Population ageing patterns in Małopolskie voivodship by poviats until 2030

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Abstract. The aim of the paper is to demonstrate differences and similarities in population structures of the poviats of Małopolskie voivodship in the years 2010–2030, with particular attention to population ageing. To describe the ageing process two types of indicators are used, namely conventional and prospective measures. As conventional ones we assume the percentage of the population aged 65 and over, and the old-age dependency ratio expressed as the number of persons aged 65 and over per 100 persons aged 20–64. The same aspects of population ageing are expressed by a new group of measures based on a fresh concept for measuring age, the so-called prospective age. Unlike chronological (retrospective) age, prospective age takes into account the changes in life expectancy that occur in the period under consideration. Using the data coming from Demographic Years Book 2011, and from Demographic Projection 2008–2011 (www.stat.gov.pl) some types of population ageing patterns in Małopolskie voivodship by poviats until 2030 are demonstrated. They count both differences in population ageing of poviats in Małopolskie voivodship and the dynamics of this process in view of conventional and prospective measures. The general features of demographic ageing in Małopolskie voivodship in 2010–2030 are formulated in conclusions.

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1. Introduction

Population ageing is a process that appeared at a certain stage of development of human populations, when as a result of falling fertility the share of older persons in the population started growing. R. Pressat (1966) indicates that this phenomenon may be observed in the French age pyramid as early as 1851. France entered the twentieth century as an old country (with 13% of its population in 1901 aged over 60) and had no rivals in this field until the end of the Second World War. Currently, population ageing is a typical element of the demographical landscape in developed countries. This is the result of the current drop in fertility, longer life duration, and shift of the post-war boom generations to the top of the age pyramid. The occurrence of these changes was foreseeable. However, their size and rate may be surprising. Population ageing is an area of interest for representatives of various sciences including demography, geography, sociology, psychology, medicine, and economics. Different approaches to population ageing result from diverse determinants of the processes that influence its course, and from the significance of the process to other phenomena that occur in the surrounding environment. The wide body of literature on population ageing reflects these interests. In this context, the economical consequences of population ageing merit attention, and have been examined by Cutler et al. (1990), Börös-Supan (2002), Bloom et al. (2003), Prskawetz, Fent (2004), Kotowska (2006), Mason, Lee (2006), Börsch-Supan (2002), Bloom et al. (2003), Prskawetz, and Szukalski (2008) study population ageing in the post-war boom generations to the top of the age pyramid. The occurrence of these changes was foreseeable. However, their size and rate may be surprising. Population ageing is an area of interest for representatives of various sciences including demography, geography, sociology, psychology, medicine, and economics. Different approaches to population ageing result from diverse determinants of the processes that influence its course, and from the significance of the process to other phenomena that occur in the surrounding environment. The wide body of literature on population ageing reflects these interests. In this context, the economical consequences of population ageing merit attention, and have been examined by Cutler et al. (1990), Börös-Supan (2002), Bloom et al. (2003), Prskawetz, Fent (2004), Kotowska (2006), Mason, Lee (2006), Börsch-Supan (2002), Bloom et al. (2003), Prskawetz, and Szukalski (2008) study population ageing in the Małopolskie voivodship in the years 2010-2030, with particular attention to population ageing. We understand this process as a transformation of the age structure of the population in which the age distribution shifts towards older generations. In quantitative terms, the changes are reflected in the growing share of elderly in the whole population.

2. Methods of analysis and data base – measures of population ageing

We use two types of indicators to describe population ageing. As conventional measures of population ageing, we assume the percentage of the population aged 65 and over (‘proportion of elderly’) and the ‘old-age dependency ratio’, which is the number of persons aged 65 and over per 100 persons aged 20-64. The same productive age are thus assumed for males and for females (2).

The new group of population ageing measures, introduced by Sanderson and Scheibov (2005, 2007, 2008), is based on a fresh concept for measuring age, the so-called ‘prospective age’. Unlike chronological (retrospective) age, prospective age takes into account the changes in life expectancy that occur in the period under consideration. To determine prospective age, a so-called reference period is assumed and information is taken from life tables for two periods: the reference period and the studied period. The example in Table 1 illustrates the concept.

Let us assume that we wish to determine the prospective age of a male in Poland who was 65 years old in 2009, which is also the studied year. In the period life tables for males in Poland in 2009 we find that the remaining life expectancy of a male aged 65 is 14.69 years. Now we consult the period life tables for males in 1960, the reference year. We look for the age that corresponds with the remaining life expectancy of 14.69 and find that it is 62 years. This is the prospective age that we wanted to find.

