



Original article

Regional differentiation of demographic transformations in urban and rural populations across Polish voivodeships

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ABSTRACT

The aim of this study was to determine the spatial differentiation in the level of demographic ageing of Poland's population. The temporal scope of the analyses covers the years 2005–2024, as well as projections for the period 2030–2050. The research was conducted at the voivodeship level, and took into account the division between urban and rural areas. The study focused on the analysis of two measures that enable the identification of demographic changes, including the advancement of the ageing process: the *demographic ageing rate index* (W_{std}) and the *old-age index* (I_{st}). The results of the analyses revealed differences in the degree of advancement of the ageing process over time, in spatial terms, and between urban and rural populations. The rural population has been ageing more slowly than the urban population across the voivodeships. The forecasts, however, indicate that in the future the average annual rate of population ageing will slow down.

KEY WORDS: ageing population, city, rural areas, demographic changes, regions

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1. Introduction

The ageing of the population in Poland is in line with general European demographic trends (GRZEŚKOWIAK ET AL., 2021). Europe is currently described as a region in an advanced stage of population ageing. The demographic changes observed in Europe in recent decades are characterised by low mortality and fertility rates, leading to an ageing society. This process poses serious challenges to the country's economic stability (CONRADO ET AL., 2025). This process first became apparent in the country during the 1950s and 1960s. The ageing process intensified in Poland in the 1990s (WARYCH & JURAS, GAŁKA, 2011), and by 2004, the Polish population had entered the late old age phase (ANTCZAK & LEWANDOWSKA-GWARDA, 2018).

This phenomenon is therefore nothing new in Poland, but the mechanism of change has varied over time (WIŚNIEWSKI ET AL., 2020). Compared to other European countries, Poland was still considered a country with a relatively young population in the second decade of the 21st century (KAMIŃSKA & OSSOWSKA, 2017) (at that time, the old-age index did not exceed 20%). However, according to data from the Central Statistical Office (GUS), in 2023, the share of people aged 65+ was 20% (GUS, 2023).

Demographic changes have occurred with considerable variation at the international level. However, as noted by JANISZEWSKA (2013), it was in Europe that the processes of the first and second demographic transitions began. These processes were associated with large-scale emigration of Europeans

in the 19th century. In contrast, the second half of the 20th century in Europe, was marked by profound political, economic, and social transformations, contributed to further demographic changes. The theory of demographic transitions provides an explanation for the complex changes in demographic patterns worldwide. This theory was initiated by THOMPSON in 1929 and later developed by, among others, Notestein in 1945, who proposed four phases of the demographic transition: pre-transitional, early transitional, high transitional, and late transitional (SARKAR, 2025). Subsequently, Blacker expanded the theory to include a fifth phase, representing reproductive decline (KORBELA, 2023). TATARCZAK & JANIK (2023) emphasize that contemporary social transformation – evident in, among other aspects, changes in the age at marriage, shifts in partnership stability, delayed family formation, and expanded educational opportunities for women – has contributed to a decline in fertility. KUREK (2026) indicates that these changes exemplify the second demographic transition.

According to KOWALCZYK (2024), “the vast majority of demographic events depend on what we have inherited from the past, shaped by past events and previous generations”. In addition, LUTZ & GAILEY (2020) emphasise that the decline in fertility is usually attributed to the decline in population and the increase in the proportion of older people, while the broader context is not considered. The ageing of most societies is the result of civilisational, social, cultural and environmental changes that lead to lower fertility rates, declining mortality in the oldest age groups, and migration.

Population ageing is influenced by a variety of factors, including a decline in the birth rate (DERIVANTI, 2025), an increase in life expectancy, labour market conditions (PARK, 2017), population migration (KOWALCZYK, 2024), and higher education among women, which results in a delay in starting a family (BALASCH & GRATACÓS, 2012). Additionally, the availability of resources, urbanization (MARTINE ET AL., 2013), the quality of primary healthcare (AITKEN, 2024), the rise in living standards (OGURA & JAKOVLJEVIC, 2018), and social policy (WIŚNIEWSKI ET AL., 2020) are all contributing factors.

The consequences of demographic change are multifaceted. When the size of a given population group changes, this has an impact on the entire socio-economic system, from the national level to regions, cities, rural areas, households and businesses. They have economic consequences that affect multiple

channels. Changes in population structure and ageing are accompanied by increased government spending, rising healthcare costs (MAHESHWARI & MAHESHWARI, 2024), challenges for pension systems (STUMPF ET AL., 2025), shrinking tax revenues affecting the funding of public services (VAN DALEN & HENKENS, 2011), increased demand for social services (WALKER, 2024) and degradation of social infrastructure (SZAJA, 2024), rehabilitate of technical infrastructure (SUTRADHAR ET AL., 2025), a growing labour supply deficit (KOZERA-KOWALSKA, 2024), company relocation (JELONEK & MAZUR, 2024), changes in the intensity of specific economic behaviours (WALERYSIAK-GRZECHOWSKA, 2024), changes in the construction and real estate market (WANG ET AL., 2015), income inequality (GAO ET AL., 2024), and disruptions in the education system (DERIVANTI, 2025). All these consequences may ultimately lead to an economic slowdown (CONRADO ET AL., 2025).

Disruptions in basic services, which occur at various levels of socio-economic life, will continue to impede the viability of the basic functions of cities and rural areas, in addition to the aforementioned consequences of population ageing. The ageing of the population may lead to a widening income gap between urban and rural areas (DING ET AL., 2024) and a decline in the well-being of residents. Ultimately, the competitiveness and investment attractiveness of the region may be impacted by the diverse array of consequences (ELSHOF ET AL., 2014).

2. Purpose, study period, subject matter, source materials and methods

This study aimed to determine the spatial variation in the demographic ageing of the country's population. Within the framework of this aim, the following questions were addressed:

- Is there a visible difference in the degree of population ageing between urban and rural areas?
- Do demographic forecasts for 2030-2050 indicate a faster pace of demographic change than in 2005-2024?

The research was conducted at the regional level, and took into account the division between urban and rural areas. The time frame of the analyses covered the years 2005-2024 and forecasts for the years 2030-2050. The processes of population ageing were analyzed in static and dynamic terms. The static analysis covered the years 2005, 2010, 2015, 2019, 2024 and forecasts for 2030, 2035, 2040, 2045, and

2050, and the dynamic approach depended on the selected indicators.

The empirical material came from the Central Statistical Office (GUS) – Local Data Bank and Demography Database (GUS, NSP, 2025). Quantitative data for the forecasts were compiled by GUS on the basis of the 2011 National Census.

Demographic changes and the progression of population ageing were analysed using a number of indicators. Research in this area has been conducted by KANTOR-PIETRAGA (2014), TRZPIOT & OJRZYŃSKA (2014), RAKOWSKA (2016), BALACHANDRAN ET AL. (2019), POLNA (2020), and GRZEŚKOWIAK ET AL. (2021). According to GRZEŚKOWIAK ET AL. (2021), assessments of the ageing process cannot be considered in isolation from other elements of the population structure.

The demographic ageing rate index (originally proposed by DŁUGOSZ (1998)) was used to measure the degree of population ageing. This formula considers changes in the proportions of children and older individuals over time:

$$W_{std} = [U_{(0-14)t} - U_{(0-14)t+n}] + [U_{(65+)t+n} - U_{(65+)t}]$$

where:

W_{std} – demographic ageing index;

$U_{(0-14)t}$ – share of the population aged 0–14 at the beginning of the study period;

$U_{(0-14)t+n}$ – share of the population aged 0–14 at the end of the period under study;

$U_{(65+)t}$ – share of the population aged 65 and over at the beginning of the period under review;

$U_{(65+)t+n}$ – share of the population aged 65 and over at the end of the period under review.

