https://doi.org/10.31891/2307-5740-2023-324-6-8
UDC 911.3:338.48

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DEMOGRAPHIC AGING TRENDS IN EU COUNTRIES AND UKRAINE

The article provides an analysis of trends in the development of the demographic aging process in the countries of the European Union and Ukraine based on the calculation of values of demographic aging (aging coefficient, aging index, demographic burden due to the elderly, age of values aging). The obtained data allow us to draw a conclusion about the convergence of most values of population aging in the EU as a whole, as well as to identify several groups of countries with the same aging values and demographic trends. As a result of the study, the authors identified 5 groups of countries that demonstrate: 1) the highest of aging and population aging rates; 2) the average values of the index and the aging coefficient, however, show high rates of growth of the aging population and demographic burden; 3) average values of aging, but reduced growth rates of the aging population; 4) average values of aging; 5) the lowest rates and values of population aging.

The authors forecast changes in the age structure of the population in the EU until 2100, which showed that in the future the share of people aged 65+ will only increase, and this will require certain changes in the social life and economy of the countries of the studied region.

The demographic situation that has developed in the studied region requires constant monitoring and accounting in strategic planning at all levels, as well as improvement of the social policy of the EU countries regarding the elderly.

Keywords: population, demographic situation, population aging, aging coefficient, depth of aging.

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ТЕНДЕНЦІЇ ДЕМОГРАФІЧНОГО СТАРІННЯ У КРАЇНАХ ЄС ТА В УКРАЇНІ

У статті проведено аналіз тенденцій розвитку процесу демографічного старіння у країнах Європейського Союзу та Україні на основі розрахунку значень демографічного старіння (коефіцієнт старіння, індекс старіння, демографічне навантаження за рахунок людей похилого віку, вік старіння). Отримані дані дозволяють зробити висновок про зближення більшості значень старіння населення в ЄС загалом, а також виділити кілька груп країн із однаковими значеннями старіння та демографічними тенденціями. У результаті дослідження автори виділили 5 груп країн, які демонструють: 1) найвищі темпи старіння та старіння населення; 2) середні значення індексу та коефіцієнта старіння, однак, демонструють високі темпи зростання старіння населення та демографічного навантаження; 3) середні значення старіння, але знижені темпи зростання старіючого населення; 4) середні значення старіння; 5) найменші темпи та величини старіння населення. Автори прогнозували зміни вікової структури населення ЄС до 2100 року, які показали, що у майбутньому частка людей віком 65+ буде лише зростати, а це вимагатиме певних змін у соціальному житті та економіці досліджуваних країн. Демографічна ситуація, що склалася у досліджуваному регіоні, потребує постійного моніторингу та врахування при стратегічному плануванні на всіх рівнях, а також удосконалення соціальної політики країн ЄС щодо людей похилого віку.

Ключові слова: населення, демографічна ситуація, старіння населення, коефіцієнт старіння, глибина старіння.

Introduction

The increase in the number of elderly people in the total population remains one of the most important problems of modern society. This process applies to almost all areas of human activity, and it cannot be considered as a simple consequence of certain shifts in the structure of the population. This is an important factor of social changes, the impact of which on society can be both direct and indirect. The aging of the population causes radical changes in the demographic and social structure of society, in the systems of production, distribution and consumption and ultimately affects the situation of all social groups and strata. In this regard, it is important to trace the dynamics of changes in demographic aging in the EU countries, which allows to more accurately determine the causes and consequences of these processes in the region.

Theoretical framework

A number of scientific studies in recent years are aimed at studying the impact of population aging on the economic development of EU countries (Nicole Van Der Gaag, Joop de Beer, 2014), individual countries of the world, in particular – the USA (Maestas Nicole, Kathleen J. Mullen, and David Powell, 2023).

In recent years, researchers have been paying more and more attention to the study of the problems of the demographic situation in the EU countries in general, the problem of the demographic aging of the population and consideration of key factors that will affect European demography in the coming decades, as well as creating scenarios of long-term consequences of changes in key trends and countering unwanted demographic consequences. At the same time, researchers place significant emphasis on the problem of migration, education and employment of the population, unemployment, etc. (Lutz W., Amran G., Belanger, A., Conte A., Gailey N., Ghio D., Grapsa E., Jensen K., et al., 2019).