Prospective measures of population ageing require the assumption of an old-age threshold that takes into account changes in life expectancy, and therefore is expressed as a certain prospective age. We assume that this is an age for which the remaining life expectancy is up to 15 years. As a result, we obtain old-age thresholds that, unlike their classical counterparts, change over time alongside the changes in life expectancy. In this paper, we use the following prospective measures: the ‘prospective percent (proportion) of elderly’ and the ‘prospective old-age dependency ratio’. The prospective proportion of elderly is the ratio of the number of persons in period t of an age for which life expectancy is 15 years or less, to the whole population under study. The prospective old-age dependency ratio has the same numerator as the conventional measures of elderly dependency ratio this is the number of persons over 65 and over (‘proportion of elderly’) and the ‘old-age dependency ratio’.

The classification of the poviats of the Małopolskie voivodship by proportion of elderly is illustrated in Fig. 1a-1c. Their distribution by old-age dependency ratio is presented in Fig. 1d-1f.

3. Discussion and research results

The classification of the poviats of the Małopolskie voivodship by proportion of elderly is illustrated in Fig. 1a-1c. Their distribution by old-age dependency ratio is presented in Fig. 1d-1f.

The results of the analysis are discussed in more detail for the two marginal groups of poviats (‘younger’ and ‘older’). The ageing process is respectively the least and the most advanced. Colours on the maps are ranged according to the advancement of ageing (from white – ‘younger’ to black – ‘oldest’). The group of poviats classified as ‘younger’ in terms of the percentage of elderly population has an almost identical composition over the whole period analysed. It includes the limanowski, myślenicki, nowosądecki, nowotar and wielicki poviats. Only the bocheński enters the old group in 2020, but returns to the ‘younger’ poviats in 2030. The proportion of population aged 65+ in the bocheński poviats increases and in successive periods in question is equal to: 12.14 in 2010, 15.59 in 2020, and 19.42 in 2030. The first-quartile values that characterise the ‘younger’ group are 12.34 in 2010, 15.34 in 2020, and 19.43 in 2030, and so the bochenki poviat is near the threshold, which explains the expected shifts.

The oldest group, in which the proportion of elderly exceeds third-quartile values in each year under consideration, comprises the following poviats: chrzanow, tarnow and nowosądecki, nowotarski and wielicki poviats. Cracow is included among them in 2010 and 2020. Over the whole period under study, the percentage of population aged 65+ in Cracow increases, equaling 15.74 in 2010, 19.48 (2020), and 21.32 (2030).
However, in 2030 the percentage is below the third quartile of 22.25. The proszowicki, olkuski, and Nowy Sącz also change position. In 2010 the olkuski, with a percentage of 14.28, belonged to the older group, but was comparatively near to the upper threshold set by the third quartile of 14.53. In 2020 and 2030 it is classified among the poviat referred to as oldest. The ageing of Nowy Sącz population may be observed as successive moves of the territorial unit from the older group in 2010 to the old group in 2020, and to the oldest group in 2030.

In 2010 the old-age dependency ratio was the lowest in the following poviat: bocheński, limanowski, Nowy Sącz, myślenicki, nowosądecki, and wielicki. In 2020 and 2030 the place of limanowski, myślenicki, nowosądecki, and wielicki in the set of poviat remains unchanged despite an increase of the old-age dependency ratio. In the approaching two decades, the bocheński poviat moves to the old group, remaining in it in 2030. Nowy Sącz moves to the old group in 2020, and to the oldest group in 2030. The poviat with the highest old-age dependency ratio in all the years under consideration are: chrzanowski, miechowski, oświęcimski, and Tarnów. In 2010 and 2020 the group also includes Cracow. The dependency ratio is expected to be lower in 2030, so that the town would be in the older group. The shift of the proszowicki from the oldest to the older group occurs 10 years earlier, i.e. in 2020. Meanwhile, the olkuski and Nowy Sącz will join the oldest group.

### 3.2. Dynamics of population ageing in the poviat of the Małopolskie voivodeship

The dynamics of the proportion of the elderly measured by relative growth for 2020 in comparison with 2010 and for 2030 in comparison with 2020 is presented in Fig. 2a–2b. Figures 2c–2d illustrate the development trends of the old-age dependency ratio.