W_{std} values greater than zero indicate population ageing, with higher values indicating a more rapid pace of ageing. Negative W_{std} values indicate population rejuvenation, with lower values indicating a more rapid pace of rejuvenation (Table 1).

The study also utilized a relational indicator known as the old-age index, which refers to the number of elderly individuals per 100 people aged 0–14.

$$I_{st} = L_{65+} / L_{0-14} * 100$$

where:

I_{st} – old-age index;

L_{65+} – number of people aged 65 and more;

L_{0-14} – number of children aged 0–14.

The actual ageing of the population is considered to begin when the number of children falls below the number of elderly people, meaning that the ageing index exceeds 100. This threshold helps to identify stages of demographic youth and old age. A higher value of this index indicates an older society, as it

reflects a greater number of older individuals in relation to the younger population. Additionally, this index can be interpreted as the number of grandparents for every 100 grandchildren (Table 2).

Table 1. Proposal for a scale of demographic ageing based on the Demographic Ageing Rate Index (Source: own study)

Group	Index value	Demographic stage
1	up to 0,0	Demographic youth
2	0,0 – 1,0	Demographic maturity
3	1,0 – 2,0	Pre-ageing
4	2,0 – 3,0	Demographic old age
5	3,0 – 4,0	High old age
6	above 4,0	Abnormally high old age

Table 2. Scale of demographic ageing based on the Ageing Index (Source: own study based on Kowaleski & Majdzińska, 2012)

Group	Index value	Demographic stage
Stages of population ageing		
1	less than 60	Demographic youth
2	60–80	Pre-ageing
3	80–100	Inherent ageing
Stages of demographic ageing		
4	100–120	I
5	120–140	II
6	140 and more	III

In this study, the scale proposed by KOWALSKI & MAJDZIŃSKA (2012) was adopted, along with the introduction of a simple, arbitrary scale for the Demographic Ageing Rate Index, due to the facilitation of comparisons over time and across regions. This approach is based on predefined, fixed threshold values. Consequently, it allows for the monitoring of the actual progression of the ageing process over an extended period and enables meaningful comparisons between regions.

3. Results

3.1. Demographic ageing rate index

The demographic ageing index offers a dynamic perspective on the extent of population ageing by considering the changes in the proportions of the oldest age group (over 65) and the youngest age group (0–14). The index values presented in general terms (Table 3), covering cities, rural areas, and Poland as a whole, as well as detailed values for individual provinces, indicate that the areas under analysis are currently experiencing and will continue to face population ageing. This trend is supported by the

positive values of the index shown in Tables 3, 4, and 5. Specifically, each year of the study revealed an increasing percentage of the population aged 65 and over, while the percentage of those aged 0–14 in the total population was declining.

In the overall summary (Table 3) of the demographic ageing rate index from 2005 to 2024, a lower level of ageing was observed among the rural population. Between 2005 and 2010, the index value was 0.9 percentage points, indicating that the rural population was at a stage of demographic maturity during that period. In contrast, the urban population in Poland could be classified as being in the pre-ageing stage, with the population structure shifting towards ageing by 1.4 percentage points.

Differences were observed between voivodeships regarding the demographic ageing rate index for urban and rural areas. In the first period analyzed (2005–2010), there was significant variability in the index for rural areas across provinces (45.4%), while variability for urban areas and Poland as a whole was moderate, ranging from 38% to 39%

(see Table 4). However, in each subsequent period, the variation between provinces decreased. Forecasts for the period 2045–2050 suggest that the variability of the demographic ageing index for the analyzed regions will be low, not exceeding 10%.

The minimum, maximum, and range values further illustrate the diversity among provinces. The difference between the maximum and minimum values was greater in the period from 2005 to 2024 than in the forecasted period. The lowest value of the index was recorded among the rural population in the Dolnośląskie voivodeship in 2005. However, this region also experienced the highest growth rate of this indicator. The average annual rate of change in the demographic ageing index for the rural population in Dolnośląskie voivodeship from 2005 to 2024 was over 120% (see Table 5). Conversely, the highest value of the index was recorded among the urban population in the Warmińsko-mazurskie region during the period from 2019 to 2024, with an increase of 5.4 percentage points.

Table 3. Index of demographic ageing of the Polish population in 2005–2050 (in percentage points) (Source: own study based on data from the Central Statistical Office)

	2005-2010	2010-2015	2015-2019	2019-2024	Forecast			
					2030-2035	2035-2040	2040-2045	2045-2050
Urban area	1.4	2.9	2.3	3.7	2.4	1.2	2.8	3.4
Rural area	0.9	2.0	1.4	2.5	2.3	2.8	3.0	3.3
Poland	1.2	2.6	1.9	3.2	1.8	2.4	2.9	3.3

Table 4. Statistical characteristics of the demographic ageing rate of the Polish population in 2005–2050 (Source: Own study based on data from the Central Statistical Office)

Specification	2005-2010	2010-2015	2015-2019	2019-2024	2030-2035	2035-2040	2040-2045	2045-2050
Poland								
min	0,2	1,4	1,2	2,2	1,3	2,1	2,5	3,0
max	2,0	3,6	3,0	4,9	2,7	3,0	3,3	3,9
R	1,8	2,2	1,8	2,7	1,4	0,9	0,8	0,9
average	1,3	2,8	2,1	3,5	1,9	2,5	3,0	3,4
med.	1,5	2,8	2,1	3,4	1,8	2,4	2,9	3,4
Vs (%)	38,1	19,5	24,2	22,9	22,0	11,7	7,8	7,7
Urban area								
min	0,2	1,4	1,2	2,3	1,7	0,4	2,6	3,0
max	2,5	4,2	3,5	5,4	3,7	2,4	3,6	4,2
R	2,3	2,8	2,3	3,1	2,0	2,0	1,0	1,1
average	1,6	3,3	2,5	4,1	2,4	1,4	3,0	3,5
med.	1,7	3,4	2,6	4,2	2,5	1,4	2,9	3,5
Vs (%)	39,1	21,3	24,8	20,8	22,6	32,5	8,5	8,8
Rural area								
min	0,1	1,5	0,7	0,9	1,7	2,6	2,6	3,1
max	1,8	3,1	2,7	4,6	3,1	3,5	3,4	3,9
R	1,7	1,6	2,0	3,7	1,3	0,9	0,8	0,8
average	1,0	2,2	1,6	2,7	2,4	2,9	3,1	3,4
med.	1,1	2,2	1,5	2,5	2,3	2,8	3,1	3,5
Vs (%)	45,4	23,8	32,2	35,4	15,2	8,9	7,7	8,2

Table 5. Regional differences in the demographic ageing rate of the Polish population (by urban and rural areas) (in p.p.) (Source: Own study based on the Central Statistical Office)