Scientific studies show that in the coming years, the processes of demographic aging in the European region will only intensify. Accordingly, the group of elderly people will increase, and this creates a number of problems of social content in the countries of the region. Individual researchers are studying the prospects for solving the problems associated with a significant increase in the population aged 65+. In particular, there are studies devoted to the issue of population aging in the EU and the formation of the labor market (Cristea M., Noja G.G., Stefea P., Sala A.L., 2020), global dimensions of the phenomenon of population aging in the world and the social and economic consequences of this process (Harper S., 2014), the problem of active population aging in the world and in Ukraine, the influence of an active lifestyle, mobility and sports on the quality of life of elderly people (Andreieva O., Hakman A., 2021).

The problem of population aging is especially relevant for rural areas both in EU countries and in Ukraine. Smart Silver Villages can be an interesting example of solving the employment of the elderly population and the organization of "smart" life in rural areas (Bogataj D., Bolarin F.- C., Kavšek M., Rogelj V., 2020).

A new demographic policy should be developed for Ukraine in the post-war period, aimed at demographic revival, return of forced migrants, support of youth and the elderly. Scientists of the Institute of Demography of the National Academy of Sciences of Ukraine emphasize this during public speeches, relevant demographic studies are being conducted (Libanova E., 2023). As a result of the joint work of the M. V. Ptukha Institute for Demography and Social Studies and other scientific institutions of the Department of Economics of the National Academy of Sciences of Ukraine created a vision called "Post-war revival of Ukraine", which is presented in 9 directions of the future revival of Ukraine: 1) ensuring national security and defense; 2) development of critical infrastructure; 3) development of a competitive sustainable economy; 4) integrated development of territories; 5) transformation of labor markets; 6) restoration of the environment; 7) combination of strict adherence to laws with revolutionary changes; 8) demographic revival; 9) formation of a new quality of life (Libanova E., 2023).

Data and methods

Eurostat data were used to analyze statistical values and demographic characteristics of EU countries. To study the demographic situation in Ukraine, in particular, aspects of the demographic aging of the population in Ukraine in the pre-war period (until 2022), the authors used the materials of the M. V. Ptukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine, the State Statistics Service of Ukraine. To calculate individual demographic values and indexes (population aging coefficient, population aging index, demographic burden coefficient), the authors chose the time interval of the study from 2011 to 2022. Determining the index of the depth of population aging, the authors worked out statistical data for 2022.

To analyze the demographic aging of the population, the calculation of the population aging coefficient, which is determined by the formula, was used (1):

$$K_{aging} = \frac{P_{65+}}{P_{total}} \times 100\% \quad (1),$$

where: K_{aging} – population aging coefficient;
P_{65+} – population aged 65+;
P_{total} – total population in the country.

The authors analyzed the aging index for the countries of the European Union, which is defined as the number of elderly persons per 100 children aged 0 to 14, and is determined by the formula (2):

$$I_{aging} = \frac{P_{65+}}{P_{0-14}} \times 100 \quad (2),$$

where: I_{aging} – population aging index;
P_{65+} – population aged 65+;
$P_{0\text{-}14}$ – population aged 0 to 14 years.

To determine the demographic burden on the population of working age by the elderly population (calculated as the ratio of the number of elderly population per 1000 persons of working age) the formula is used (3):

$$K_{demographic\ burden} = \frac{P_{65+}}{P_{15-64}} \times 1000 \quad (3),$$

where: $K_{demographic\ burden}$ – demographic burden coefficient;
P_{65+} – population aged 65+;
$P_{15\text{-}64}$ – population aged 15 to 64 years.

To determine the index of the depth of aging of the population, we determine the share of people over the age of 80 in relation to the number of the population aged 65 and over.

Results and discussion

Population aging is a long-term trend that began in the European region several decades ago. This trend is manifested in the transformations of the age structure of the population and is reflected in the increase in the share of elderly people, as well as in the decrease in the share of people of working age from the total population. The population of the EU-27 countries as of January 1, 2022 was 446.7 million people: youth (from 0 to 14 years) – 15.0%; persons of working age (from 15 to 64 years) – 63.8%; elderly people (65 years and older) – 21.2%. As shown in Table 1, the share of the population aged 65 and over is growing in each EU-27 member state, as evidenced by positive rates of population aging in each of them (Table 1).