The greatest dynamics of the percentage of population 65 and over in the years 2010–2020 typify the following poviat: olkuski, Nowy Sącz, Tarnów, and chrzanow. The lowest indicators of dynamics occur in the dąbrowski, nowosądecki, limanowski, and tarnowskie. Among territorial units with the highest dynamics of ageing in the second decade of the 21st century, attention should be paid to Tarnów and chrzanowski poviat, which belong to the oldest group both in 2010 and in 2020. The nowosądecki, limanowski, and tarnowskie, where the growth of the proportion of the elderly is the lowest, have relatively young age structures in both of the analysed periods. The 2020–2030 period, with a growing share of the elderly, is characterised by a lower intensity of changes than the years 2010–2020. The dynamics become less varied and the distribution of poviat by relative...
growth of the measure in question changes. In general, a higher rate of ageing is noted in poviats that have a lower percentage of elderly population in 2020. The greatest dynamics in the third decade of the 21st century are observed in poviats that in the previous decade were placed in the second ten by descending order, namely: myślenicki, nowosądecki, limanowski, gorlicki, dąbrowski, and tarnowski. The poviats in which the growth rate of the percentage of population aged 65+ in the years 2010–2020 is the largest will be ranked from ten up in the next decade. Cracow is worth discussing as it is expected to be characterised by the lowest growth rate (9.43%) of the percentage of the elderly in 2030.

Over the whole period under consideration, the old-age dependency ratio is generally characterised by a higher growth rate than the share of the elderly. In the years 2010–2020 the groups with the highest and the lowest rates have identical compositions with regard to the dynamics of both measures. In poviats with the highest rates, the dependency ratio has a greater rate of growth than the percentage of the elderly, while units with the lowest rates have a higher growth rate of the percentage of population aged 65+.

The patterns observed in the years 2020–2030 are not so distinct. While, as in the previous decade, the growth rate of the dependency ratio is higher than that of the percentage of the elderly (the opposite trend is observed in Cracow and the miechowski and bocheński poviats), the distribution of poviats by the rate of changes is more varied. The greatest similarities can be found in the group of poviats with a lower growth rate of the measures under discussion. In both cases these are: krakowski, Cracow, Tarnów, miechowski, oświęcimski, proszowicki, tatrzański, and wielicki.

### 3.3. Differences in population ageing of poviats in the Małopolskie voivodship in view of prospective measures

The classification of the poviats of the Małopolskie voivodship by prospective proportion of elderly is illustrated in Fig. 3a–3c. The distribution based on the old-age dependency ratio is presented in Fig. 3d–3f.
In each of the periods studied, this group includes the old poviat group. In 2020, their place among the ‘younger’ poviats is taken by the oldest in 2010 and 2030. In Tarnów the oldest group for the older group, and in 2030 it moves to the ‘younger’ group. The dynamics of the prospective proportion of the elderly falls over all of the periods under study equaling 10.93 (2010), 10.20 (2020), and 8.36 (2030). Thus in 2020 Tarnów leaves the oldest group for the older group, and in 2030 it moves to the ‘younger’ group. The limanowski and myślenicki poviats group, moves to the ‘younger’ poviat group in 2020, and remains there also in 2030. In Tarnów the prospective proportion of the elderly falls over all of the periods measured by relative growth for 2020 in comparison with 2010, and for 2030 in comparison with 2020.

In general, the greatest dynamics of the prospective proportion of the elderly measured by relative growth for 2020 in comparison with 2010, and for 2030 in comparison with 2020 are noted in the poviats: wielicki, dąbrowski, nowotarski, and Tarnów. It should be noted that unlike the conventional measure, its new counterpart shows that in the 2010–2020 period both increases and decreases of the measures discussed may be observed in the poviats under study. In an overwhelming majority of the poviats, the ageing process will progress. The exceptions are found in the nowotarski, Tarnów, and Cracow, where the values of the measure in question decrease. Among the territorial units with the highest dynamics of ageing in the second decade of the 21st century, the myślenicki and limanowski poviat groups are worth noting as their rate of ageing results in a shift from the ‘younger’ group in 2010 to the oldest group in 2020. Cracow and Tarnów, which have a decreasing prospective proportion of elderly, move from the oldest group to the ‘youngest’ in the period in question. The 2020–2030 period, with a falling prospective percentage of elderly population, is characterised by a lower intensity of changes than the years 2010-2020. The dynamics become less varied and the distribution of poviat’s by relative growth of the measure in question changes. In this period, relative growth of the group’s absolute values only indicates a slower proportion of the elderly falls. In general, a higher rate of ageing in terms of absolute value is noted in the poviat with a lower prospective percentage of elderly population in 2020. The greatest

**3.4. Dynamics of population ageing in the poviatsof Małopolskie voivodship in view of prospective measures**

The dynamics of the prospective proportion of the elderly measured by relative growth for 2020 in comparison with 2010, and for 2030 in comparison with 2020 are illustrated in Fig. 4a–4b, while Fig. 4c–4d present the development trends of the prospective old-age dependency ratio.

