

THE IMPACT OF DEMOGRAPHIC IMBALANCES ON EDUCATION AND HEALTHCARE IN BISTRIȚA-NĂȘĂUD COUNTY

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ABSTRACT. – **The Impact of Demographic Imbalances on Education and Healthcare in Bistrița-Năsăud County.** Low birth rates and limited immigration, together with high mortality and emigration, reflected in a negative total population change, have placed and continue to place Bistrița-Năsăud County in an unfavourable demographic position, with both direct and indirect consequences for society. One of the most severe consequences has been its impact on society and economy, which is particularly evident in the education and healthcare sectors, while simultaneously widening the imbalance between the economically active and inactive populations. According to data provided by the National Institute of Statistics, in 2024 the proportion of the elderly population (aged 65 years and over) reached 16.77%, whereas the proportion of the young population (0–14 years) was 15.77%. The crude birth rate was 8.23‰, the crude death rate 9.83‰, the immigration rate 16.6‰, and the emigration rate 18.18‰. In 2025, the most aged populations were concentrated in the southern, western, and south-western parts of the county, particularly in the communes of Mîlaș, Miceștii de Câmpie, Silivașu de Câmpie, Chiochiș, Nușeni, Șintereag, Braniștea, Ciceu-Giurgești, and Târlîșua. Consequently, these communes experienced the most pronounced demographic, social, and economic consequences. The communes with fewer than 100 pupils enrolled in a school were Miceștii de Câmpie (63 pupils), Ciceu-Mihăiești (82 pupils), Silivașu de Câmpie (83 pupils), and Ciceu-Giurgești (86 pupils). As a result, the number of teaching staff was also limited, while educational investments remained comparatively low. In the healthcare sector, an ageing population entails

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increasing investment requirements, higher morbidity, and a growing shortage of economically active individuals capable of sustaining the healthcare system through financial contributions.

Keywords: *population ageing; population; spatial planning; Bistrița-Năsăud County; Romania*

1. INTRODUCTION

Population ageing is currently one of the most significant demographic phenomena worldwide, with particularly pronounced manifestations in certain regions, including Europe. Women's increasing social and economic emancipation, advances in healthcare, and sustained large-scale migration have contributed to a continuous decline in the size of the young population. Consequently, the number of individuals of reproductive age has also decreased, posing a long-term challenge to population replacement and overall demographic sustainability (Iftimoaei, 2018; Cristea et al., 2020; Inomjonova, 2022; Cochino, 2005; Erdeli & Dumitrache, 2016).

Within the Romanian context, recent decades have been characterised by profound demographic transformations, particularly with regard to the age structure of the population. These changes are closely associated with the process known as the demographic transition, during which high birth rates gradually declined while mortality increased. This evolution was largely influenced by Romania's transition from a totalitarian political regime to a democratic one, a process that triggered substantial political, economic, and social changes, all of which were reflected in the country's demographic dynamics (Vert, 2001; Muntele & Ungureanu, 2006; Surd, 2001).

Throughout most of the twentieth century—excluding the periods of the two World Wars, when mortality increased dramatically owing to wartime conditions—Romania's population experienced sustained demographic growth. A particularly significant increase occurred during 1966–1967, following the prohibition of abortion and the implementation of pro-natalist policies, which resulted in a marked rise in birth rates. After 1989, however, Romania entered a period of demographic decline. The population decreased annually by approximately 0.15%, while the ageing process gradually but steadily intensified, especially in rural areas, as young people increasingly migrated to urban centres. During the twenty-first century, international migration became progressively more widespread, further contributing to demographic change (Bălașa, 2005; Mărginean, 2016; Mihaescu, Dimian, & Căplescu, 2011; Guga & Sindreștean, 2021).

The factors driving demographic change play a fundamental role in shaping transformations across demographic, territorial, social, and economic structures. Among the most visible consequences of population ageing are the growing proportion of elderly people relative to the young population, declining birth rates, increasing mortality, a reduction in school enrolment, higher expenditure on healthcare services, increased public spending on pensions, and widening disparities between the economically active and inactive populations (Neguț, 2011; Nicolae, 2012).

2. MATERIALS AND METHODS

Most of the data used in this study were obtained from the website of the National Institute of Statistics (NIS), which annually publishes statistical data through the TEMPO-Online platform for each administrative-territorial unit in Romania. The present study is based on data for the years 2023 and 2024, which were used to calculate the demographic indicators analysed. Subsequently, the results were presented in the form of choropleth maps and graphs using ArcMap 10.8.2 and Microsoft Excel.

In addition to the data retrieved from the TEMPO-Online platform, the study also used information provided by the Bistrița-Năsăud County School Inspectorate regarding the educational situation in the rural communes of the county. These data refer to the 2024–2025 school year and were employed to assess the relationship between demographic change and educational indicators, including school enrolment, teaching staff, and educational infrastructure.