Table 1

Aging indicators for individual EU countries and Ukraine, 2022*

Country	Population, million people	Share of people aged 65+, % (aging coefficient)	Population aging index	Demographic burden due to elderly people	Average annual growth rates of the demographic burden coefficient for 2018-2022, ‰	Population aging rates, % per year
Austria	8.9	19.4	133.8	293.8	2.96	0.15
Belgium	11.6	19.5	114.8	306.0	3.10	0.20
Bulgaria	6.9	21.7	150.1	339.6	3.00	0.27
Greece	10.8	22.7	157.6	356.2	3.70	0.28
Denmark	5.9	20.3	123.4	316.6	3.81	0.29
Estonia	1.3	20.4	123.7	323.2	3.40	0.25
Ireland	5.0	15.0	73.5	230.6	3.74	0.29
Spain	47.4	20.1	136.3	304.6	2.60	0.25
Italy	59.1	23.8	180.4	374.8	4.20	0.28
Cyprus	1.2	16.5	103.4	245.1	2.24	0.32
Latvia	1.9	20.9	129.0	330.8	3.44	0.21
Lithuania	2.8	20.0	131.8	306.7	1.22	0.18
Luxembourg	0.6	14.8	92.7	213.0	1.36	0.08
Malta	0.5	19.1	140.8	284.9	1.08	0.29
Netherlands	17.5	20.0	126.8	310.5	3.85	0.37
Germany	83.2	22.1	160.4	346.6	3.62	0.12
Poland	37.8	19.1	120.8	292.6	7.94	0.46
Portugal	10.3	23.7	165.3	372.5	7.96	0.42
Romania	19.1	19.5	122.2	297.1	5.62	0.28
Slovakia	5.4	17.4	107.9	254.7	7.32	0.40
Slovenia	2.1	21.1	140.0	321.3	6.33	0.38
Hungary	9.7	20.5	139.1	311.9	6.80	0.32
Finland	5.5	23.1	144.2	367.6	6.28	0.47
France	67.8	20.1	116.3	340.6	4.90	0.36
Croatia	4.3	22.5	148.7	355.7	9.68	0.40
Czechia	10.6	20.6	126.2	326.0	6.06	0.42
Sweden	9.4	19.0	113.8	323.6	1.52	0.15
Ukraine	41.2	16.7	118.2	261.6	1.70	0.18

*calculated by the authors based on data from Eurostat and the State Statistics Service of Ukraine

The reasons for the increase in the share of elderly people can be determined as follows:

- increasing the level of longevity, which has been characteristic for many recent decades;
- a consistently low level of fertility, while the smaller number of children born leads to a decrease in the share of young people in the total population;
- progressive aging of the oldest population, as the relative share of elderly people is growing faster than any other age segment of the EU-27 population.

The analysis of Table 1 allows us to distinguish groups of countries according to the gradation of the value of the population aging coefficient.

A group of countries with the highest aging coefficient (over 22.0%) is clearly distinguished: Germany (22.1%), Croatia (22.5%), Greece (22.7%), Finland (23.1%), Portugal (23.7%), Italy with the absolute maximum (23.8 %).

The lowest value of aging coefficient (less than 17.0%) was found in the following countries: Cyprus (16.5%), Ireland (15.0%), Luxembourg with an absolute minimum (14.8%). Ukraine is included in this group of countries with a value of 16.7%. This is 4.4% less than the average value of aging coefficient in the EU (21.1%).

The group of countries with an aging index above 145.0 includes: Croatia (148.7), Bulgaria (150.1), Greece (157.6), Germany (160.4), Portugal (165.3) and Italy with a maximum of 180.4.

The lowest values of the aging index (less than 105.0) are observed in the countries: Cyprus (103.4), Luxembourg (92.7), Ireland with a minimum value of 73.5.