The greatest indicators of dynamics, in terms of their absolute value, are noted in the poviat: wielicki, dbgrowski, nowotarski, and Tarnów. It should be noted that unlike the conventional measure, its new counterpart shows that in the 2010–2020 period both increases and decreases of the measures discussed may be observed in the poviats under study. In an overwhelming majority of the poviats, the ageing process will progress. The exceptions are found in the nowotarski, Tarnów, and Cracow, where the values of the measure in question decrease. Among the territorial units with the highest dynamics of ageing in the second decade of the 21st century, the myślenicki and limanowski poviat groups are worth noting as their rate of ageing results in a shift from the ‘younger’ group in 2010 to the oldest group in 2020. Cracow and Tarnów, which have a decreasing prospective proportion of elderly, move from the oldest group to the ‘youngest’ in the period in question. The 2020–2030 period, with a falling prospective percentage of elderly population, is characterised by a lower intensity of changes than the years 2010-2020. The dynamics become less varied and the distribution of poviat’s by relative growth of the measure in question changes. In this period, relative growth of the group’s absolute values only indicates a slower proportion of the elderly falls. In general, a higher rate of ageing in terms of absolute value is noted in the poviat with a lower prospective percentage of elderly population in 2020. The greatest

**Fig. 3. Spatial differentiation of aging process in Małopolskie voivodship in 2010–2030 according to the prospective measures**

Explanation: A – prospective percentage of elderly in Małopolskie voivodship in 2010; B – prospective percentage of elderly in Małopolskie voivodship in 2020; C – prospective percentage of elderly in Małopolskie voivodship in 2030; D – prospective old-age dependency ratio in Małopolskie voivodship in 2010 (the number of people above the old-age threshold to 100 persons aged 20 to the old-age threshold); E - prospective old-age dependency ratio in Małopolskie voivodship in 2020 (the number of elderly per 100 persons aged 20 to the threshold of old age); F – prospective old-age dependency ratio in Małopolskie voivodship in 2030 (the number of people above the old-age threshold to 100 persons aged 20 to the old-age threshold). The measures of population ageing are holistic. They take into account the demographic indicators of dynamics, in terms of their absolute value, are noted in the poviat: wielicki, dbgrowski, nowotarski, and Tarnów. The measures of population ageing are holistic. 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They take into account the demographic indicators of dynamics, in terms of their absolute value, are noted in the poviat: wielicki, dbgrowski, nowotarski, and Tarnów.
Fig. 4a. Dynamics of prospective proportion of persons aged 65 and over in 2020 in comparison to 2010 (in percent)

Fig. 4b. Dynamics of prospective proportion of persons aged 65 and over in 2030 in comparison to 2020 (in percent)

Fig. 4c. Dynamics of prospective old-age dependency ratio in 2020 in comparison to 2010 (in percent)

Fig. 4d. Dynamics of old-age dependency ratio in 2030 in comparison to 2020 (in percent)

Source: Own calculations based Demographic Yearbook of Poland 2011, and Demographic Projection 2008‒2011 (www.stat.gov.pl)
dynamics in the third decade of the 21st century is ob-
erved in poviat where is characterized by a de-
crease of the prospective proportion of the elderly in
the previous decade. These are Tarnów, Cracow, and
the nowotarski poviat. Those poviat in which the
growth rate of the prospective percentage of popula-
tion aged over the new old-age threshold in the years
2010-2020 is the greatest will be placed in the middle
of the ranking in the next decade. The oświęcimski
poviat is worth noting as it is expected to be charac-
terised by the lowest rate of decrease in terms of the
absolute value (–4,85%) of the prospective percentage
of elderly population in 2030.