3. RESULTS AND DISCUSSION

At the national level, population ageing has become an increasingly pronounced demographic phenomenon that is progressively more difficult to reverse, generating substantial demographic imbalances. This process has been sustained by a persistently negative total population change over an extended period. Similar to many other Romanian counties, Bistrița-Năsăud has not been exempt from these demographic developments.

Overall, the analysis of the period 1992–2024 (fig. 1) reveals a clear downward trend in the crude birth rate. The highest value was recorded at the beginning of the study period, in 1992, when the crude birth rate reached 14.19‰. By contrast, the lowest value was recorded in 2024, the most recent year for which statistical data are available, when the rate declined to 8.23‰ (NIS, 2025).

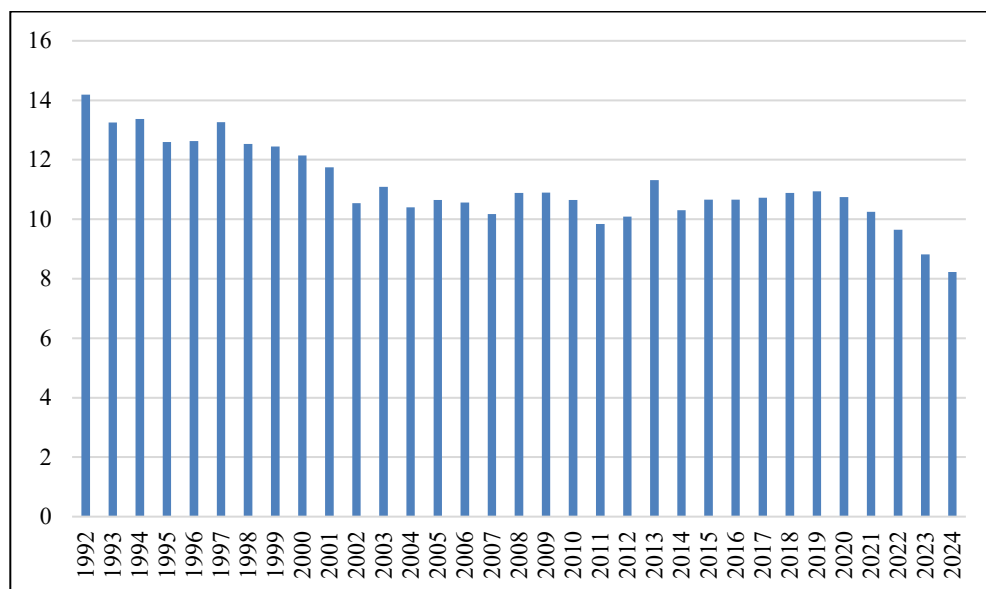


Fig. 1. Evolution of the crude birth rate in Bistrița-Năsăud County between 1992 and 2024.

Source: National Institute of Statistics – TEMPO-Online (2025).

After 2000, the crude birth rate in Bistrița-Năsăud County remained consistently below 12‰, while after 2020 it fell below 10‰, with the exception of 2021, when it recorded a slightly higher value of 10.25‰. This downward trend is expected to continue because the population of reproductive age is itself declining relative to the total population. At the same time, fertility has stabilised at comparatively low levels, as the small-family model—typically consisting of one or two children—has become increasingly widespread throughout Romanian society.

The crude death rate remained relatively stable throughout most of the study period (Fig. 2), with the notable exception of the COVID-19 pandemic years. It has had constant values, for instance 9.87‰ in 1992 (the first year of the period) and 9.83‰ in 2024 (the last year of the studied period). The highest mortality level was recorded in 2021, reaching 14.17‰, whereas the lowest value (9.15‰) occurred in 2023. Mortality increased substantially during the pandemic, rising from 10.05‰ in 2019 to 12.46‰ in 2020, before peaking at 14.17‰ in 2021. In the subsequent years, the crude death rate decreased, reaching its minimum value in 2023. However, in 2024, the most recent year for which data are available, a slight increase was again noticed, with the rate rising to 9.83‰ (NIS, 2025).

