

# Demographic Evolutions Premise for Digital Innovation in Health

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## Abstract

*Whether we like it or not, technology has become part of our lives and, at the same time, it has undoubtedly helped people become more informed and connected. Reducing healthcare costs and improving patient outcomes are benefits of implementing modern technologies in the medical sector. Digital health can significantly improve the productivity of an organization or nation, including at the individual level, and if digital healthcare solutions are made at an affordable cost, digital health could be a response to emerging market challenges to grow sustainable and improve health systems to provide patient-centred care, meaning accessibility and quality.*

*This paper assesses trends in demographic evolution and their influence on digital health innovation as well as emerging trends as a result of healthy aging.*

**Key words:** digital innovation, demographic change, welfare, well being

**J.E.L. classification:** I31, J11, O30

## 1. Introduction

The increase in longevity, as observed by the analysis of demographic developments, requires the introduction of digital technologies to lay the foundations of modern health services to ensure an inclusive society among older adults.

A vision on aging populations is based on actions and investments that support healthy aging, especially using innovative technologies.

On the other hand, a correct implementation of digital innovations can have remarkable results in terms of the evolution of a country's demographic structure. An immediate effect is to reduce the aging of the population by keeping the aging population independent and looking for solutions to keep it as active as possible. The digital economy emphasizes the ways in which older people can benefit from the benefits of modern technology in healthcare, Telehealth, Telemedicine, Connected Health etc.

The development of the silver economy implies, for people older than 60 years, an inclusive work and inclusive life environment based on technological innovations applied in any field.

The reconfiguration and adaptation of political and social institutions to the scale of demographic change and the evolution of quality of life in the 21<sup>st</sup> century is necessary for long-term economic and sustainable growth, providing the silver generation with healthy and productive living conditions. In this sense, the evolutions of the demographic structures are fundamental in the elaboration of programs and strategies for economic and social development.

As mentioned above, the current population is in sharp decline because of demographic aging, on one hand, but also as a result of the decline in fertility and the increase in emigration, on the other hand, which are normal demographic phenomena for a developing country. In this context, Romania is confronted with complex economic and social consequences, with a population in a process of demographic-aging, similar to that of the European Union (EU).

As for the number of Romanians leaving the country, we are talking about 3.4 million people in 2007-2017, a value that places Romania second in the world, after Syria, from the point of view of emigration, according to United Nations (UN) data. It should be mentioned that the analysis of the data from the UN migration reports refers to the fact that the Romanian Diaspora size has a significant weight only in relation to the total population of Romania, not globally.

In the case of Romania, we cannot say that the number of immigrants compensates for the number of emigrants because at the end of 2017 117000 foreigners were established in Romania, 3900 being persons with international protection, other types of protection or refugees.

Romania has the fewest non-EU residents, about 0.3%, so our country is on the last place in the European Union from this point of view, followed by Slovenia and Slovakia.

The National Council of the Elderly People, in its report "The Elderly Population of Romania in the Horizon of 2060" from May 2014, pointed out that "the effect of the aging process has been felt in Romania since 1 January 2000 when the young population was overcome numerically by the elderly population, this phenomenon still increasing and on 1 January 2012 the share of the young population was exceeded by the share of the elderly population (16.1% versus 15.8%)".

The intensity of these phenomena is increasing, with implications and effects in society being significant. The evolution of the employed population and of the active population must be known because it is necessary to substantiate the economic and social development strategies.

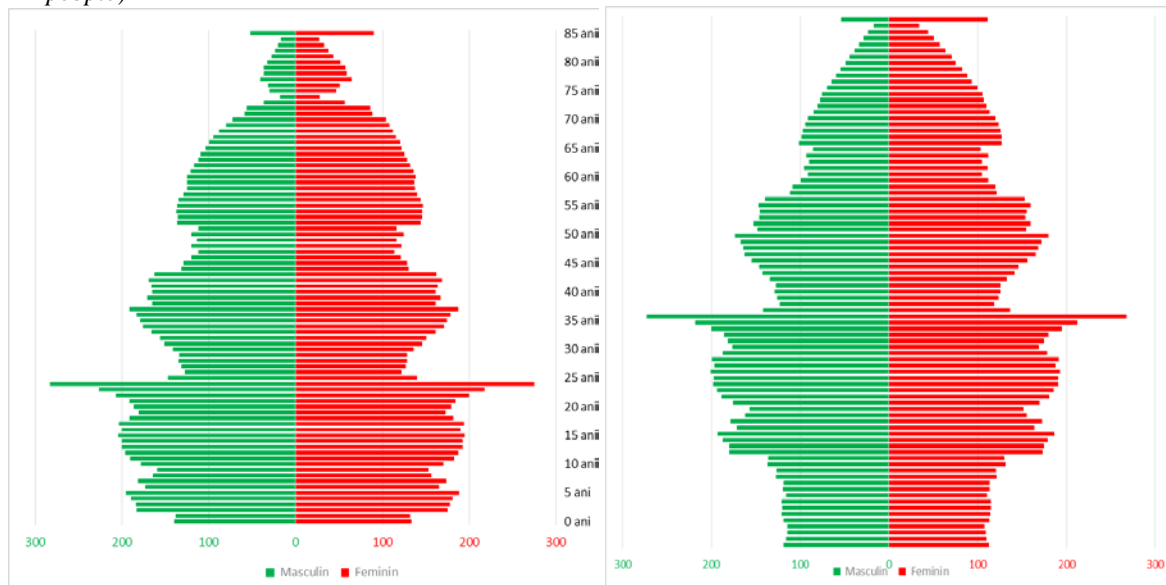
## 2. Population and demographic structure

