

DEMOGRAPHIC TRENDS AND POPULATION AGING IN ROMANIA (1977–2011): A QUANTITATIVE ANALYSIS OF CENSUS DATA

Andreea-Elena VOROVENCI

PhD Candidate, Doctoral School of Cybernetics and Economic Statistics,
Bucharest University of Economic Studies, Bucharest, Romania

E-mail: andreear.vorovenci@gmail.com

Dan DRAGOMIRESCUⁱ

PhD Candidate, Doctoral School of Cybernetics and Economic Statistics,
Bucharest University of Economic Studies, Bucharest, Romania

E-mail: dragomirescu.dan@gmail.com

Abstract

This paper analyzes demographic trends and population aging in Romania between 1977 and 2011, using harmonized census microdata from IPUMS International. The results reveal a sustained process of demographic aging, driven by declining fertility, increased life expectancy, and international migration. Key indicators—including age structure, median and mean age, aging index, and fertility levels—demonstrate significant shifts in Romania's demographic profile.

Rural and peripheral areas are particularly affected by population decline and accelerated aging, while urban centers exhibit growing demographic concentration. Additionally, disparities among vulnerable groups such as the Roma population, and mismatches in elderly care infrastructure highlight the social dimensions of demographic change. The findings underscore the urgency of policy responses aimed at mitigating regional inequalities, supporting intergenerational solidarity, and ensuring the sustainability of social protection systems in the face of long-term demographic decline.

Key words: Population aging; Demographic trends; Romania; Fertility decline; Aging index; Census data; IPUMS; Socio-demographic change.

1. Introduction

Since the early 1990s, Romania has undergone profound demographic transformations, driven by a combination of natural population decline and persistent out-migration (Andrei et al., 2015; Săgeată et al., 2024). Census data from 1977 to 2011 reveal a steady decrease in the proportion of children (0–14 years) from 25.7% to 15.9%, alongside a significant increase in the elderly population (65+), from 10.5% to 16.2% (Ruggles et al.

2025). These shifts are also reflected in the doubling of the aging index—from 41.0 in 1977 to 101.9 in 2011—indicating that by 2011, elderly individuals outnumbered children under 15.

The increase in both mean and median age, with the median rising from 32 to 40 years over the same period, confirms that aging is a population-wide phenomenon and not an effect driven by outliers. Fertility trends further illustrate demographic contraction, with the average number of children born to women aged 15+ dropping from 2.69 in 1977 to 1.52 in 2011. Meanwhile, household size has decreased steadily, and the proportion of single-parent families increased from 6.1% to 11.8%. Rural areas have been disproportionately affected, experiencing higher rates of depopulation and accelerated aging (Kulcsár and Brădăţan 2014). Migration patterns compound these effects, with population concentrating in large urban centers such as Bucharest, while second-tier and remote regions continue to lose inhabitants (Dentinho and Serbanica 2020). Romania's demographic profile is further shaped by ethnic disparities: the Roma minority continues to face disadvantages in education, employment, and housing (Rauh 2018). The aging trend has also led to an expansion of residential care centers, though their geographic distribution does not align with demographic needs (Matei et al. 2018).

These developments raise major concerns for regional equity, public service delivery, and long-term sustainability. Addressing Romania's demographic challenges—particularly depopulation, population aging, and spatial disparities—requires coordinated, long-term policy interventions that reflect regional and social diversity (Rotariu 2019; Otovescu and Otovescu 2019).

2. Trends and Population Aging in Romania

Since 1990, Romania has experienced a series of deep demographic shifts, marked by a declining population, progressive aging, and spatial imbalances in population distribution. These changes are the cumulative result of low fertility, rising life expectancy, and sustained international migration, which have produced a consistent natural population decrease (Tudorel et al. 2015; Săgeată, Baroiu, and Dumitrică 2024).

An enduring trend of structural change in the population's age composition between 1990 and 2013 is evident, with notable increases in the share of elderly persons and a corresponding reduction in younger cohorts (Tudorel et al. 2015). Romania's post-communist transition has shaped demographic behavior through socio-economic instability and labor market shocks, contributing to long-term population aging (Rotariu 2019). The consequences of these shifts are particularly acute in rural Romania. Remote rural areas face an accelerated process of demographic aging and depopulation, a phenomenon described as the 'greying periphery' (Kulcsár and Brădăţan 2014). Meanwhile, urban regions - especially Bucharest and other large agglomerations - have attracted population growth due to internal migration, further accentuating regional imbalances (Dentinho and Serbanica 2020).