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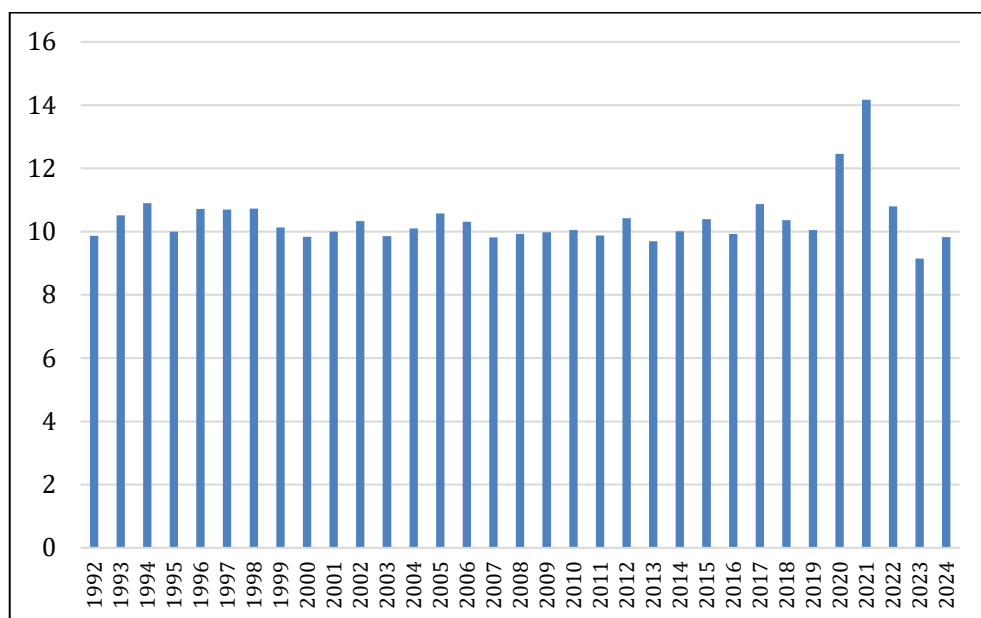


Fig. 2. Evolution of the crude death rate in Bistrița-Năsăud County between 1992 and 2024.

Source: National Institute of Statistics – TEMPO-Online (2025).

Despite the trends remarked during the study period, the crude birth rate exceeded the crude death rate throughout most of the interval, resulting in a positive natural increase until 2019, with the exception of three years in which slightly negative values were recorded: 2011 (-0.04‰), 2012 (-0.33‰), and 2017 (-0.15‰) (fig. 3). It can reasonably be assumed that the values of the natural increase rate prior to 1992 were even higher, given the considerably higher birth rates recorded during the preceding decades.

Since 2020, however, the natural increase has become negative every year, largely owing to the sharp rise in mortality associated with the COVID-19 pandemic. Although the indicator showed signs of recovery after 2022, the most recent data indicate a renewed decline, from -0.33‰ in 2023 to -1.60‰ in 2024 (NIS, 2025).

With regard to immigration, a clear upward trend can be noticed (Fig. 4). Since 2012, the immigration rate has consistently exceeded 12‰ and has contributed more to the county's population dynamics than natural increase through births.

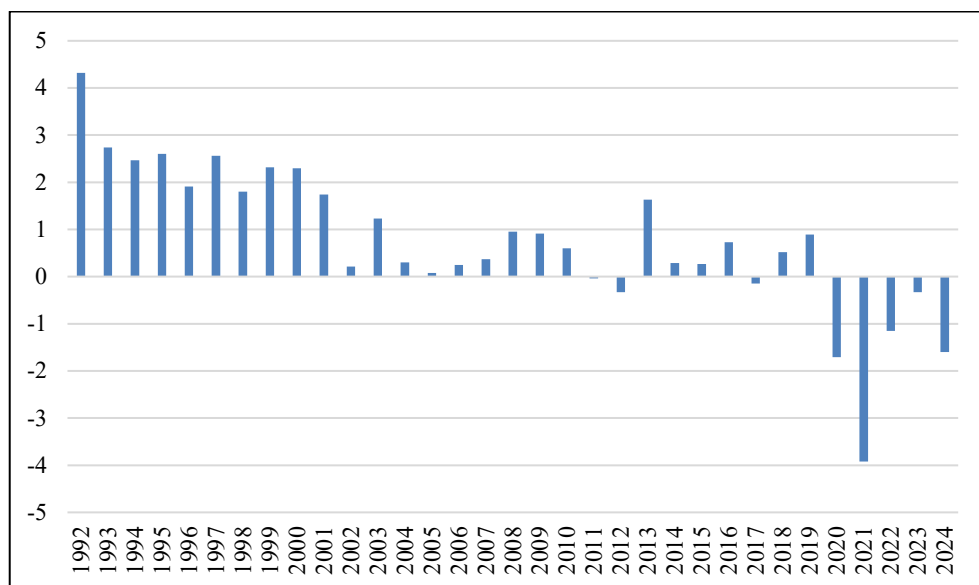


Fig. 3. Evolution of the natural increase rate in Bistrița-Năsăud County between 1992 and 2024.

Source: National Institute of Statistics – TEMPO-Online (2025).

The lowest immigration rate was recorded in 2000, at 7.84‰.

Thereafter, immigration increased markedly, particularly after 2012, with a further acceleration after 2020, reaching its highest value of the study period (16.60‰) in 2024. Although the long-term trend has been one of sustained growth, temporary declines were recorded in certain years (NIS, 2025). During the study period, the emigration rate exceeded the crude death rate (Fig. 5). Its evolution closely mirrored the number of individuals who changed their residence from Bistrița-Năsăud County. Between 1990 and 2012, the indicator fluctuated considerably, after which it stabilised at relatively high levels. Compared to immigration, emigration has consistently recorded higher values, resulting in negative net migration in the county as a whole.