Based on the official data from the National Institute of Statistics (NIS) statistics, using the age pyramid, an analysis of evolution and dynamics of population structure on age groups is observed, as evidenced by the aging process of the population.

The effects of demographic developments are felt in the long run and bring about changes in the population structure. The age pyramid is a graphic method of visualizing population structure and highlighting long-term fertility and mortality trends and short-term migration. In order to highlight the changes in age structure, age pyramids for the years 1992, 2005 and 2017 were built on the basis of National Institute of Statistics data.

If in 1992 the age pyramid had a "clubs" shape, the population being in the process of demographic rejuvenation, increasing the birth rate as a firm tendency, after an accentuated demographic aging process, in 2005 we see a bell-like graph. Compared to 1992, the base is in compression, suggesting a decrease in the number of young people under the effect of a steady decline in birth rates.

Figure no. 1 Population by residence by age and gender on 1 July 1992 and 1 July 2005 (thousands of people)



Source: author's processing based on NSI data

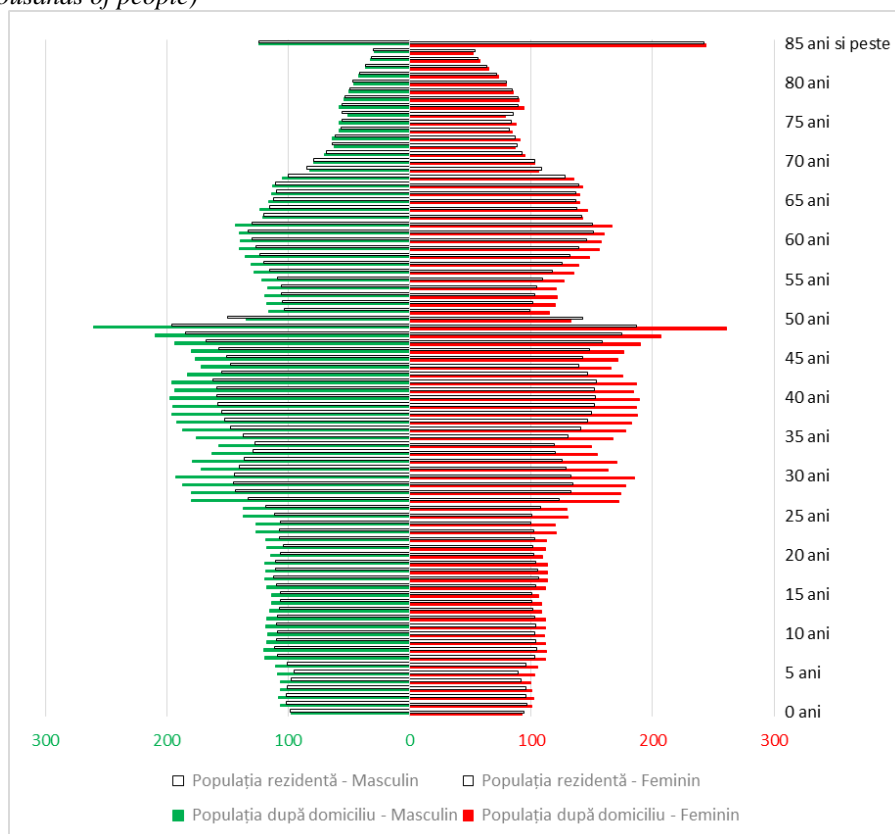
Moreover, there is a significant difference between pyramid spikes, the 2005 peak has been bumped because of the reduction in mortality, both in young and middle ages, which has led to a significant increase in life expectancy. The form of "bell" expresses an aging population with a low proportion of young people and a high proportion of adults and elderly people. It is the consequence of a low birth rate, with a mature age and an obvious aging of the population. This pyramid expresses the demographic vulnerability of the country.