	Years								Average annual growth rate (%)	
	2005-2010	2010-2015	2015-2019	2019-2024	2030-2035	2035-2040	2040-2045	2045-2050	2024/2005	2050/2030
Poland										
Dolnośląskie	0,6	2,9	2,3	3,2	1,3	2,1	2,9	3,5	50,0	28,5
Kujawsko-pomorskie	1,5	3,3	2,3	4,0	1,8	2,4	2,9	3,4	27,9	16,7
Lubelskie	1,7	2,7	2,2	3,7	2,3	2,8	3,3	3,9	22,0	14,3
Lubuskie	1,1	3,4	2,7	4,6	1,5	2,3	3,0	3,5	41,2	22,8
Łódzkie	0,9	2,8	2,1	3,5	1,6	2,3	2,9	3,3	41,0	19,9
Małopolskie	1,4	2,1	1,3	2,3	2,1	2,5	2,9	3,3	12,1	11,3
Mazowieckie	0,2	1,4	1,2	2,2	1,6	2,3	2,8	3,1	82,5	17,4
Opolskie	2,0	2,8	2,1	2,9	2,5	2,6	3,0	3,5	10,0	8,6
Podkarpackie	2,0	2,9	2,0	3,0	2,5	3,0	3,3	3,7	10,6	10,1
Podlaskie	1,9	2,3	1,4	2,9	2,7	2,9	3,1	3,7	11,6	8,5
Pomorskie	1,0	2,7	1,7	3,1	1,6	2,1	2,5	3,0	31,7	17,5
Śląskie	1,7	2,3	2,1	3,4	1,8	2,1	2,7	3,1	18,7	14,9
Świętokrzyskie	1,5	3,1	2,6	4,1	2,0	2,7	3,3	3,9	27,7	17,9
Warmińsko-mazurskie	1,8	3,1	2,6	4,9	2,0	2,5	3,0	3,5	29,3	14,3
Wielkopolskie	0,9	2,9	1,7	3,3	1,8	2,4	2,8	3,2	40,6	16,2
Zachodniopomorskie	1,4	3,6	3,0	4,6	1,5	2,2	2,9	3,4	34,3	23,7
Urban area										
Dolnośląskie	1,0	3,2	2,5	3,8	1,7	1,4	2,8	3,5	40,7	20,1
Kujawsko-pomorskie	1,8	3,8	2,7	4,6	2,4	1,6	3,0	3,7	27,2	11,3
Lubelskie	2,5	3,7	3,1	4,8	2,8	2,0	3,3	4,0	18,5	9,0
Lubuskie	1,4	3,5	2,8	5,1	2,0	1,2	3,0	3,6	38,0	15,6
Łódzkie	1,1	3,4	2,8	4,1	1,7	1,7	2,9	3,5	39,5	20,2
Małopolskie	1,5	2,4	1,5	2,5	2,9	1,1	3,0	3,5	13,1	4,8
Mazowieckie	0,2	1,4	1,2	2,3	2,9	0,4	2,7	3,0	94,4	0,8
Opolskie	2,5	3,8	2,6	3,9	2,4	2,0	3,1	3,6	11,8	10,5
Podkarpackie	2,2	3,4	2,8	4,1	3,0	1,6	3,3	4,0	17,4	7,1
Podlaskie	2,5	2,7	1,8	4,2	3,7	1,4	2,9	3,6	14,0	-0,5
Pomorskie	1,3	3,1	2,0	3,5	2,5	0,9	2,6	3,1	29,2	5,4
Śląskie	1,9	2,6	2,3	3,8	2,1	1,4	2,7	3,2	18,5	10,6
Świętokrzyskie	2,1	4,2	3,5	5,1	1,8	2,4	3,6	4,2	25,5	22,5
Warmińsko-mazurskie	1,9	3,4	2,7	5,4	2,5	1,4	2,9	3,5	29,4	8,0
Wielkopolskie	1,2	3,5	2,2	4,2	2,7	1,3	3,0	3,6	37,4	7,3
Zachodniopomorskie	1,4	3,9	3,1	4,6	1,9	1,2	2,8	3,4	34,2	14,7
Rural area										
Dolnośląskie	0,1	2,3	1,9	2,5	1,7	2,7	3,1	3,5	121,8	19,2
Kujawsko-pomorskie	1,2	2,8	1,9	3,3	2,2	2,8	3,0	3,3	28,5	9,9
Lubelskie	0,9	1,8	1,4	2,6	2,5	3,0	3,4	3,8	29,3	11,9
Lubuskie	0,8	3,0	2,3	3,8	2,1	2,8	3,1	3,5	48,4	14,1
Łódzkie	0,5	1,8	1,2	2,4	2,1	2,7	3,0	3,2	44,7	11,0
Małopolskie	1,4	1,9	1,2	2,1	2,6	2,8	2,9	3,2	10,7	5,3
Mazowieckie	0,3	1,5	1,2	1,9	2,2	2,7	3,0	3,1	55,6	8,8
Opolskie	1,4	1,7	1,4	1,7	3,1	2,9	3,0	3,5	6,5	3,4
Podkarpackie	1,8	2,5	1,5	2,2	2,9	3,3	3,4	3,6	4,8	5,8
Podlaskie	1,0	1,6	0,7	0,9	3,0	3,5	3,4	3,9	-4,0	6,9
Pomorskie	1,0	2,4	1,6	2,9	2,2	2,6	2,6	3,1	29,5	8,9
Śląskie	1,1	1,5	1,3	2,4	2,4	2,6	2,8	3,1	22,0	6,9
Świętokrzyskie	1,1	2,1	1,8	3,3	2,3	3,0	3,3	3,8	31,2	13,3
Warmińsko-mazurskie	1,6	2,6	2,3	4,3	2,6	2,9	3,2	3,6	28,4	8,7
Wielkopolskie	0,6	2,3	1,2	2,5	2,1	2,6	2,8	3,1	44,5	11,0
Zachodniopomorskie	1,4	3,1	2,7	4,6	2,2	2,7	3,1	3,5	33,7	13,1