Compounding these trends are persistent socio-economic inequalities. The Roma minority continues to face chronic disadvantage across key domains, including education, employment, and housing (Rauh, 2018), rendering this population particularly vulnerable within the broader demographic aging process. In addition, although Romania has seen growth in elderly residential care services, there is a mismatch between the geographic

distribution of elderly care centers and the demographic need for such services, revealing spatial inequities in public health infrastructure (Matei et al. 2018).

Overall, the convergence of depopulation, aging, and territorial inequality raises major policy concerns. As emphasized before, these dynamics demand integrated and regionally adapted policy responses that go beyond reactive strategies to confront the long-term demographic decline and promote inclusive development.

3. Methodology and data

This study employs a quantitative research design based on harmonized census microdata provided by the Integrated Public Use Microdata Series – IPUMS International (IPUMS, 2025). Data for Romania were extracted for the census years 1977, 1992, 2002, and 2011. These datasets include individual-level information on demographic, social, and economic characteristics such as age, sex, marital status, household composition, educational attainment, employment status, and fertility history.

All datasets were accessed through the IPUMS International portal, which ensures consistency in variable definitions and coding across census years, allowing for valid cross-temporal comparisons. The datasets cover both urban and rural populations, enabling an analysis of spatial demographic disparities. Weighted frequency distributions were used to estimate population characteristics nationally and by subgroup.

Key indicators analyzed include:

- Age group distribution (0–14, 15–24, 25–44, 45–64, 65+)
- Mean and median age
- Aging Index (65+/0–14)
- Fertility indicators (children ever born, proportion of women 15–49)

Descriptive statistics and time series comparisons were used to assess trends in population aging. Data processing and statistical analyses were conducted using IBM SPSS Statistics and Microsoft Excel. SPSS was primarily used for computing descriptive measures, cross-tabulations, and age-specific indices, while Excel was employed for data visualization and synthesis of summary tables. Where relevant, findings were contextualized with insights from recent academic literature addressing demographic change in Romania. However, several methodological limitations should be noted. First, while IPUMS provides harmonized and comparable data across census years, differences in census design, question wording, and data collection procedures may introduce inconsistencies. Second, the study is based on self-reported data, which may be subject to reporting bias, especially in areas such as fertility history or employment. Finally, the analysis does not incorporate post-2011 data, limiting the ability to assess more recent demographic developments such as the impact of increased emigration post-EU accession.

4. Results

Romania's population structure has undergone significant changes between 1977 and 2011, with a steady decline in the share of younger cohorts and an increase in older age

groups. Table 1 presents the percentage distribution of the population by age group in each census year, while Figure 1 illustrates the evolution visually.

Table 1. Percentage Distribution of the Population by Age Group, Romania (1977–2011)

Age Group	Weighted Frequency	Percent
0–14	4,981,890	25.7%
15–24	2,708,950	14.0%
25–44	5,453,280	28.2%
45–64	4,183,150	21.6%
65+	2,042,940	10.5%
Total	19,370,210	100.0%

Between 1977 and 2011, the share of individuals aged 0–14 declined from 25.7% to 15.9%, while the population aged 65 and over rose from 10.5% to 16.2%. This trend reflects a consistent aging process, driven by fertility decline and increasing life expectancy, as emphasized in national demographic literature.

The most notable demographic shift occurred between 1992 and 2002, when the proportion of individuals aged 0–24 dropped significantly, while the population over 65 continued to increase. These shifts are consistent with previous findings on Romania's post-communist demographic adjustments (Tudorel et al. 2015)