At the level of 2017, the age pyramid has a narrow base, characteristic of aging populations, which means an aging workforce and leading to significant effects on the economy and the labour market.

The representation of the resident population and of the permanent resident population on 1<sup>st</sup> of July 2017 through the age pyramid reveals a significant difference for the ages of 25 to 50, this range comprising a large proportion of the active population on the labour market. The difference between the permanent resident population and the resident population can be explained through the phenomenon of international migration. Among the permanent residence population and the resident population there is a considerable difference in size, on July 1<sup>st</sup>, 2017, the first being by 2.61 million people higher than the second.

Using the age pyramid (Figure 2), demographic analysis highlights the aging process based on the structure of the population by permanent residence and the resident population by gender and age.

Figure no. 2 Population by permanent residence and resident population by gender and age, 1 January 2017 (thousands of people)



Source: author's processing based on NSI data

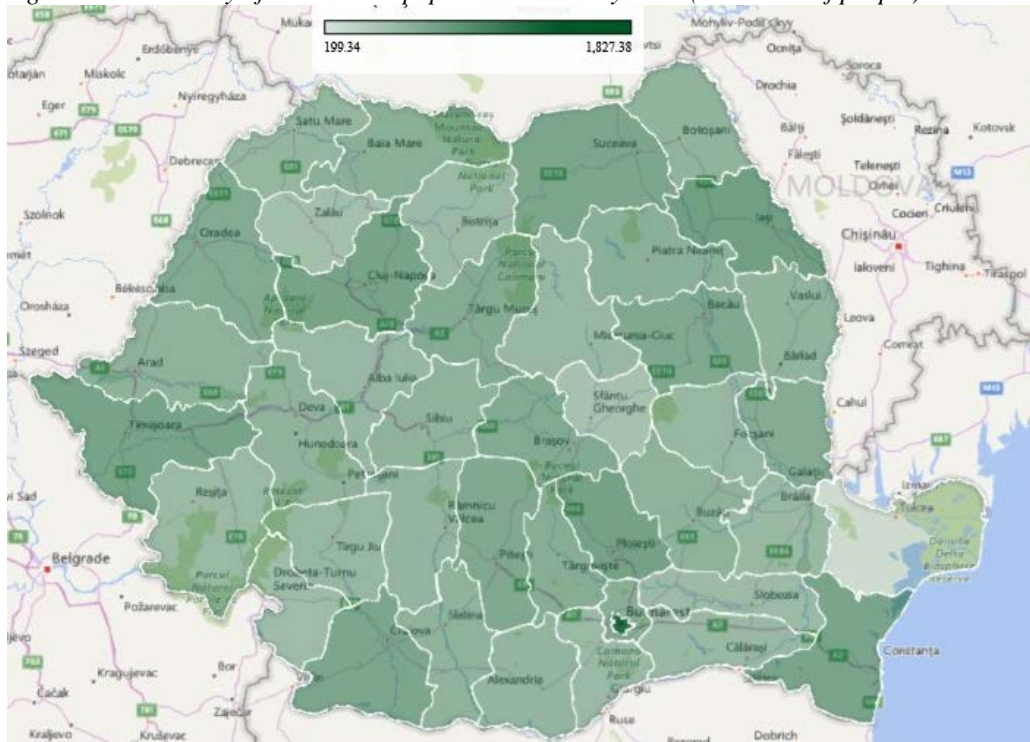
The three diagrams highlight developments in the age structure of the population over the last 25 years, the evolution from a demographic rejuvenation process in the early 1990s to an accelerated demographic aging process in 2017.

The amplexness of the phenomenon of demographic aging is also obvious from the population dynamics recorded for the large age groups for the period 1992-2017. If in 1992 the age group of 65-years-and-over represented 11.01% of the total population, by 2017 it increased by about five

percentage points, reaching 16.11%, while the share of children less than 15 years, which in 1992 was almost a quarter of the total population (22.59%), fell significantly, only to 14.75% in 2017.

The aging of the Romanian population is a phenomenon with a non-uniform distribution on the territorial level. There are areas that focus mainly on the elderly population (usually in rural areas), but also on areas characterized by a high density of the young population, in this case being the poles of economic growth: Cluj, Braşov, Iaşi, Timiș, Constanța, Prahova, Bucharest, these being attractions for the labour force. The highest population density is in Bucharest (1,827,381 people), Romania's economic growth poles being also characterized by a high population density, as shown in the following figure.

Figure no. 3 Density of the resident population on 1 July 2017 (thousands of people)



Source: author's processing based on NSI data

### 3. Digital innovation in health "the remedy" of an aging population

According to the NIS, Romania's resident population will be reduced by 2060 to between 3.6 million people and 8.8 million people, and the female population will continue to dominate. In the same context, according to the OECD, the share of the EU population aged over 65 has doubled over the past 55 years, reaching 20% in 2015. It is estimated that by 2060 it will rise to nearly 30%.