A certain interdependence is observed between the aging coefficient and the aging index. In particular, these values are the highest in Greece, Italy, Germany, Portugal, Croatia, and the lowest in Ireland, Cyprus and Luxembourg.

The highest values of the demographic berden due to elderly people (over 345.0) are characteristic of the following countries: Germany (346.6), Croatia (355.7), Greece (356.2), Finland (367.6), Portugal (372.5), Italy (374.8).

Analyzing the value of the share of elderly people in the general structure of the population in the EU countries, it is worth noting that in each of them this value has been growing since 2011. However, there was a difference in the rates of population aging. Thus, we can single out a group of countries with the highest population aging rates during the studied period (over 0.35). It includes the following countries: France (0.36), Netherlands (0.37), Slovenia (0.38), Croatia (0.4), Czechia (0.42), Portugal (0.42), Finland has the highest value (0.47).

The lowest aging rates (below 0.21) were recorded in: Belgium (0.2), Lithuania (0.18), Austria (0.15), Sweden (0.15), Germany (0.12), Luxembourg with an absolute minimum (0.08). Ukraine also belongs to this group of countries in values of population aging rates (0.18). And the average value of population aging rates in EU countries is 0.28.

According to the value of the share of elderly people in the EU countries in 2022, it is possible to distinguish a group of countries with the maximum share of people of this age group in the population structure (over 22.0%): Germany (22.1%), since 2011 this indicator has increased by 1.4%, Croatia (22.5%), since 2011 this value has increased by 4.8%, Greece (22.7%), since 2011 this value has increased by 3.4%, Portugal (23.7%), since 2011 this value has increased by 5%, Italy with an absolute maximum (23.8%), since 2011 this value has increased by 3.3%.

In 2011, this group of countries also included Bulgaria and Sweden. At the same time, a group of countries stands out, which in 2011 had one of the lowest values of the share of elderly people in the population structure, and by 2022 they have moved into the group of countries with the highest values: Finland (the value increased from 17.5% to 23.1%), Croatia (the value increased from 17.7% to 22.5%), Poland (the value increased from 13.6% to 19.1%).

The minimum share of elderly people (less than 17.5%) in EU countries was recorded in: Slovakia (17.4%), since 2011 this value has increased by 4.8%, Cyprus (16.5%), since 2011 this value has increased by 3.8%, Ireland (15.0%), since 2011 this value has increased by 3.5%, Luxembourg with an absolute minimum (14.8%), since 2011 this value has increased by 0.9%. Ukraine also belongs to this category of countries. In this country, the share of elderly people is 17.5%, which is 2.2% more than in 2011.

The study of the values of the demographic burden due to elderly people on the working population revealed that in all EU countries, without exception, they have been increasing over the past 5 years (2018-2022). However, the rates of this growth differed significantly. The highest growth rates of the demographic burden due to the elderly population on the working-age population (over 7.0) were observed in: Slovakia (7.32), Poland (7.94), Portugal (7.96), Croatia with the absolute maximum (9.68). This could be caused by a significant outflow of young people from these countries to work and study in EU countries with greater economic development, military conflicts in some of these countries, etc. The lowest rates of growth of the demographic burden due to elderly people per working-age population (less than 2.0) were recorded in: Sweden (1.52), Luxembourg (1.36), Lithuania (1.22), Malta with an absolute minimum (1.08). The same group of countries includes Ukraine with a growth rate of the demographic burden due to the elderly on the working-age population of 1.7.

The following countries show the highest growth rates of the demographic burden due to the elderly on the working-age population from 2018 to 2022: Slovakia from 225.4‰ to 254.7‰ (increase by 29.3‰), Poland from 252.9‰ to 292.6‰ (increase by 39.7‰), Portugal from 332.6‰ to 372.4‰ (increase by 39.8‰), Croatia from 307.3‰ to 355.7‰ (increase by 48.4‰).

The lowest growth rates of demographic burden during the studied period were observed in the following countries: in Sweden from 317.5‰ to 323.6‰ (increase by 6.1‰), in Luxembourg from 205.9‰ to 212.7‰ (increase by 6.8‰), in Lithuania from 300.6‰ to 306.7 ‰ (increase by 6.1‰), in Malta from 279.8‰ to 285.2‰ (increase by 5.4‰). In Ukraine, the value of the demographic burden due to elderly people on the working-age population in 2018 was 258.2‰, and in 2022 it was 261.6‰ (an increase of 3.4‰).

