at a great distance from an urban

centre, or in localities isolated by waters in the Danube Delta). On the other hand, there are some developed localities, with a large population, but which do not have enough physicians, in which case, the doctors are overworked and often fail to meet the needs of patients.

Beds in hospitals

Regarding the number of hospital beds/1,000 inhabitants, we note that the highest value is registered in Bucharest (10.45 beds/1000 inhabitants), since the capital registers the highest medical infrastructure nation-wide. The subsequent counties that register high value for this indicator are Cluj (9.47 beds/1,000 inhabitants), Iași (8.9 beds/1,000 inhabitants), Timiș (7.46 beds/1,000 inhabitants), Hunedoara (7.00 beds/1,000 inhabitants), Mureș (6.79 beds/1,000 inhabitants) and Dolj (6.76 beds/1,000 inhabitants). Low values for this indicator are recorded, as in the case of physicians, in the counties in the south and southeast of the country: Giurgiu (2.92 beds/1,000 inhabitants), Ialomița (2.93 beds/1,000 inhabitants), Vrancea (3,40 beds/1,000 inhabitants), Tulcea (3.41 beds/1,000 inhabitants), Ilfov (3.48 beds/1,000 inhabitants), Călărași (3.66 beds/1,000 inhabitants) and Neamț (3.90 beds/1,000 inhabitants) (Fig. 11).

We may say that there are differences in the two areas, urban and rural, with both the number of physicians, as well as the number of medical units being concentrated in large urban centres: Bucharest, Cluj-Napoca, Iași, Timișoara, Târgu-Mureș, Craiova, Galați. These differences in the distribution of medical staff lead to a reduced

supply of medical services in rural areas or in cities with a small population. Most of the time, the lack of medical staff overlaps socio-economically disadvantaged areas, which have high unemployment rates, poverty, low levels of education, that is, where more medical care is needed.
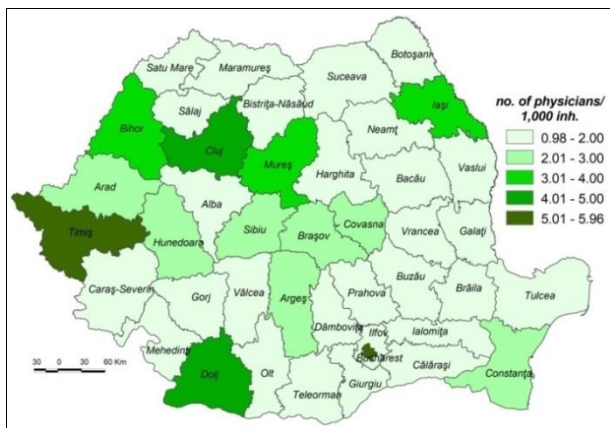

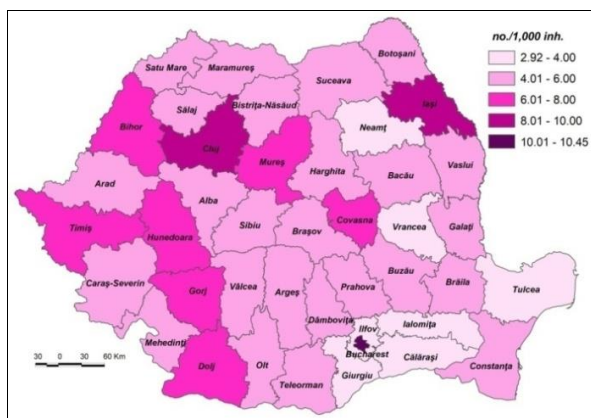Figure 10. Number of physicians/1,000 inhabitants.

Figure 11. The number of beds in hospitals/1,000 inhabitants.

Part of the shortage of medical staff is also due to their emigration in recent years, especially after Romania's integration into the EU, to other countries. They were enticed by higher salaries and much better working conditions offered by their host countries. In order to stop this migration, and reduce the shortage of medical personnel, the Romanian Government has taken measures, starting 2018, by allocating funds to increase salaries, and trying to make jobs as attractive as possible, thus encouraging staff retention. A trait of the national health system is that in our country primary healthcare is underused by people with health problems, many of them preferring to solve their various ailments by going and resorting to emergency medical services in hospitals, although said ailments may not require urgent care.