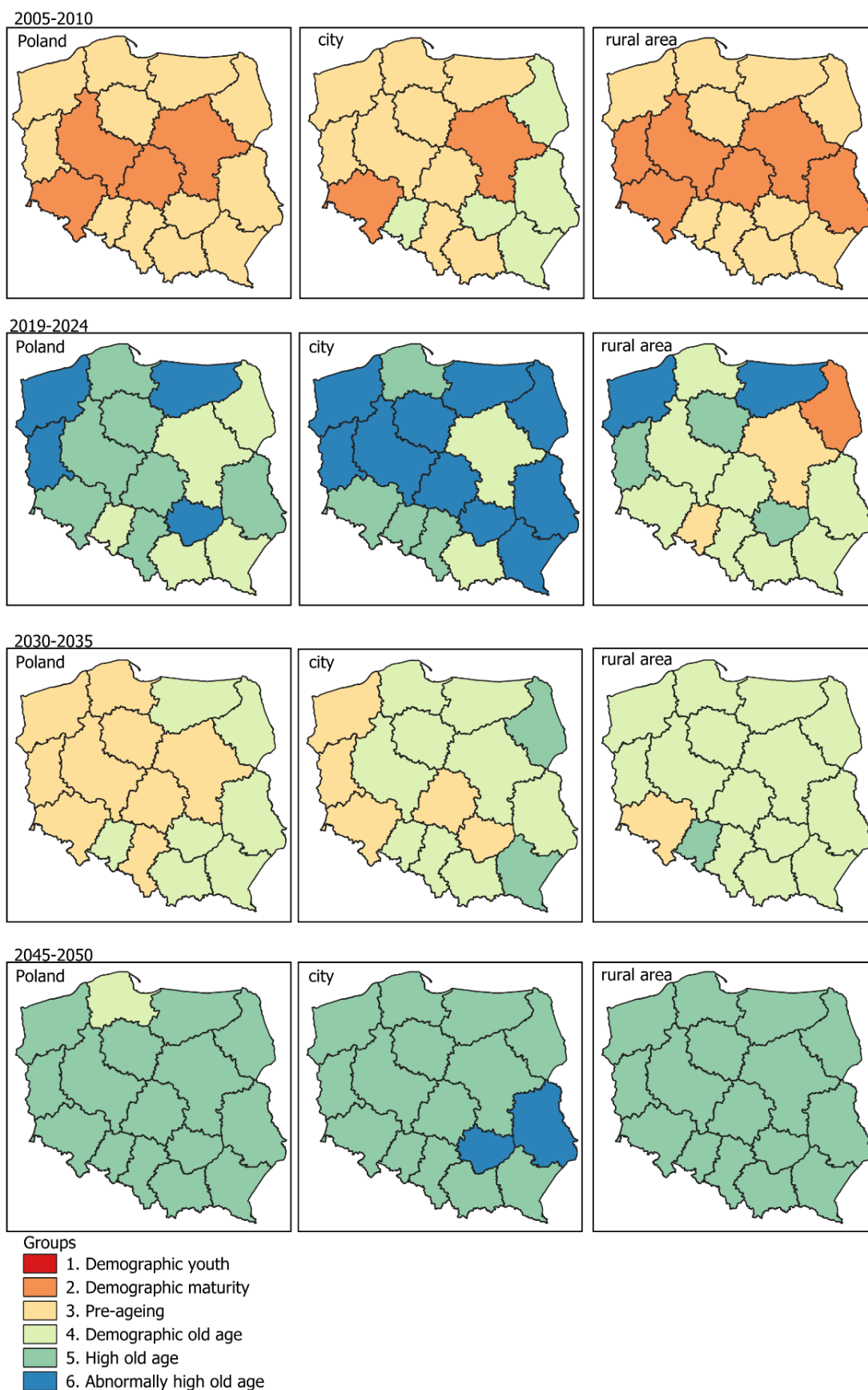


Fig. 1. Regional differences in the demographic ageing rate of the Polish population (by urban and rural areas)
(Source: Own study based on the Central Statistical Office)

The changes in the demographic ageing index across Polish voivodeships from 2005 to 2024 were more pronounced than those projected for the period from 2030 to 2050 (Table 4). This trend is also evident when considering the urban-rural divide. During the forecast period, the average annual rate of change is often several times lower than it was from 2005 to 2024. An exception to this trend can be observed in the rural populations of the Podlaskie and Podkarpackie provinces, where the rate of change during the forecast period exceeded that of 2005-2024. However, it's important to note that the overall rate of change in these provinces was still relatively low, with the average annual rate of change not exceeding 10% (Table 5).

The demographic ageing index for the rural population in the voivodeships during the first period analyzed (2005–2010) showed less advanced ageing compared to urban areas. The average values of the index were 1.0 for rural areas and 1.6 for cities (Table 4). This difference is also evident when examining individual groups, particularly from 2005 to 2024. In the initial analysis period (2005-2010), both urban and rural populations in the regions were primarily classified as demographically mature and in the pre-ageing stage (groups 2 and 3). However, in the subsequent period (2010-2015), groups 3, 4, and 5 (pre-ageing, demographic ageing, and high ageing) became more prominent. From 2019 to 2024, an unusually high level of ageing in the urban population (group 6) was noted in 10 provinces. In contrast, this level of ageing was only observed among the rural population in two provinces: Warmińsko-mazurskie and Zachodniopomorskie (Annex Table 1). Overall, the rural population in these regions aged more slowly than the urban population from 2005 to 2024.

During the forecast period, both the urban and rural populations continued to age, although the pace of demographic ageing slowed down. This trend was reflected in the consistent classification of the population into proposed typological groups. The classification of the urban population in the provinces for the years 2030-2035 indicates that the rate of change in the demographic ageing index is less advanced compared to the previous period of 2019-2024. This does not signify an improvement in the situation in Polish voivodeships (Table 5). According to GUS forecasts, the percentage of the population aged 65 and older is expected to rise, while the percentage of individuals aged 0-14 will decline. The rate of change for this indicator is anticipated to be lower.

Between 2030 and 2040, the rural population was categorized into groups reflecting advanced stages of demographic ageing. In contrast, the changes in the urban population were less pronounced. However, during the last two periods, there was a noticeable stabilization in these classifications. By the years 2045 to 2050, the rural population had been classified into group 5, which indicates high levels of ageing. The urban population experienced a similar trend, except for residents of cities in the Świętokrzyskie and Lubelskie provinces (Fig. 1), where group 6, denoting abnormally high levels of ageing, was identified.

The demographic ageing rates in voivodeships, categorized by urban and rural populations, displayed differences in specific values despite being organized into nearly identical groups during the forecast period. In some cases, the degree of ageing among the urban and rural populations in a particular voivodship was the same. For instance, in the Dolnośląskie province, both urban and rural populations were projected to shift towards old age by 1.7 percentage points between 2030 and 2035, and by 3.5 percentage points between 2045 and 2050 (Table. 5). Conversely, in regions where the rural population aged more quickly than the urban population, the Mazowieckie province serves as an example. Data for this area indicated that the rural population transitioned towards old age more significantly than the urban population, showing an increase of 2.3 percentage points.

3.2. Old-age index

The demographic ageing index highlights significant changes in the ratio of elderly individuals to children aged 0-14. Overall, the situation in rural areas has proven to be more favourable than in urban areas, despite a trend of increase over time. In 2005, there were 72 grandparents for every 100 grandchildren in rural areas, compared to 90 elderly individuals for every 100 grandchildren in cities. Forecasts suggest that this ratio is expected to nearly triple by 2050 (Table 6).

The regions were characterized by low volatility of the analyzed indicator from the first year of the study. In comparing rural and urban populations, greater volatility was observed among the rural population. Notably, the range of this indicator showed significant diversity; for instance, in the period 2005 and 2010, the range for rural populations was nearly twice that of urban populations in the voivodeships. The coefficient of variation (v_s) for the ageing of the rural population in the provinces

in 2005 indicated minimal variation in the old-age index, and this variation decreased even further in subsequent years (Table 7). This suggests that the index values among the provinces were quite similar. A comparable trend in this statistical measure was also observed in the urban population and for data concerning provinces as a whole. Interestingly, it is projected that only in one case will the number of

people aged over 65 per 100 individuals aged 0-14 exceed 400. This projection for 2050 pertains to the urban population of the Świętokrzyskie province. Additionally, maximum values of the index –showing over 300 grandparents for every 100 grandchildren – may be reached in 2045 and 2050 for rural areas in the Opole and Świętokrzyskie voivodeships (Table 8).

Table 6. Old-age index of the Polish population in the period 2005–2050 (persons aged 65+/100 persons aged 0–14)
(Source: Own study based on data from the Central Statistical Office)

	2005	2010	2015	2019	2024	Forecast				
						2030	2035	2040	2045	2050
Urban area	90,6	100,3	121,3	136,0	166,2	207,1	233,4	247,3	270,0	295,4
Rural area	71,5	74,1	85,2	94,0	109,3	143,3	162,7	186,9	211,9	239,1
Poland	82,0	88,6	105,6	118,0	140,7	178,1	196,6	219,2	243,0	269,3

Table 7. Statistical characteristics of the old-age index of the Polish population in the period 2005–2050 (Source: Own study based on data from the Central Statistical Office)

Specification	2005	2010	2015	2019	2024	2030	2035	2040	2045	2050
Poland										
min	65,4	72,7	90,0	100,6	120,2	149,5	162,8	180,3	198,8	220,1
max	100,0	106,2	126,0	143,2	176,2	231,0	262,7	294,9	325,9	359,9
R	34,6	33,5	36,0	42,6	56,0	81,5	99,9	114,6	127,1	139,8
average	81,1	88,5	106,9	120,7	146,0	185,3	205,4	230,1	256,3	285,6
med.	80,7	88,8	105,0	119,2	147,2	187,1	207,0	233,5	259,6	286,3
Vs (%)	13,4	13,4	11,6	11,6	12,2	12,5	13,0	13,2	13,4	13,6
Urban area										
min	72,7	84,0	106,4	118,6	136,8	173,4	200,9	206,0	224,3	243,5
max	107,1	115,9	145,0	172,4	219,8	281,4	309,0	340,5	377,7	420,0
R	34,4	31,9	38,6	53,8	83,0	108,1	108,1	134,5	153,5	176,5
average	87,5	98,4	121,9	138,7	172,7	217,4	244,8	262,2	288,1	317,6
med.	86,6	96,0	120,9	136,0	170,9	217,1	243,8	258,7	281,9	309,0
Vs (%)	12,8	10,6	10,0	11,0	12,0	12,5	11,5	13,1	13,5	13,9
Rural area										
min	43,8	44,5	54,3	62,7	77,1	103,9	117,8	135,1	153,1	174,2
max	102,5	109,2	120,5	125,7	145,9	203,5	238,7	273,3	304,7	338,5
R	58,7	64,7	66,2	62,9	68,8	99,5	120,9	138,1	151,6	164,3
average	72,5	75,8	87,9	97,9	114,9	150,9	172,0	198,2	225,4	255,3
med.	70,1	72,5	84,1	93,7	115,1	150,2	170,8	195,2	222,0	251,5
Vs (%)	23,2	24,5	20,9	18,2	15,4	16,1	17,0	17,3	17,3	17,3