The index of the depth of aging, which is defined as the share of people over the age of 80 in relation to the population aged 65 and older, differs significantly in different EU countries (Fig. 1). This value is highest in Greece (32%), Italy (32%), Germany (31%), Spain (30%). This value is the lowest in Slovakia (20%), the Czech Republic (21%), Hungary, Cyprus and Bulgaria (22% in each of these countries).

Unlike most EU countries, Ukraine also has a low “depth of aging” (Fig. 1). An increase in life expectancy in general leads to an increase in the depth of aging. However, in such a case, the dynamics in Ukraine may be complicated by the peculiarities of the age-sex structure of the population. When many cohorts born in the 1950s and 1960s enter the age of incapacity, compared to the narrowed generation of “children of war”, a short-term decrease in the indicator can be observed.

The conducted study of values and indices of population aging on the territory of the EU makes it possible to distinguish separate groups of countries based on similar rates and volumes of population aging, to determine similar trends in their demographic development. Thus, we distinguish 5 groups of countries:

1) countries with the highest rates of population aging, the highest population aging index and coefficient, the largest volumes of demographic burden on the working-age population: Germany, Portugal, Italy, Greece;

2) countries that have average values of the index and the aging coefficient, but show high rates of growth of the aging population and demographic burden: the Netherlands, Poland, Slovenia, Slovakia, Bulgaria, Hungary, Finland, France, Croatia, Czechia, Romania;

3) countries that show average values of aging, but reduced growth rates of the aging population: Austria, Malta, Latvia, Lithuania, Sweden;

4) countries that show average values of population aging in all studied parameters: Belgium, Denmark, Estonia, Spain;

5) the countries with the lowest rates and values of population aging are: Cyprus, Ireland, Luxembourg.

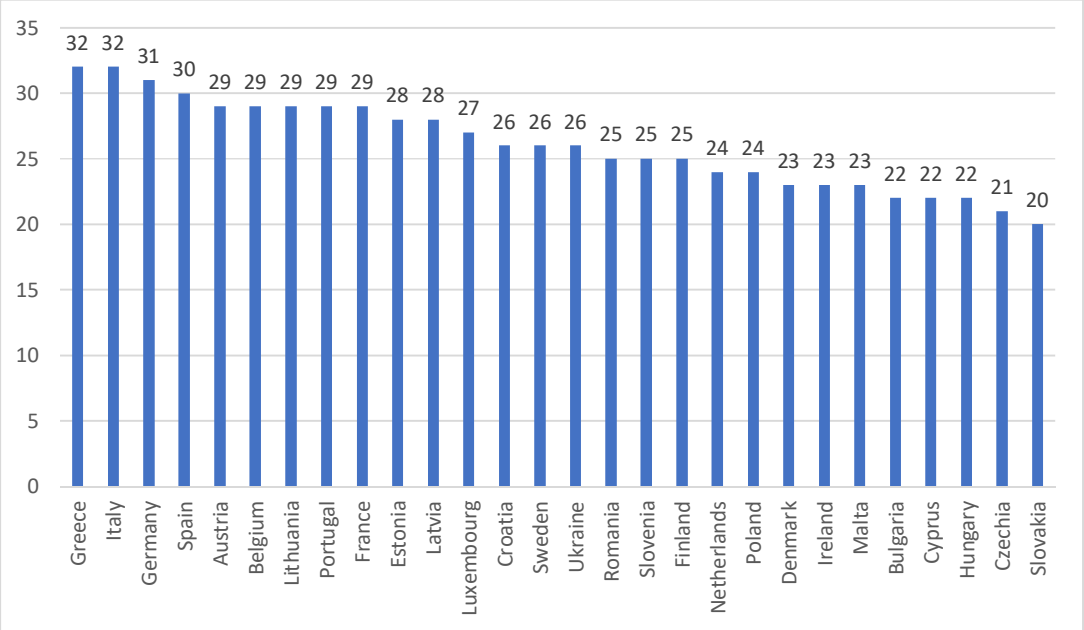

Fig. 1. Index of the depth of population aging in the EU countries and Ukraine
(the share of people aged 80+ out of the population aged 65+)

As predicted by the EU statistical service Eurostat, from January 1, 2022 to January 1, 2100, the number of inhabitants in the EU states will decrease by 27.3 million, to 420 million (Eurostat). At the same time, in 2022, the population began to recover after the decline associated with the coronavirus.