Currently, in Romania, most health services are provided in hospitals, but some services such as maternal and child healthcare, home care services for people with disabilities, services for monitoring patients with diabetes are far below the existing requirement. At the same time, the future aim is to increase specialized services in the outpatient department, thus reducing the number of hospitalizations that could be otherwise solved using this service.

An important role in assessing and maintaining the health of the population is played by doctors through family planning programs, who have responsibilities in organizing, administering and providing these services.

POPULATION HEALTH
AND THE CORONAVIRUS PANDEMIC

The year 2020 was also marked by the SARSCOV-19 virus pandemic. As a result of this pandemic, there has been a slight decrease in life expectancy at birth. At the same time, there was an increase in deaths due to diseases that could have been treated or prevented, which indicates the low performance in the Romanian health system, the lack of access to services, but also the lack of prevention, as shown in a report on the health of the Romanian population[42]. This entire situation was deteriorated further during the pandemic. At the same time, Romania ranks last in terms of spending on prevention and primary care. The increased demand for health care during the pandemic, together with restrictions in health facilities, have led to delays in consultations and treatment for a number of other conditions during this period, leading to increased levels of unmet medical needs, which has contributed to a deterioration in the health of the population suffering from certain diseases.

It is known that a large part of the population in Romania, especially in rural areas, has not developed a habit of preventing or monitoring their health, instead preferring to go to the doctor only when they are very ill. This behaviour intensified during the pandemic, for fear of contracting the virus in clinics or hospitals.

Another category of population, that is, the young population, preferred to keep in touch with family doctors by phone, depending on the availability of doctors, without resorting to online medical appointments on specialized platforms.

Both before and during the pandemic, a problem was the lack of specialized staff, with the most acute shortage during the pandemic being that of doctors and nurses in ICU. At the same time, the medical staff who, in the state of emergency, had in evidence or under treatment patients infected with COVID-19, received risk incentives[46].

CONCLUSIONS

The changes occurring after the 1990s, politically, economically and socially, together with the change in people's mentalities, have influenced the demographic behaviour of the population. In the past 20 years, in our country, the population has decreased substantially, due to low natality rates, and the trend of demographic aging (by decreasing the share of the young population and increasing the share of the elderly population), to which is added external migration, especially that of the young population. Romania thus aligned itself to the trends manifested in most European countries. At the same time, life expectancy at birth, which is an indicator of the quality of life, has increased in the past two decades, the percentage being higher in urban areas compared to rural areas, but we are lagging behind this indicator compared to the European average.

Population health is a key element in the development of Romanian society, both socially and economically. To this end, efforts are made at the national level to reduce the gaps and inequalities in the health system. The health of the population, and of a family in general, depends on employment and working conditions, as well as on the level of income and training that the population in question has, as well as on the physical living environment of the population. Last but not least, attention must be paid to the relationship between health and the environment, as some diseases are associated with the environment in which we live (respiratory, cardiovascular, neurological diseases, some types of cancer).

National priorities in the health sector are as follows: improving the infrastructure of the health system, developing the health infrastructure at all levels (national, regional and local) to reduce inequalities in terms of access to health services (both between the two residential environment and among vulnerable groups), or improving the health of both mother and child.

Regarding the natality rate, starting 2010 there has been a continuous decrease, the largest reduction being registered in the southern counties (except for the Capital and Ilfov County) and the southeast of the country, whereas the infant mortality rate has dropped. The year 2020 was the year with the lowest number of live births from 1930 to present-day. At the same time, there is a decrease in the fertility rate compared to previous years. In the case of births, there is a gap between the two environments - urban and rural, which is related to differences in the age structure of the population, the percentage of women of childbearing age, and the level of education, tradition, gender roles, as well as the level of migration.

In recent decades, our country has taken over the reproductive model encountered in Western countries, namely families limit themselves to an even-decreasing number of children, and the age of expectant mothers is on the rise.

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