Regional differences indicate that as early as 2005, the populations in various provinces were entering the pre-ageing and ageing phases (groups 2 and 3). However, distinguishing between urban and rural populations revealed more diverse trends. Generally, the rural population in these provinces was younger than the urban population. Five voivodeships – Kujawsko-pomorskie, Pomorskie, Warmińsko-mazurskie, Wielkopolskie, and Zachodniopomorskie – were classified as demographically young (group 1) (Annex Table 2). Notably, during the analyzed years, no province fell into this category when considering the urban population or when looking at the provinces as a whole. The differences in demographic indices between urban and rural populations were significant

in some instances. For example, in 2005, the Pomorskie province reported 40 fewer grandparents per 100 grandchildren in rural areas compared to cities. This gap often widened in subsequent years. By 2024, the highest levels of population ageing, measured by the population ageing index (group 6), were observed in nearly all provinces, particularly within urban populations. Conversely, the rural population in these provinces primarily fell into the first and second stages of ageing (groups 4 and 5) (Annex Table 2). Between 2005 and 2024, there were no instances in any province where the rural population aged faster than the urban population in a given year, based on typological groups. However, when examining the index values, there were isolated

cases where the index for the rural population was slightly higher than for the urban population in 2010. specific regions, such as in the Lubelskie province in 2010.

Table 8. Regional variation in the old-age index for Poland (persons aged 65+/100 persons aged 0–14) (Source: Own study based on data from the Central Statistical Office)

	Years										Average annual growth rate (%)	
	2005	2010	2015	2019	2024	2030	2035	2040	2045	2050	2024/ 2005	2050/ 2030
Poland												
Dolnośląskie	90,9	94,9	115,3	130,4	155,4	198,2	213,7	235,1	259,0	286,6	11,3	8,6
Kujawsko-pomorskie	73,1	80,4	101,8	117,0	146,0	178,3	196,6	219,8	244,6	273,0	14,8	7,7
Lubelskie	84,2	93,4	111,3	126,3	153,3	191,9	216,4	247,5	280,7	318,3	12,7	8,9
Lubuskie	70,6	75,9	97,7	115,0	148,4	182,3	198,8	220,4	245,6	274,8	16,0	10,6
Łódzkie	100,0	106,2	126,0	140,2	167,2	203,0	221,3	244,3	269,0	296,3	10,8	8,6
Małopolskie	77,1	84,3	97,2	105,5	120,2	155,9	175,2	198,3	222,3	248,2	9,3	7,9
Mazowieckie	92,8	93,9	103,2	110,3	124,6	160,2	175,8	195,9	216,6	238,2	6,1	9,7
Opolskie	90,4	103,6	125,2	140,1	162,1	231,0	262,7	294,9	325,9	359,9	12,4	8,3
Podkarpackie	71,5	80,5	98,1	111,6	131,9	176,1	201,4	232,0	264,5	299,2	13,0	9,3
Podlaskie	85,8	96,6	112,1	121,3	141,5	195,4	223,9	256,4	288,2	323,1	10,5	11,2
Pomorskie	69,0	73,8	90,0	100,6	120,4	149,5	162,8	180,3	198,8	220,1	11,8	10,6
Śląskie	90,0	101,9	118,5	132,1	158,4	200,1	220,1	240,6	261,9	286,0	11,9	8,0
Świętokrzyskie	92,4	102,1	124,3	143,2	176,2	216,6	240,8	272,3	307,4	346,4	13,8	7,4
Warmińsko-mazurskie	65,4	72,7	91,5	108,3	143,5	174,6	194,3	218,0	244,1	273,5	17,0	9,8
Wielkopolskie	69,7	73,3	91,1	101,6	123,0	154,5	170,7	191,1	212,7	236,9	12,0	9,4
Zachodniopomorskie	74,9	82,2	106,9	127,2	163,2	196,5	212,7	234,9	260,1	288,7	16,9	8,9
Urban area												
Dolnośląskie	101,7	109,1	132,8	149,6	183,3	222,0	243,0	258,4	281,0	307,8	12,5	6,8
Kujawsko-pomorskie	84,4	95,9	123,3	142,2	181,4	219,5	246,2	264,7	291,6	323,7	16,5	8,1
Lubelskie	76,5	92,1	118,6	140,2	179,1	229,9	263,6	289,3	322,2	360,0	18,5	9,4
Lubuskie	77,2	85,5	109,4	128,2	168,3	204,9	226,6	239,8	264,1	293,1	16,9	7,4
Łódzkie	107,1	115,9	141,1	160,1	196,8	241,4	263,4	283,0	307,5	335,7	12,9	6,8
Małopolskie	95,2	106,1	123,2	131,9	151,9	194,9	225,6	240,3	265,6	292,6	9,8	8,5
Mazowieckie	103,7	104,7	113,6	120,2	136,8	173,4	200,9	206,0	224,3	243,5	5,7	7,0
Opolskie	89,7	107,8	137,8	156,1	190,6	259,8	291,5	317,8	348,7	383,2	16,3	8,1
Podkarpackie	74,6	87,5	111,7	131,2	162,3	222,0	256,8	277,4	309,0	344,0	16,8	9,2
Podlaskie	72,7	87,2	106,4	118,6	148,9	206,5	244,5	263,2	290,7	321,1	15,4	9,2
Pomorskie	86,6	94,8	115,8	127,9	155,9	186,0	209,4	219,0	238,3	260,1	12,5	6,9
Śląskie	93,0	107,1	126,2	141,5	173,3	214,8	238,5	253,6	274,3	298,1	13,3	6,8
Świętokrzyskie	95,9	111,5	145,0	172,4	219,8	281,4	309,0	340,5	377,7	420,0	18,0	8,3
Warmińsko-mazurskie	73,2	84,0	107,7	126,2	168,6	204,4	230,2	245,5	270,4	298,5	18,1	7,9
Wielkopolskie	81,1	88,3	112,2	126,4	159,3	194,4	222,5	237,6	262,0	290,0	14,5	8,3
Zachodniopomorskie	86,6	96,2	125,2	147,0	187,0	223,4	245,1	258,9	282,8	310,2	16,7	6,8
Rural area												
Dolnośląskie	70,4	68,6	82,0	94,3	109,9	156,0	172,4	196,5	223,0	252,3	9,3	10,1
Kujawsko-pomorskie	59,2	61,8	75,8	86,8	106,7	134,9	152,6	175,5	199,2	225,2	12,5	10,8
Lubelskie	89,8	94,3	105,6	115,1	133,4	165,0	188,4	219,0	252,4	290,0	8,2	11,9
Lubuskie	60,9	61,8	78,1	92,3	117,1	150,4	169,0	193,9	220,4	250,1	13,9	10,7
Łódzkie	90,1	92,5	104,1	111,4	127,3	155,5	174,3	199,1	224,5	251,4	7,2	10,1
Małopolskie	64,3	68,3	77,3	84,4	96,5	128,1	147,5	170,1	193,4	218,3	8,5	11,3
Mazowieckie	77,9	78,0	86,1	93,2	104,6	139,0	157,0	179,8	203,7	228,8	6,1	10,5
Opolskie	91,0	99,4	112,3	122,5	134,1	203,5	238,7	273,3	304,7	338,5	8,1	10,7
Podkarpackie	69,8	76,4	89,8	99,1	113,2	150,1	175,6	207,4	240,2	274,7	10,2	12,9
Podlaskie	102,5	109,2	120,5	125,7	130,8	179,2	208,6	246,4	284,2	326,2	5,0	12,7
Pomorskie	43,8	44,5	54,3	62,7	77,1	103,9	117,8	135,1	153,1	174,2	12,0	10,9
Śląskie	80,9	86,3	95,6	104,2	119,4	160,7	183,0	207,3	230,5	255,6	8,1	9,7
Świętokrzyskie	90,0	95,7	109,9	122,1	145,9	178,5	202,4	234,2	268,6	306,9	10,1	11,5
Warmińsko-mazurskie	56,2	59,5	71,8	84,9	112,2	139,2	160,2	185,6	212,7	243,4	14,8	11,8
Wielkopolskie	58,0	58,1	69,9	77,1	90,9	120,1	135,1	154,6	175,2	197,5	9,4	10,5
Zachodniopomorskie	55,4	58,2	73,9	90,0	120,1	149,8	169,1	193,8	221,0	251,5	16,7	10,9