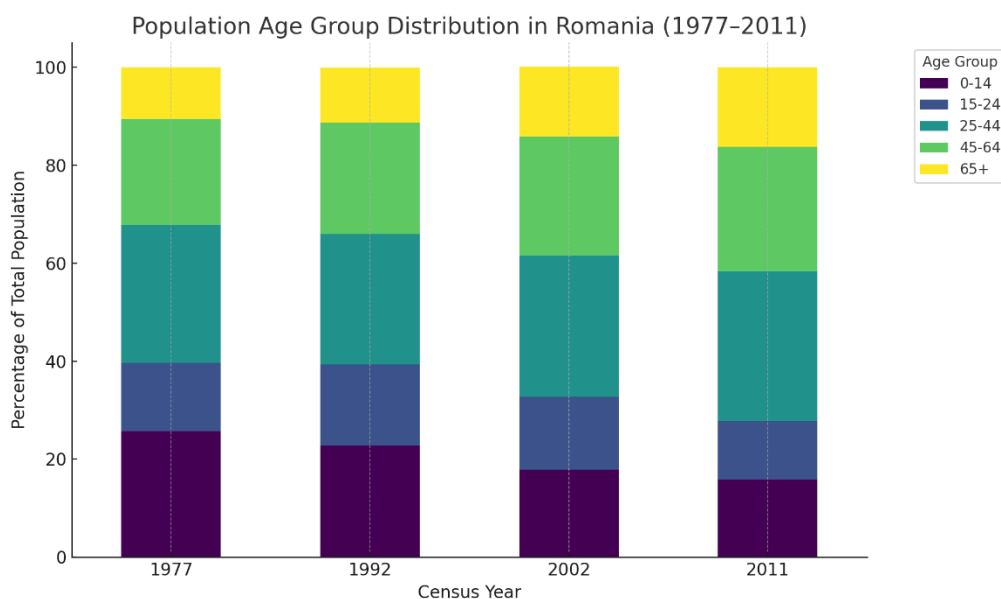


Figure 1: Age Group Distribution in Romania (1977–2011)

In 2011, the age group 25–44 became the largest demographic cohort, accounting for 30.5% of the population. The steady growth of the 45–64 group – from 21.6% in 1977 to 25.5% in 2011 – also signals the accumulation of aging within the working-age population. Meanwhile, the youth dependency base is shrinking steadily.

These trends confirm the transition of Romania into an aging society, with implications for social protection systems, labor markets, and intergenerational solidarity. The demographic contraction in younger age groups, paralleled by the expansion of older cohorts, poses significant challenges to the long-term sustainability of Romania's socio-economic framework. Another important aspect of Romania's demographic transformation is the steady rise in both mean and median age. As shown in Figure 2, the mean age increased from 37.64 years in 1977 to 40.21 years in 2011, while the median age rose from 32 to 40 years.

This increase indicates a broad-based aging trend, not limited to specific cohorts. The narrowing gap between mean and median age over time suggests that population aging is affecting all segments more evenly, consistent with patterns documented before.

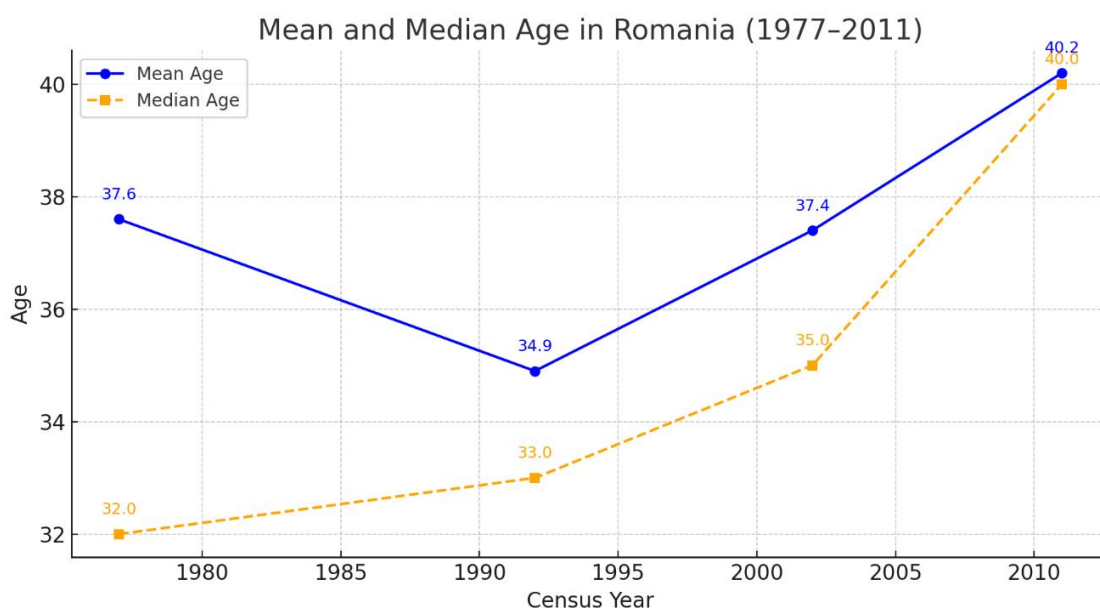


Figure 2. Mean and Median Age in Romania (1977–2011).

Another key indicator of demographic aging is the aging index, which represents the number of persons aged 65 and over per 100 persons aged 0–14. Between 1977 and 2011, Romania's aging index more than doubled—from 41.0 to 101.9—signaling a major demographic reversal.

Table 2. Aging Index in Romania, 1977–2011

Year	Aging Index
1977	41.0
1992	49.0
2002	79.9
2011	101.9

This transformation implies that by 2011, elderly individuals outnumbered children under 15, a phenomenon rarely observed before in Romania. The sharpest increase occurred between 1992 and 2002, when the index surged from 49.0 to 79.9. This transition is consistent

with structural trends before, who underline the interplay between low fertility and long-term survival.