At the same time, the process of suburbanisation has played, and continues to play, an important role in increasing both emigration and immigration rates. Much of this movement represents internal migration within the county. Consequently, these rates are likely to continue increasing in the near future, provided that suburbanisation remains an important demographic process (NIS, 2025).

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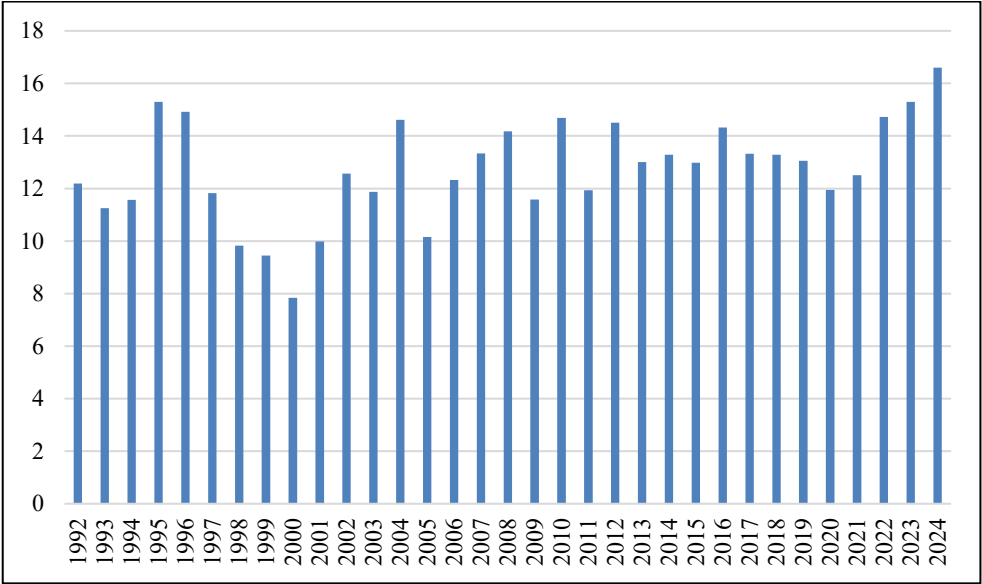


Fig. 4. Evolution of the immigration rate in Bistrița-Năsăud County between 1992 and 2024.
Source: National Institute of Statistics – TEMPO-Online (2025).

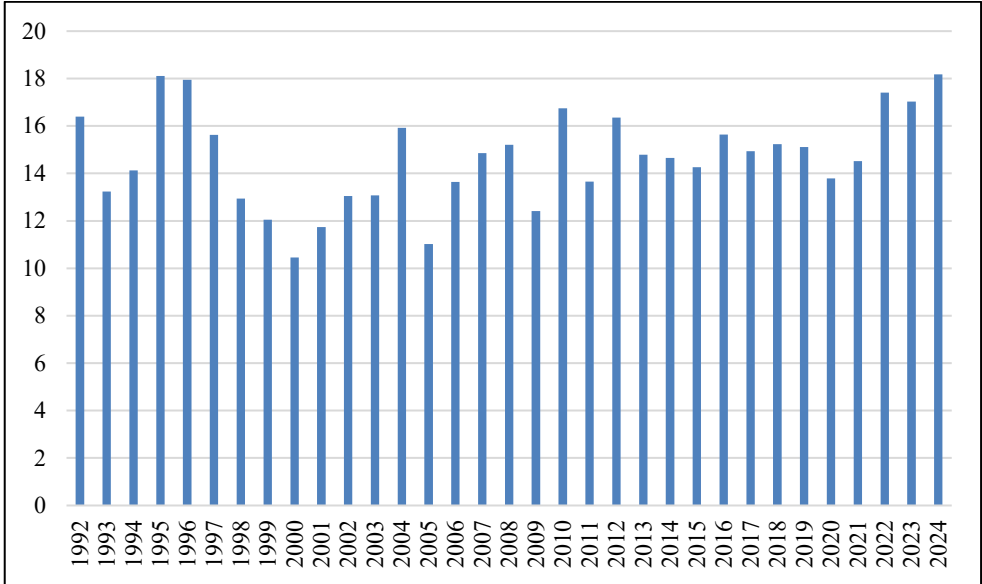


Fig. 5. Evolution of the emigration rate in Bistrița-Năsăud County between 1992 and 2024.
Source: National Institute of Statistics – TEMPO-Online (2025).

The net migration rate evolved differently than the natural increase rate over the period 1992–2024. While net migration remained consistently negative throughout the entire interval, natural increase became negative only during the latter part of the study period (Fig. 6). The negative values of the net migration rate contributed to the long-term decline of the county's population.