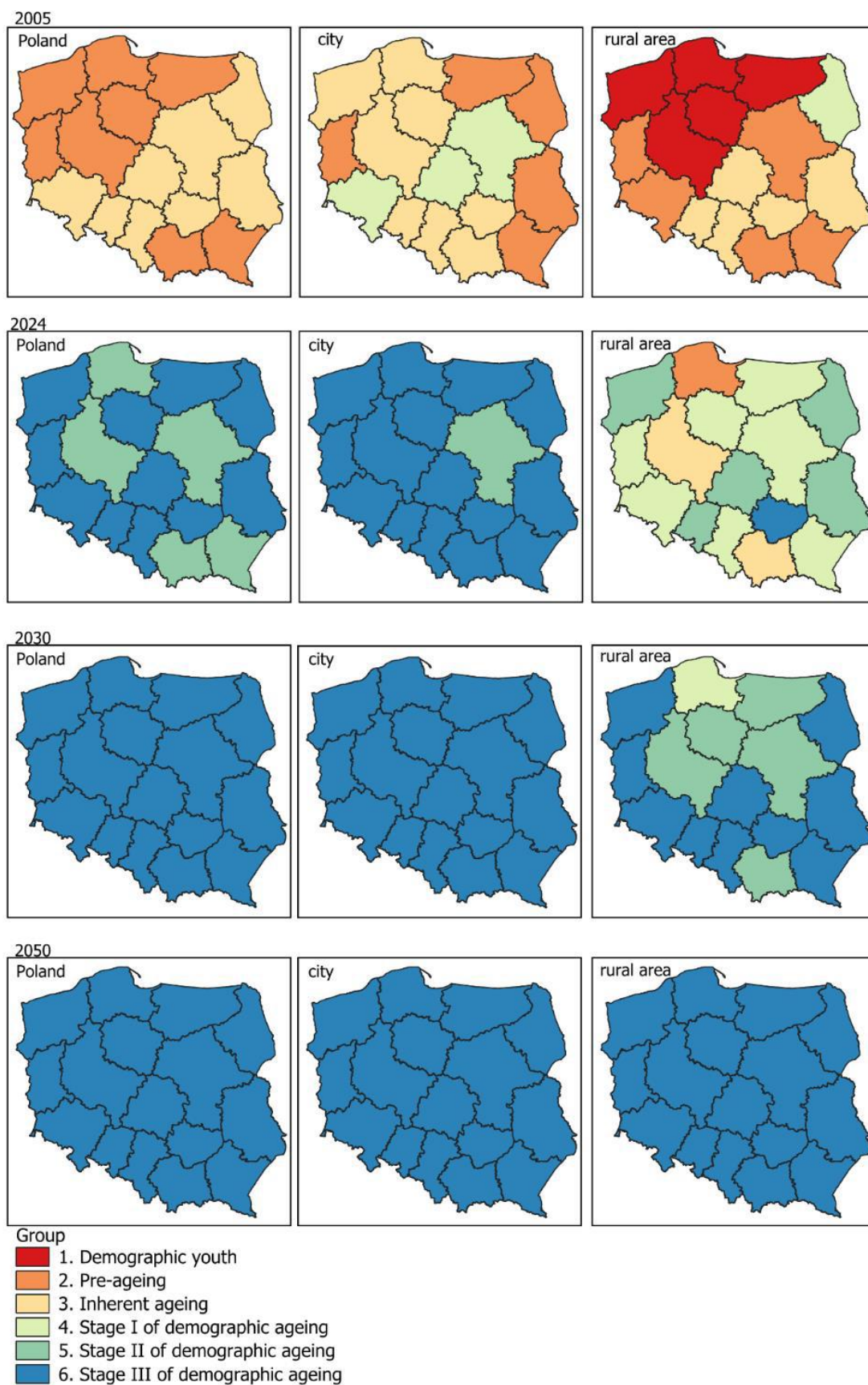


Fig. 2. Regional differences in the old-age index of the Polish population in 2005 and 2024, and forecasts for 2030 and 2050
(Source: Own study based on data from the Central Statistical Office)

The average annual rate of change indicates that the ageing index for the urban population increased more significantly from 2005 to 2024, with the exception of the Mazowieckie voivodeship. In contrast, the situation was somewhat different for the rural population. Forecasts suggest that in over half of the provinces, the ageing of the rural population will accelerate between 2030 and 2050. For instance, in Podlaskie province, the ageing index is expected to rise by an average of 13% each year during this period, which is double the rate observed between 2005 and 2024 (Table 8). Thus, it can be concluded that rural areas aged more slowly than urban areas from 2005 to 2024. However, this trend may reverse in the future, although the pace of change is gradual, and a complete reversal is not anticipated within the next 25 years.

Forecasts suggest that the ageing of the population will continue, and by 2050, both rural and urban populations will be classified in stage III of population ageing (group 6) (Annex Table 2). At that point, there will be approximately 300 grandparents for every 100 grandchildren in urban areas. Similarly, in rural areas, there will be an average of 255 individuals aged 65 and over for every 100 children aged 0-14 (Table 8). In the initial year of the forecast, some differences in the indicator values were observed. For 2030, the urban population – regardless of region – was classified in group 6, while the rural population reached this classification in only 10 provinces. However, in subsequent years, the differences in the typological groups nearly disappeared. By 2040, 2045, and 2050, the number of grandparents in both urban and rural populations in each province will exceed 140 for every 100 grandchildren (Table 8). Although the index values are lower among the rural population compared to the urban population, since 2035, a gradual decline in these differences can be observed in several provinces, including Lubuskie, Mazowieckie, Śląskie, Warmińsko-mazurskie, and Zachodniopomorskie. According to the forecasts, in Podlaskie province by 2050, the old-age index in rural areas is expected to surpass that of urban areas. Moreover, from 2030 to 2050, the number of grandparents per 100 grandchildren among the rural population may increase by an average of 40%.

The country's population ageing index has significantly increased over the years, and forecasts suggest that it will continue to rise in the coming years. A comparison with research conducted by WOLAŃSKA (2013) for 1995 shows that by 2005, the number of elderly individuals per 100 people aged

0-14 in Poland increased by 30. In 1995, there were 50 grandparents for every 100 grandchildren. Over the 20 years since 1995, the old-age index has doubled. Based on projections, the number of grandparents per 100 grandchildren is expected to double again over the next two decades. Additionally, it is worth noting that in 1995, advanced ageing was more prevalent among the rural population, and there was greater regional variation in the old-age index across different provinces.