Having forecasted the structure of the population by age groups for EU countries (Fig. 2) , we can note that in the period 2020-2100, the share of people aged 0 to 14 will decrease in the first half of the century from 15.1% to 14.7%, and in the future the situation in this age category will stabilize by 15% by the end of the 21st century. The most noticeable changes will occur for the age category of the population from 15 to 64 years old – it will decrease from 64% to 52%. The share of residents aged 65-79 will increase from 14.6% to 17%, and the number of the population aged 80+ will increase from 5.9% to 14.8% (Eurostat).

Thus, the demographic burden on the working population will increase. The rapid aging of the population that Europe is experiencing is a fundamental demographic shift that affects almost all areas of society. The aging of societies is still viewed through a negative prism: as if it is a threat to the welfare of the state and a burden on the youth. But, apparently, the increase in the share of the elderly population becomes a problem only when institutions do not prepare for it and do not adapt. Indeed, the fact that people are living longer and generally healthier is primarily a testament to advances in medicine, improved living and working conditions, improved well-being, and improved health systems. The age group we traditionally define as “old people” has never been more diverse. This has prompted a rethinking of how we define and measure “old age”. And it is clear that in this new, more diverse, more dynamic world of the elderly, there is no place for rigid age categories or retirement age thresholds, there is no place for stereotypes and discrimination based on ageism.

Population aging is here to stay, at least for the foreseeable future, and governments in Europe generally recognize the importance of making the necessary reforms to create age-inclusive societies. It is important at this

stage to consider the progress achieved in the implementation of the significant Madrid International Action Plan on Aging, which was adopted by the governments of the EU countries 20 years ago, to determine the priority directions and spheres of social activity aimed at creating comfortable conditions for people of any age.

In order for countries to be able to strengthen their resilience in the face of demographic change, the first step is to ensure that older people can remain healthy, active and engaged in public life.

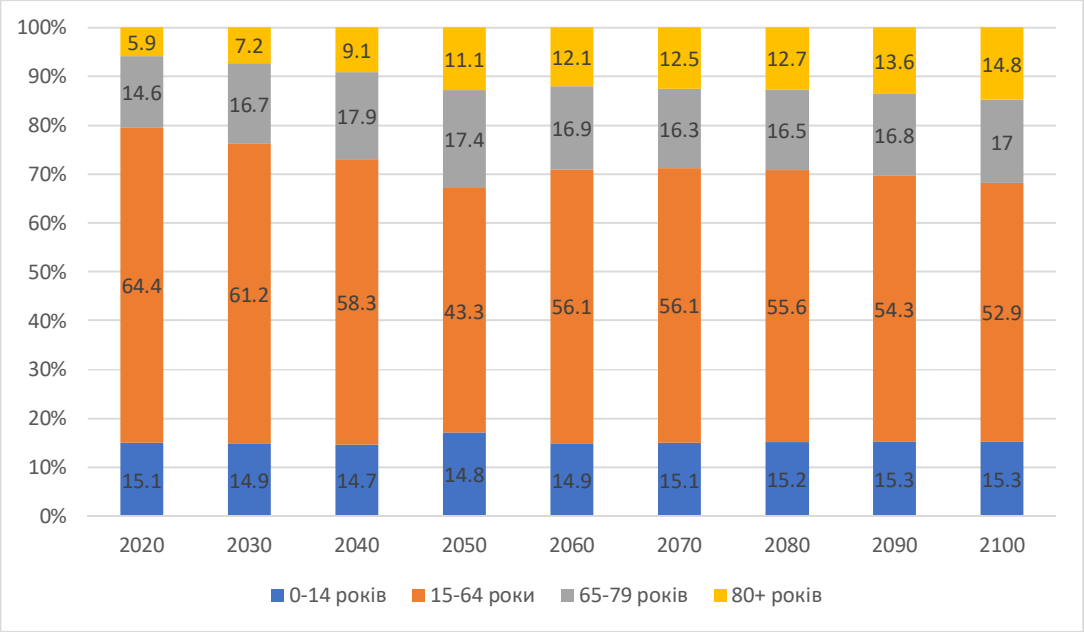

Fig. 2. Forecast of population structure by main age groups, EU-27, 2020–2100 (% of total population)