At the beginning of the 1990s, the net migration rate recorded the lowest values of the entire period, reaching its absolute minimum in 1992 (-4.19‰) and a secondary minimum in 1997 (-3.81‰). The highest value was recorded at the end of the 2000s, when the rate reached -0.83‰ in 2009. Thereafter, the rate fluctuated but remained negative through 2024, the most recent year for which data are available. The slight improvement noticed in recent years can be attributed primarily to the increase in immigration (NIS, 2025).

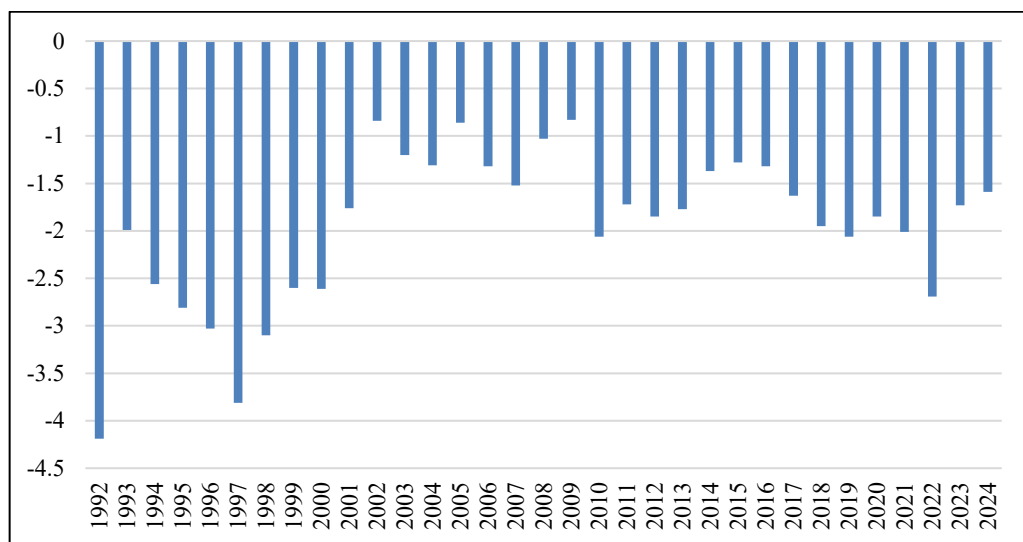


Fig. 6. Evolution of the net migration rate in Bistrița-Năsăud County between 1992 and 2024.

Source: National Institute of Statistics – TEMPO-Online (2025).

The total population change rate in Bistrița-Năsăud County (Fig. 7) exhibited considerable fluctuations over the past decades. The decline in natural increase beginning in 2020 coincided with persistently negative net migration, driven primarily by external migration, resulting in negative values of total population change. With the exception of 1992, 1993, 2003, and 2009, the total population change remained negative throughout the study period, reaching particularly low values during the outbreak of the COVID-19 pandemic.

The highest value was recorded in 1993 (0.75‰), whereas the lowest occurred in 2021, when the indicator declined to -5.93‰. Following this minimum, a gradual recovery was remarked, with values improving from -5.93‰ in 2021 to -3.84‰ in 2022 and -2.06‰ in 2023. Nevertheless, in 2024, the most recent year for which data are available, the rate declined once again to -3.19‰ (NIS, 2025).

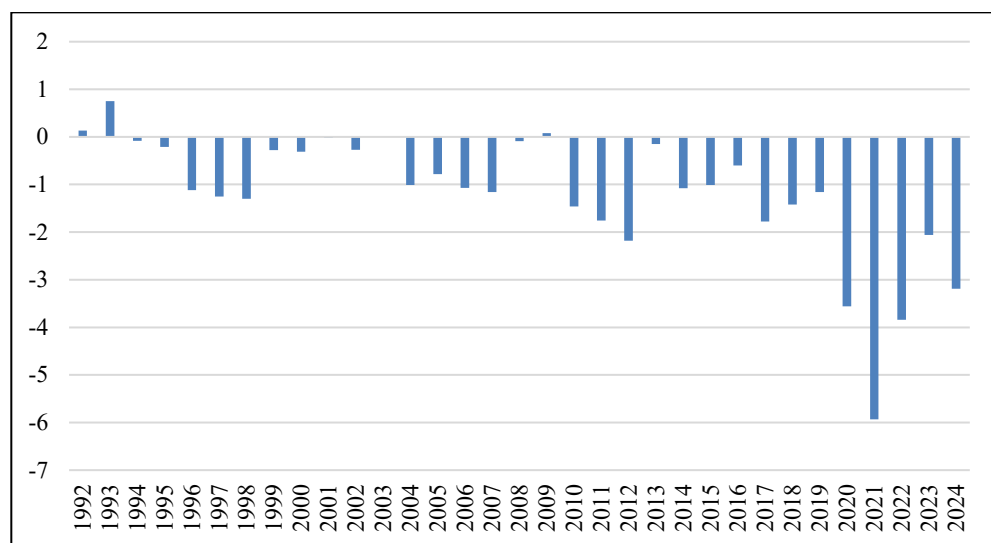


Fig. 7. Evolution of the total population change rate in Bistrița-Năsăud County between 1992 and 2024.