4. Discussion

This research indicates that all regions of Poland are currently experiencing demographic ageing, despite some regions being considered demographically young at the beginning of the period studied. This analysis is based on comparisons at the NUTS-2 level, which may obscure greater diversity that could be observed at a more detailed level of aggregation, such as municipalities. In fact, a study by RAKOWSKA (2016) on Polish municipalities in 2014 found similar trends regarding demographic ageing at the local level.

KAMIŃSKA & OSSOWSKA (2017) developed a synthetic indicator of demographic ageing in rural areas and found that the eastern part of the country experienced a significantly higher level of ageing compared to western Poland. This difference may be partly related to the timeframe of the research. For instance, MAJDZIŃSKA (2017) noted that in 2002, the regions in the eastern part of the country were the oldest in demographic terms. However, in the analysis presented in this article, even for the initial years reviewed (2005-2010), we cannot clearly demonstrate a consistent pattern regarding demographic ageing in rural areas on a regional level. The research indicates that the eastern regions are among those experiencing ageing (as shown in Fig. 2), but there is no definitive difference when compared to the rest of the country. This suggests that the regional disparities in ageing are becoming less pronounced over the years analyzed. Additionally, the level of territorial aggregation used in this research may contribute to this observation; a more granular approach, such as examining counties or municipalities, could yield more precise information. This argument is supported by analyses of the ageing process at the county and municipality levels conducted by MAJDZIŃSKA (2017). These analyses indicate that ageing is more pronounced in the border areas of eastern Poland. ANTCZAK & LEWANDOWSKA-GWARDA (2018) drew interesting conclusions regarding regional

differences. They found that between 2004 and 2016, Poland was divided into two regions: one with a rapidly ageing population in western Poland and another with a slowly ageing population in eastern Poland. The standardization of the ageing groups for the indicators analyzed in this study could be attributed to differing dynamics during the forecast period.

POLNA (2020) analyzed demographic ageing in the Wielkopolskie province and found that the ageing process in rural areas is less advanced compared to that in cities. This correlation is also evident in other provinces. The ageing index indicates that the percentage of elderly individuals is higher in urban areas and is expected to continue growing in the future. However, it's important to note that this trend was different in the relatively recent past. Between 1990 and 2005, the percentage of people aged 65 and over was actually higher among the rural population than among those living in urban areas. During this time, the share of individuals aged 0-14 significantly decreased in the population structure (MAJZIŃSKA, 2017). Consequently, by 2005, the trend in the old-age index between urban and rural areas had reversed.

It is important to explain the higher percentage of older individuals in urban populations. According to NEWSHAM & ROWE (2025, p. 10), "rural and urban areas differ in population size, composition, density, and economic function, resulting in different demographic outcomes." Rural areas are more prone to population decline, primarily due to migration, as many young people move to cities. The nature of work in rural areas, which often involves physically demanding agricultural tasks, contributes to a higher mortality rate among older residents. Additionally, as JANIGOVÁ & KOWALSKA (2015, p. 95) note, "for members of rural communities, retirement does not always result in a significant change in lifestyle, as many continue to work on the farm even after reaching retirement age." Data from the Central Statistical Office (GUS) for 2023 indicates that the average life expectancy in rural areas is shorter than in urban areas; for example, men in rural settings live, on average, 0.8 years less than their urban counterparts (GUS, 2023). KUREK (2026) reports that rural regions and the eastern part of the country are experiencing a decline in fertility; however, the fertility gap between urban and rural areas is narrowing. This trend may also be reflected in indicators of the advancement of population ageing in urban and rural areas, which take into account both younger

and older age groups. A decreasing fertility gap may therefore justify projections of a faster increase in the advancement of population ageing in rural areas in the future.

Research by KUROPKA & KRUPOWICZ (2025) indicates that Poland's voivodeships are likely to become more homogeneous in terms of population ageing, which is consistent with the indicator-based analysis conducted in this publication. The dispersion in the shares of the youngest population (aged 0-14) and the elderly population (aged 65 and over) across voivodeships is expected to decrease over time. The narrowing gap in population ageing between urban and rural areas is influenced – and will continue to be influenced – by socio-economic factors. For example, BURAKOWKI & LIZIŃSKA (2024) draw attention to migration attractiveness, which is reflected in ageing indicators. The authors point to factors such as wage differentials between urban and rural areas and the regressive nature of transport accessibility in peripheral rural areas, which contribute to the depopulation of rural regions, particularly those located in peripheral zones.

As the population ages, new proposals are emerging to address the challenges associated with this demographic shift. CONRADO ET AL. (2025) suggest that migration could serve as a valuable solution, potentially promoting economic growth and reducing social security costs. Migration is a distinct demographic process because it contributes to population growth in receiving areas while simultaneously leading to population decline in the areas from which people migrate (ROWE ET AL., 2019). It leads not only to changes in population size but also in the age structure of the population. For areas experiencing population inflows, it generates benefits, whereas the opposite effects are observed in areas experiencing population outflows. MAHESHWARI & MAHESHWARI (2024, p.10) suggest that "adjusting income tax rates to generate additional revenue for balancing increased health and pension expenditures could be considered as a potential solution to address fiscal balance challenges". SZAJA (2024) analyzed the development strategies of selected cities regarding the measures they adopted in response to demographic changes. She highlighted several solutions, including the development of technologies to assist the elderly, the adaptation of urban spaces for seniors, the enhancement of social care systems for older adults, and educational programs aimed at both young people and seniors. In contrast, SUTRADHAR ET AL. (2025) emphasize the modernization of the

technical infrastructure. Areas experiencing population decline often face the challenge of oversized infrastructure, which places a financial burden on communities. The authors argue that in these depopulating areas, the technical infrastructure should be remodelled with a multifunctional approach. For instance, they suggest transforming parking lots into recreational facilities in the evenings and marketplaces on weekends. DERIVANTI (2025) highlights significant challenges facing the education system due to the impacts of depopulation. In his article, he proposes strategies to alleviate these effects by enhancing the quality of education, ensuring equal access to education, and providing training in digital skills development. GARCÍA-MADURGA ET AL. (2024) identify several key pillars for securing a viable demographic future, including the improvement of childcare facilities, the implementation of flexible work models, the introduction of adaptable public employment options, and the promotion of municipal housing for social purposes. In contrast, TÁRRAGA & MORALES (2021) stress the vital role of women in rural areas as local entrepreneurs. They recognize the social and professional contributions of women in these regions as effective strategies to combat depopulation. Additionally, the concept of the silver economy, which focuses on opportunities for older individuals, plays an important role in addressing the challenges posed by demographic change. The engagement of older adults in the workforce can help mitigate labour supply issues and enhance the financial situation of the elderly.

5. Conclusions

The aim of the study highlights that differences in population ageing were observed between provinces from 2005 to 2024. While demographic changes are becoming increasingly significant, they occurred at varying rates for urban and rural populations.

Initially, the ageing process was less advanced in rural areas compared to urban areas. However, as the study progressed and forecasts extended to 2050, these differences began to diminish slowly. This suggests that cities have aged more rapidly than rural areas, but the situation might equalize or even reverse in the future. Nevertheless, the pace of these changes remains relatively slow.

The research conducted provided an opportunity to observe changes in the dynamics of population ageing between the years 2005–2024 and 2030–2050. Overall, the rate of change in the indicators of

population ageing was higher during the 2005–2024 period, while forecasts for the coming years suggest that this rate will slow down. When examining urban-rural relationships, the medium-term rate of change for the ageing index indicates a slightly higher rate of ageing among the rural population during the forecast period.