There are enormous potential benefits for people to have access to education and health care throughout their lives and to enter old age with useful skills and health. And also, when elderly people are not pushed away after reaching retirement age, but on the contrary, they remain active participants in the economy and society. At the same time, the formation and development of the "silver" economy, in which the elderly are involved, remains important. Important social steps in combating ageism and supporting the elderly can be the following steps by society and the governments of countries:

- to promote the broad involvement of elderly people in the social life of the country, communities and settlements where they live;
- to listen to the urgent problems of persons of this age category;
- to counter ageism in public discourse and practice. There should be no tolerance for age discrimination and negative stereotypes, which have become even more evident during the pandemic. Promoting a discourse focused on intergenerational solidarity, as well as on the active activities and valuable contributions of older people, will be key to changing social norms and attitudes towards older people;
- reviewing legal and political frameworks and budgets through the prism of age. Now is the time to review what needs to change in sectors such as health, education, employment and social security so that countries are in a better position to deal with the consequences of demographic change, while ensuring the rights and choices of people throughout their lives;
- to contribute to the acquisition of new knowledge and comprehensive development of the elderly, to develop the education of the "third age".

A new and interesting solution could be the introduction of smart "silver" villages in the EU countries, which will be completely autonomous, energy-saving and adapted to the needs of the elderly. Living in such settlements will help elderly people to feel like masters of their own lives, to do their favorite work and significantly delay the need to stay in nursing homes (Bogataj D., Bolarin F.- C., Kavšek M., Rogelj V., 2020). However, today, the issue of creating such settlements is only being researched and needs practical implementation. An interesting fact is that in Ukraine almost all long-lived people (more than 85%) who reached the age of 100+ lived in rural areas (State Statistics Service of Ukraine).

Conclusions

Population aging is one of the most important demographic processes that has led to long-term consequences in many countries of the world. For European countries, this problem is more urgent than for other countries of the world. During the last decades, the mortality rate of the population has significantly decreased in the countries of the region and the average life expectancy has increased. At the same time, the total birth rate is below

the population reproduction rate. There is also a tendency to become pregnant at a more mature age and an increase in the number of families with no more than two children. According to Eurostat data, in 2022 the share of people aged 65+ in the EU amounted to more than 20%, and according to the forecast, we can state that this share will gradually increase in the coming decades. Therefore, the economies and societies of EU countries must adapt to these changes.

The conducted research allows us to distinguish 5 groups of countries on the territory of the EU, which differ slightly in terms of rates and volumes of population aging. Among these countries, Ukraine could be among the countries with the lowest values and rates of population aging. This is explained by the fact that it is only entering the fourth phase of the demographic transition, which is characteristic of most EU countries, and for Ukraine, a sharp increase in the aging population is still ahead.

Ukraine is included in the group of countries that are leading in the rate of population decline (until the beginning of 2022). During the full-scale war waged by the russian federation against Ukraine, the country is losing a lot of its population due to hostilities and large volumes of migration. In the future, after the end of the war, Ukraine will need the immediate development and implementation of an effective demographic policy that will help return its citizens who emigrated, and will also be aimed at the youth, their needs for employment, decent living conditions, etc. An important component of the future demographic policy in Ukraine should be the protection of the elderly, ensuring their full functioning in society.

Elderly people are an important pillar of our society. They are leaders and creators, teachers and mentors, caregivers and volunteers, storytellers and cultural figures, fighters for rights that we sometimes take for granted. Their support and ensuring respect for the rights and dignity of the elderly is always not only a moral imperative. It also helps countries adapt to the future, build resilience and thrive in a world of rapid demographic change.

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