Demographic change is reflected in socio-economic changes, and the changing ratio between the "working" population and the "inactive" population raises the question of how to maintain sustainable national budgets. In this sense, a reform is needed regarding the provision of social services and healthcare services specific to the elderly.

The way we respond to the needs of a growing number of our population, the inclusion policies that will be created must ensure that the aging of the population remains, on one hand, a valuable attribute, and on the other hand an active contributor to our society.

New technologies can increase the efficiency of our health and care systems, improve the life-quality of the elders, and at the same time create new opportunities for innovators. For incontestable success in digital innovation, multidisciplinary and international collaboration is often required. The current explosion in medical innovation, along with the desire to improve the quality of life and create a better and healthier environment, is matched by the enthusiasm of the young generation of inventors and entrepreneurs who want to make a profit.

In other words, reinventing our health and social care systems, the innovative technologies and new ICT services can help us provide better and accessible care for all.

In 2015, at the OECD initiative, the first workshop on the Global Coalition Aging was organized. It brought together leaders from a variety of sectors to discuss the connection between innovative technology, big data and cognitive decline.

In March of the following year, in the work on aging technologies gracefully, the council of counsellors of the president for science and technology, in the United States identified three areas in which older adults can interact with technology: emotional health, cognitive ability and physical capacity.

Identifying technologies and top trends within each category has the potential to prolong longevity and delay the onset of aging by supporting physical and mental well-beings.

*Table no. 1 Technology and healthy aging*

<b>Technological focus area</b>	<b>Impact of healthy aging</b>	<b>Emerging trends</b>
Social Connectivity and Emotional Health	The social isolation, the traumatic events and the genetic factor play an important role in the degradation of mental health, but Selwyn (2015) demonstrates, with the help of subjective indicators, that increased eudaimonia well-being can extend longevity. New technologies for social connectivity and emotional health have a powerful effect on mental health among older adults. They encourage and facilitate social interactions and emotional contact through personal or virtual communities, thus stimulate community commitment in addition to improving health, thus reducing the risk of disability and death. Focusing on technologies specific to older adults on their interaction with the rest of the community can provide social engagement, employment opportunities and volunteering, or access to information and services.	Teaching elderly people to use technology to interact with their care-givers. Nurses play a role as mediators between the use of technology and better social connectivity and emotional health.
Cognitive ability	The deterioration of cognitive capacity is caused by social, emotional and physical feelings. The use of stress relieving technologies or monitoring alcohol concentration and consumption can help reduce cognitive impairment. Technologies like as remote patient monitoring or cognitive medical applications target specific cognitive functions. Monitoring sensors follow patterns of activity to detect unusual changes or patterns that may indicate cognitive decline. Similarly, worn-out devices, remote monitors, and drug-tracking devices can be used to control the deviations that may occur, monitor vital signs and ensure adequate drug use.	The use of cognitive health applications, "brain training", that can improve memory by supporting attention. Supporting the independence of older adults based on Artificial Intelligence technologies. Older adults can benefit from cognitive training in terms of memory, reasoning and better processing speed, albeit at a slower pace than younger adults, and improvements can be sustained over time.
Physical ability	Practicing exercise regularly, leads to improved cardiovascular, aerobic capacity and reduces systemic inflammation. Technologies that support physical capacity focus on ensuring mobility among older adults and can help prevent musculoskeletal disorders, dementia and cognitive decline.	Using technologies that support the maintenance of sensory experiences. Use of sensory technologies that support hearing, seeing and touch functions and those that detect and prevent falls by using prosthetic devices and robot assistants. Supporting mobility by improving access to health services through Telehealth.

Source: Global Agenda Council on Ageing - World Economic Forum (WEF)

#### 4. Conclusions

Decreasing birth rates and increasing life expectancy lead to an aging population requiring higher health care resources. If this trend has been observed for many years in rich countries, now, the aging population can no longer be postponed, as it is being visible in emerging economies.

Population aging is a global phenomenon, so it is very important, if we have added years of life, to think about how we can improve the quality of life in these years. This is possible through policies protecting elder adults.

On the other hand, the fourth industrial revolution brings new technologies that offer a new perspective to the silver generation. Wide-scale deployment and adoption of technologies combining a variety of solutions and maintaining a strong protection of privacy and security for elder adults and their carers requires an effective, intuitive, accessible and inclusive approach. In partnership with older people, modern applications and technologies will have the potential to increase independence, support aging at home and reduce long-term care costs.

Technologies that combine a variety of solutions and maintain a strong protection of privacy and security will prevail.

It is time to make sure that our grandparents and our parents will live a long and active life, aging being seen as a stage of a productive and prosperous life and not as a burden.

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