It is important to note that the empirical data on this issue may be underestimated. This occurs because some individuals, despite changing their place of residence – such as relocating within different provinces or migrating from urban to rural areas – have not formalized their permanent residence. This issue is highlighted, inter alia, by DOLIŃSKA ET AL. (2020), who emphasise the problem of underestimation and overestimation of both the size and structure of the population across different types of areas in Poland.

Given the demographic changes observed, identifying, assessing, and understanding the factors contributing to these changes is essential for managing and developing solutions to the demographic processes that have occurred. In the context of deepening depopulation and population ageing, especially in cities and rural areas, further in-depth research in this area is crucial. Demographic changes impact the socio-economic landscape of specific territorial units, often resulting in urban shrinkage. Therefore, it is necessary to monitor and identify areas that respond to demographic changes in varying degrees.

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Annex

Table 1. Regional classification of the demographic ageing rate index for the Polish population (by urban and rural areas)
(Source: Own study based on data from the Central Statistical Office)

	Years							
	2005-2010	2010-2015	2015-2019	2019-2024	2030-2035	2035-2040	2040-2045	2045-2050
Poland								
Dolnośląskie	2	4	4	5	3	4	4	5
Kujawsko-pomorskie	3	5	4	5	3	4	4	5
Lubelskie	3	4	4	5	4	4	5	5
Lubuskie	3	5	4	6	3	4	5	5
Łódzkie	2	4	4	5	3	4	4	5
Małopolskie	3	4	3	4	4	4	4	5
Mazowieckie	2	3	3	4	3	4	4	5
Opolskie	3	4	4	4	4	4	5	5
Podkarpackie	3	4	4	4	4	4	5	5
Podlaskie	3	4	3	4	4	4	5	5
Pomorskie	3	4	3	5	3	4	4	4
Śląskie	3	4	4	5	3	4	4	5
Świętokrzyskie	3	5	4	6	4	4	5	5
Warmińsko-mazurskie	3	5	4	6	4	4	4	5
Wielkopolskie	2	4	3	5	3	4	4	5
Zachodniopomorskie	3	5	4	6	3	4	4	5
Urban area								
Dolnośląskie	2	5	4	5	3	3	4	5
Kujawsko-pomorskie	3	5	4	6	4	3	4	5
Lubelskie	4	5	5	6	4	3	5	6
Lubuskie	3	5	4	6	3	3	4	5
Łódzkie	3	5	4	6	3	3	4	5
Małopolskie	3	4	3	4	4	3	4	5
Mazowieckie	2	3	3	4	4	2	4	5
Opolskie	4	5	4	5	4	4	5	5
Podkarpackie	4	5	4	6	5	3	5	5
Podlaskie	4	4	3	6	5	3	4	5
Pomorskie	3	5	3	5	4	2	4	5
Śląskie	3	4	4	5	4	3	4	5
Świętokrzyskie	4	6	5	6	3	4	5	6
Warmińsko-mazurskie	3	5	4	6	4	3	4	5
Wielkopolskie	3	5	4	6	4	3	4	5
Zachodniopomorskie	3	5	5	6	3	3	4	5
Rural area								
Dolnośląskie	2	4	3	4	3	4	5	5
Kujawsko-pomorskie	3	4	3	5	4	4	4	5
Lubelskie	2	3	3	4	4	5	5	5
Lubuskie	2	5	4	5	4	4	5	5
Łódzkie	2	3	3	4	4	4	4	5
Małopolskie	3	3	3	4	4	4	4	5

Mazowieckie	2	3	3	3	4	4	4	5
Opolskie	3	3	3	3	5	4	4	5
Podkarpackie	3	4	3	4	4	5	5	5
Podlaskie	3	3	2	2	4	5	5	5
Pomorskie	3	4	3	4	4	4	4	5
Śląskie	3	3	3	4	4	4	4	5
Świętokrzyskie	3	4	3	5	4	4	5	5
Warmińsko-mazurskie	3	4	4	6	4	4	5	5
Wielkopolskie	2	4	3	4	4	4	4	5
Zachodniopomorskie	3	5	4	6	4	4	5	5

Table 2. Regional classification of the old-age index of the Polish population (by urban and rural areas)
(Source: Own study based on data from the Central Statistical Office)

	Years									
	2005	2010	2015	2019	2024	2030	2035	2040	2045	2050
Poland										
Dolnośląskie	3	3	4	5	6	6	6	6	6	6
Kujawsko-pomorskie	2	3	4	4	6	6	6	6	6	6
Lubelskie	3	3	4	5	6	6	6	6	6	6
Lubuskie	2	2	3	4	6	6	6	6	6	6
Łódzkie	3	4	5	6	6	6	6	6	6	6
Małopolskie	2	3	3	4	5	6	6	6	6	6
Mazowieckie	3	3	4	4	5	6	6	6	6	6
Opolskie	3	4	5	6	6	6	6	6	6	6
Podkarpackie	2	3	3	4	5	6	6	6	6	6
Podlaskie	3	3	4	5	6	6	6	6	6	6
Pomorskie	2	2	3	4	5	6	6	6	6	6
Śląskie	3	4	4	5	6	6	6	6	6	6
Świętokrzyskie	3	4	5	6	6	6	6	6	6	6
Warmińsko-mazurskie	2	2	3	4	6	6	6	6	6	6
Wielkopolskie	2	2	3	4	5	6	6	6	6	6
Zachodniopomorskie	2	3	4	5	6	6	6	6	6	6
Urban area										
Dolnośląskie	4	4	5	6	6	6	6	6	6	6
Kujawsko-pomorskie	3	3	5	6	6	6	6	6	6	6
Lubelskie	2	3	4	6	6	6	6	6	6	6
Lubuskie	2	3	4	5	6	6	6	6	6	6
Łódzkie	4	4	6	6	6	6	6	6	6	6
Małopolskie	3	4	5	5	6	6	6	6	6	6
Mazowieckie	4	4	4	5	5	6	6	6	6	6
Opolskie	3	4	5	6	6	6	6	6	6	6
Podkarpackie	2	3	4	5	6	6	6	6	6	6
Podlaskie	2	3	4	4	6	6	6	6	6	6
Pomorskie	3	3	4	5	6	6	6	6	6	6
Śląskie	3	4	5	6	6	6	6	6	6	6
Świętokrzyskie	3	4	6	6	6	6	6	6	6	6
Warmińsko-mazurskie	2	3	4	5	6	6	6	6	6	6
Wielkopolskie	3	3	4	5	6	6	6	6	6	6
Zachodniopomorskie	3	3	5	6	6	6	6	6	6	6
Rural area										
Dolnośląskie	2	2	3	3	4	6	6	6	6	6
Kujawsko-pomorskie	1	2	2	3	4	5	6	6	6	6
Lubelskie	3	3	4	4	5	6	6	6	6	6
Lubuskie	2	2	2	3	4	6	6	6	6	6
Łódzkie	3	3	4	4	5	6	6	6	6	6
Małopolskie	2	2	2	3	3	5	6	6	6	6
Mazowieckie	2	2	3	3	4	5	6	6	6	6
Opolskie	3	3	4	5	5	6	6	6	6	6

Podkarpackie	2	2	3	3	4	6	6	6	6	6
Podlaskie	4	4	5	5	5	6	6	6	6	6
Pomorskie	1	1	1	2	2	4	4	6	6	6
Śląskie	3	3	3	4	4	6	6	6	6	6
Świętokrzyskie	3	3	4	5	6	6	6	6	6	6
Warmińsko-mazurskie	1	1	2	3	4	5	6	6	6	6
Wielkopolskie	1	1	2	2	3	5	5	6	6	6
Zachodniopomorskie	1	1	2	3	5	6	6	6	6	6