Such a demographic shift places significant stress on the dependency ratio, pension systems, and healthcare infrastructure, especially in rural areas where aging is even more accelerated (Kulcsár and Brădăţan 2014).

Another indicator closely linked to population aging is fertility. As shown in Table 3 and Figure 3, the average number of children ever born to women aged 15 and over in Romania declined significantly from 2.69 in 1977 to just 1.52 in 2011.

Table 3. Average Number of Children Ever Born, Romania (1977–2011)

Year	Mean
1977	2.69
1992	1.83
2002	1.67
2011	1.52

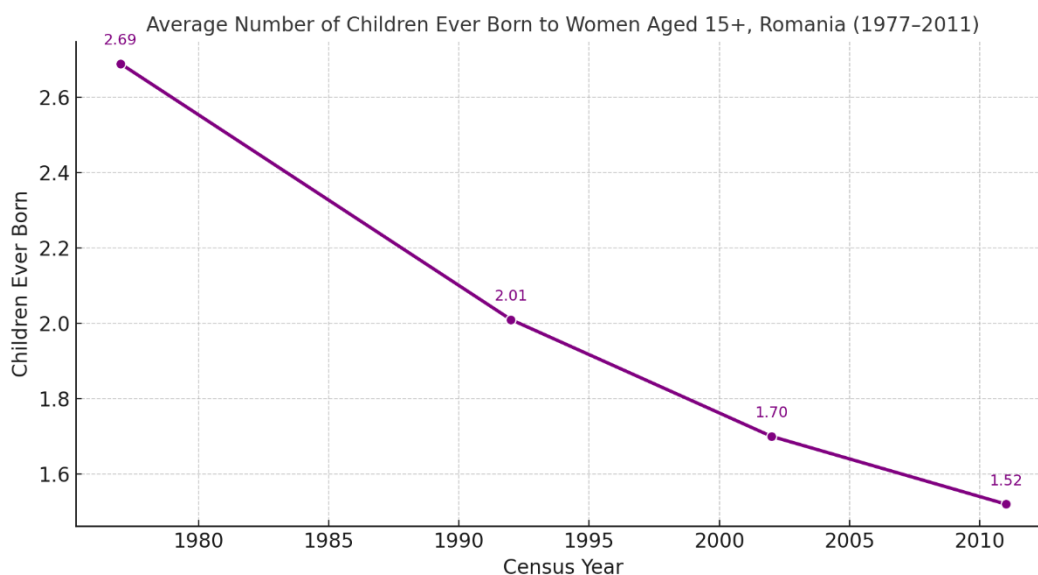


Figure 3. Average Number of Children Ever Born, Romania (1977–2011)

This steep decline reflects Romania's transition to sub-replacement fertility, a trend that intensified after 1990. The most abrupt drop occurred between 1977 and 1992—from 2.69 to 2.01—consistent with demographic contractions observed in post-socialist societies (Rotariu 2019; Tudorel et al. 2015). By 2011, the figure had fallen below 1.6, placing Romania among Europe's lowest-fertility countries.

The shrinking fertility base has compounded the pace of demographic aging and reduced the replenishment of younger cohorts. This long-term fertility decline has also been linked to broader changes in family formation, educational attainment, female labor force participation, and economic uncertainty during the post-communist period (Rauh 2018).

5. Conclusions

The findings presented in this paper demonstrate a clear and sustained process of demographic aging in Romania between 1977 and 2011. This shift is reflected across multiple indicators—including age distribution, median and mean age, fertility levels, and the aging index—and is consistent with patterns observed in other post-communist and European societies.

Population aging in Romania is driven by sub-replacement fertility, increasing longevity, and sustained emigration, all of which have contributed to both population decline and structural imbalance. The effects are most visible in rural and peripheral regions, where aging is compounded by economic underdevelopment and selective out-migration. Meanwhile, urban centers have become increasingly demographically dynamic, at the same time they are also beginning to exhibit aging patterns.

These demographic transformations pose urgent challenges for public policy. The future sustainability of the pension and healthcare systems, labor force renewal, and the delivery of social services will depend on how well Romania addresses the consequences of demographic aging. Regional disparities and the vulnerability of specific population groups, particularly the Roma, demand coordinated and inclusive strategies. To mitigate the long-term effects of aging and depopulation, Romania will need integrated responses across domains such as labor, education, health, and housing. These must be informed by robust demographic analysis, grounded in both national census data and international comparisons.

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ⁱThe author to whom correspondence should be addressed.