Source: National Institute of Statistics – TEMPO-Online (2025).

Within this demographic context, declining birth rates and sustained emigration have placed the educational system under increasing pressure, particularly through their impact on school enrolment (fig. 8). During the 2024–2025 school year, the communes with the lowest birth rates also recorded the smallest numbers of enrolled pupils: Miceștii de Câmpie (63), Silivașu de Câmpie (83), Ciceu-Giurgești (86), Milaș (104), Sânmihaiu de Câmpie (128), Poiana Ilvei (138), Urmeniș (151), and Braniștea (156 pupils).

A declining school-age population inevitably leads to a reduction in the number of teaching staff (fig. 9). In 2024, the number of teachers was directly proportional to the number of pupils enrolled. Consequently, communes with smaller school populations also employed fewer teachers, and in several cases multi-grade teaching was necessary to ensure educational provision. This situation was remarked in Ciceu-Mihăiești (6 teachers), Milaș (9 teachers), Urmeniș and Poiana Ilvei (11 teachers each), Ciceu-Giurgești and Silivașu de Câmpie (12 teachers each), Braniștea and Miceștii de Câmpie (15 teachers each), and Sânmihaiu de Câmpie (17 teachers).

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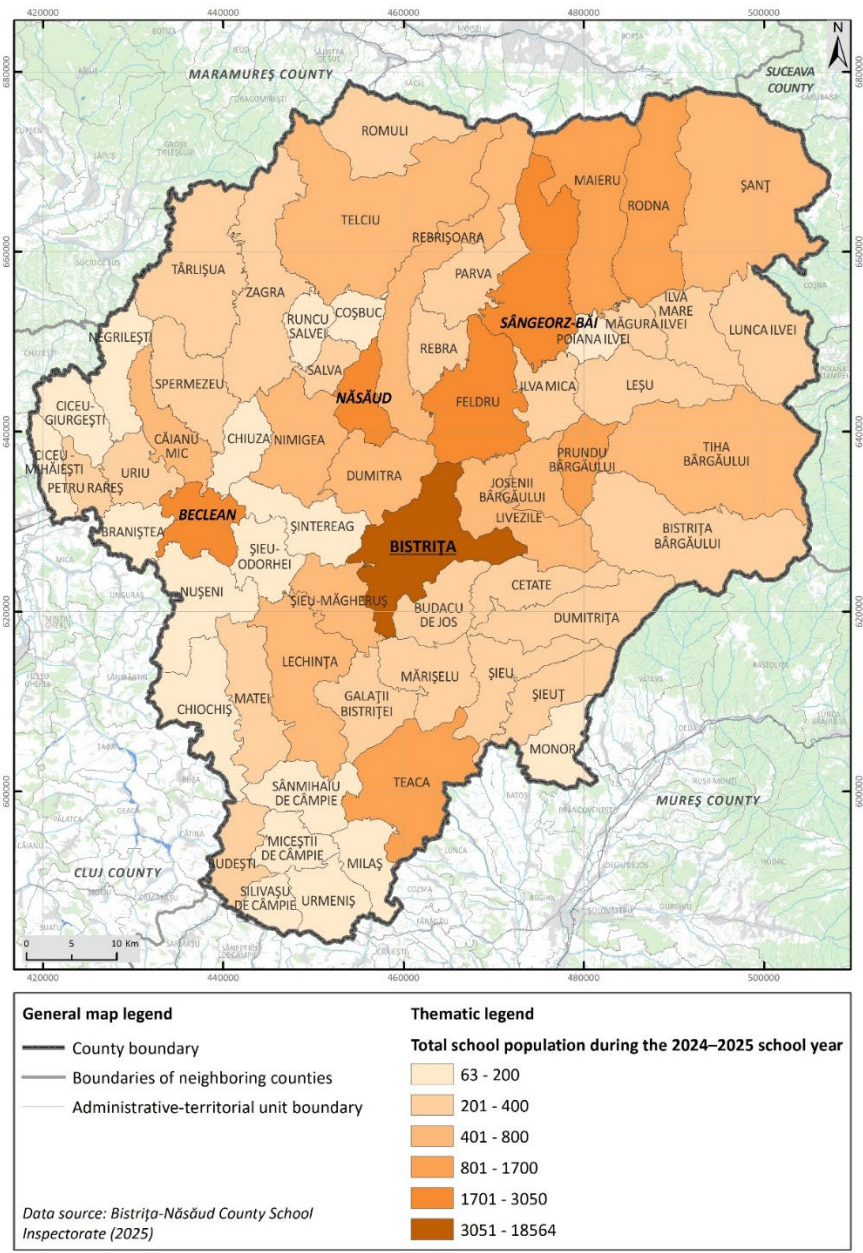


Fig. 8. Spatial distribution of the total school population in Bistrița-Năsăud County during the 2024–2025 school year.
Source: Bistrița-Năsăud County School Inspectorate (2025).

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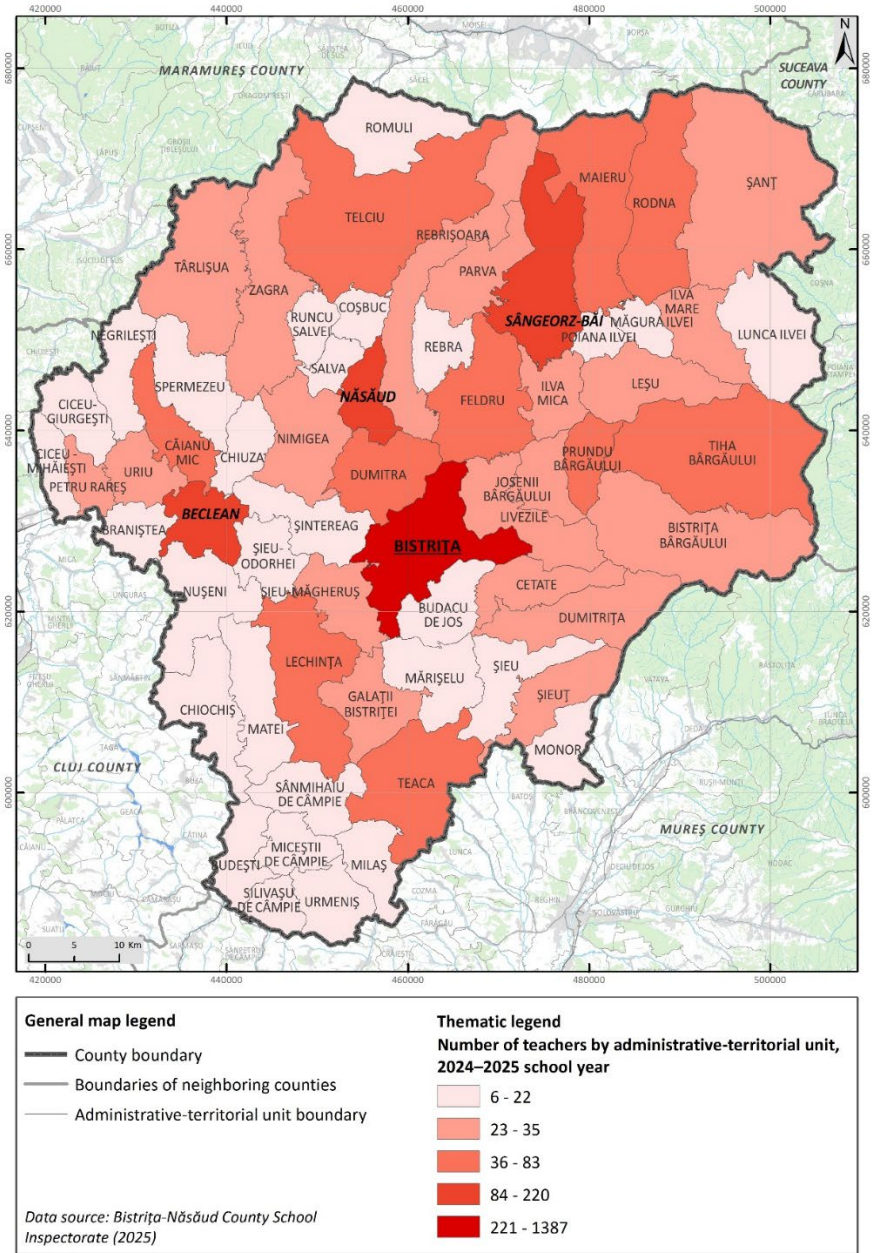


Fig. 9. Spatial distribution of teaching staff in educational institutions in Bistrița-Năsăud County during the 2024–2025 school year.
Source: Bistrița-Năsăud County School Inspectorate (2025).

The consequences of demographic decline extend beyond reductions in pupil enrolment and teaching staff, also affecting investment in educational infrastructure. Facilities such as sports fields, laboratories, gymnasiums, and vocational workshops were either limited in number or entirely absent in many of the communes analysed. During the 2024–2025 school year, none of the previously mentioned communes had a vocational workshop, with the exception of Milaș, where a single workshop was available.

The number of computers and IT devices ranged from 13 to 50 across most communes, with Silivașu de Câmpie representing an exception, having 79 such devices. With regard to sports facilities, only one sports field was available in each of the communes of Sânmihaiu de Câmpie, Silivașu de Câmpie, Ciceu-Giurgești, Milaș, and Poiana Ilvei, whereas no such facilities were recorded in the remaining communes. Gymnasiums were similarly scarce, with most communes having either one or none, while Miceștii de Câmpie had two. Laboratory facilities were limited to one, two, or three laboratories, while schools in the communes of Milaș and Silivașu de Câmpie had no laboratories at all.

These findings demonstrate that demographic decline affects not only the size of the school population but also the availability of educational resources and infrastructure. In sparsely populated rural communities, reduced enrolment is associated with lower levels of investment, fewer educational facilities, and more limited learning opportunities, thereby reinforcing existing territorial disparities in access to quality education.

The consequences of demographic ageing are even more pronounced in the healthcare sector. A growing elderly population is inevitably associated with higher mortality levels, primarily because chronic diseases become increasingly prevalent and tend to worsen with advancing age. As a result, older adults require longer periods of medical care, continuous treatment, and greater access to specialised geriatric services.

An increasingly aged population is also accompanied by a higher prevalence of morbidity, leading to a growing demand for hospital admissions, outpatient consultations, and long-term healthcare services. Consequently, medical expenditure rises, placing additional pressure on both hospitals and primary healthcare providers, while increasing waiting times for medical services.

High levels of emigration further exacerbate these challenges.

A considerable proportion of emigrants are young people who leave to pursue higher education and subsequently choose to settle either in the countries where they completed their studies or elsewhere abroad. This process contributes to a reduction in the available healthcare workforce, including both hospital personnel and primary care practitioners. As a result, the pressure on the healthcare system intensifies, increasing the risk of staff shortages and potentially affecting the quality and accessibility of healthcare services.

At the same time, the combination of a growing elderly population and a declining young population widens the imbalance between the economically active and economically inactive segments of society. As the working-age population decreases, the financial sustainability of the healthcare system becomes increasingly fragile owing to the shrinking number of contributors responsible for financing public health services. Under these circumstances, maintaining an efficient and equitable healthcare system will require both increased investment and long-term demographic and social policies aimed at mitigating the effects of population ageing.

4. CONCLUSIONS

The demographic evolution of Bistrița-Năsăud County over the past three decades highlights a persistent process of population ageing, driven by declining birth rates, increasing mortality, and sustained negative net migration. Together, these demographic trends have resulted in a negative total population change, with significant consequences for the county's demographic structure and long-term socio-economic development.

The findings of this study indicate that demographic ageing is unevenly distributed across the county, with the southern (Micești de Câmpie, Chiochiș, Silivașu de Câmpie, Milaș, Matei, Monor, Sânmihaiu de Câmpie, Urmeniș, Telciu, Nușeni), and western (Ciceu-Giurgești, Braniștea, Târlășua, Negrilești, Spermezeu, Uriu) rural communes displaying the most advanced ageing patterns. These areas are characterised by a declining young population, a growing proportion of the elderly, and a continuous reduction in the working-age population, thereby increasing the demographic dependency burden.

The high weight of elderly population (65 years and older) is influenced by the low birth rate, the emigration rate, and the increase in life expectancy. The population of reproductive age is lower in these regions, and the largest part of the population is formed by the ones born before 1990. The 1950s and the 1960s, characterised by the post-war baby boom, ensured most of the population cohorts who now belong to the elderly people or are about to enter this category. A part of the adult and young population migrated towards the urban areas, outside the county, or even outside Romania, therefore increasing the weight of the elderly. The death rate has become higher because of the increased vulnerability of the ageing population. A low nuptiality rate also generates low birth rates. In the southern and western Bistrița-Năsăud County, demographic ageing is also due to excessive emigration caused by a lack of access to social and economic opportunities, difficult connections or large distance to the urban centres to commute.

The analysis shows that Bistrița-Năsăud County is one of the Romanian counties where demographic ageing presents an ascending trend, has a direct impact in the territory, and has effects in society.

The consequences of these demographic changes are particularly evident in the education and healthcare sectors. In education, the decline in the number of school-age children has led to reduced enrolment, a lower demand for teaching staff, and more limited investment in educational infrastructure. Small rural schools increasingly face challenges related to maintaining educational services, while disparities in access to modern educational facilities continue to widen.

In the healthcare sector, population ageing is associated with increasing demand for medical services, higher healthcare expenditure, and greater pressure on healthcare infrastructure and personnel. At the same time, the continuing emigration of young and economically active individuals further reduces the labour force available to support the public healthcare system, raising concerns regarding its long-term sustainability.

The results also emphasise the need for integrated demographic, educational, and public health policies capable of addressing the effects of population ageing at the local and regional levels. Measures aimed at encouraging family formation and childbearing, reducing the out-migration of young people, improving living conditions in rural communities, and strengthening educational and healthcare infrastructure could contribute to mitigating current demographic imbalances.

In conclusion, demographic ageing should not be regarded solely as a demographic phenomenon but also as a major challenge for sustainable regional development. Without coherent long-term demographic and socio-economic policies, the disparities observed among the rural communes of Bistrița-Năsăud County are likely to become more pronounced, with increasingly significant implications for education, healthcare, and the quality of life of the local population.

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