In the 2010-2020 period the dynamics of the
prospective old-age dependency ratio is very similar
to that of the prospective proportion of the elderly.
In the years 2010-2020 the groups with the highest
and the lowest rates have identical compositions in
terms of dynamics of both measures. The patterns
observed in the years 2020-2030 are quite different.
We notice that changes of the prospective old-age
dependency ratio are larger, in terms of the absolute
value, than those of the prospective proportion of
the elderly. As in the instance of the prospective propor-
tion of the elderly, the largest changes are found for
poviat with negative values of relative growth in the
2010-2020 period. These are the Cracow, nowotarski,
and Tarnów poviat. Attention should be paid to the
projected changes in the trends in the oświęcimski
poviat from a significant growth in the 2010-2020
period to a slight fall in the 2020-2030 period.

4. Conclusions

1. Methodological approach
(1) Voivodship – administrative region of the 1st
order; poviat – administrative region of the 2nd
order; gmina – administrative region of the 3rd
order.
(2) Therefore, these age group cannot be interpreted
as the period of economic activity.
(3) Tarnów (city) and Nowy Sącz (town) are units
that have poviat status (in Polish miastka na prawach
powiatu).
(4) The term ‘remaining’ is introduced in order to
avoid confusion with the life expectancy at birth.
(5) Drawn from period life tables for males in Poland
in 2009.

Notes

References

Bloom, D.E., Canning, D. and Sevilla J., 2003: The Demo-
graphic Dividend: A New Perspective on the Economic
Consequences of Population Change. In: Population
Matters, Rand Program of Policy-Relevant Research
Communication.

Börsch-Supan, A., 2002: Labor Market Effects of Popu-
lation Aging. In: Review of Labour Economics and Indus-
trial Relations, Vol. 17, pp. 5-54.

Cutler, D., Poterba, J., Stein, I. and Summers, L., 1990:
An Aging Society: Opportunity or Challenge. In:
Brookings Papers on Economic Activity, Vol. 1990, No. 1,
pp. 1-56.

Demographic Years Book, 2011: www.stat.gov.pl, DoA:
10.01.2012.

Demographic Projection, 2008-2011: www.stat.gov.pl,
DoA: 10.01.2012.

Długosz, Z., 2004: Population ageing in towns of the
Małopolskie Voivodeship as concerns economic ac-
tivity. In: Szymańska, D. and Grelač-Komiełka, E.
editors, Bulletin of Geography: Socio-economic Series,
No. 3, Torun: Nicolaus Copernicus University Press;
pages 125-134.

and its Predictions for 2030 in the Małopolskie Voivodeship
compared to Poland and Europe. In: Moravian Geo-
 graphical Reports, 1, Vol. 17, Institute of Geographic,
Brno, pp. 2-18.

Knapik, O., 2010: Przestrzenné zróznicowanie umieralno-
ści według przyczyn w powiatach Małopolski w ujęciu
baysowskim – w celu wykrycia zjawiska przyczynowego
zgonów (Typology of population ageing in Polish
– in Polish). In: Prace z zakresu analizy danych, Zeszyty
Naukowe UEK, in press.

Kotowska, I.E., 2006: Older workers in the labour market
and retirement policies. In: Palomba, R. and Kotowska,
I.E. editors, The economically active population in Eu-
of Europe Press, pp. 55-94.

Kowalski, J.T. and Szulkiński, P., editors, 2008: Pomyślnie
starzenie się w świetle nauk o zdrowiu (Prospective age-
ing in the light of the sciences on health – in Polish).
Lódź: Komitet Nauk Demograficznych PAN, PTG,
Zakład Demografii i Gerontologii Społecznej UL.

Kurek, S., 2007: Typologia procesu starzenia się ludności
miast i gmin Polski na lęge jego demograficznych uwa-
runków (Typology of population ageing in Polish
towns and communities – in Polish). In: Przegląd Geo-
ograficzny, T. 79, Z. 2, pp. 133-156.

Kurkiewicz, J., 2007: Starzenie się ludności i jego ekono-
miczno-społeczne konsekwencje (Population ageing
In: Kurkiewicz, J. editor, Ludzie starsi w rodzinie
i społeczeństwie, Kraków: Wydawnictwo UEK w
Kra-
kowie, pp. 15-30.

Mason, A. and Lee, R., 2006: Reform and support systems
for the elderly in developing countries: capturing the
second demographic dividend, Genus, No. 2, pp. 11-36.

Pressat, R., 1966: Analiza demograficzna. Metody, wyni-
ki, zastosowania (Demographic analysis. Methods,
Results, Applications – in Polish), Warszawa: Wydawnic-
two Naukowe PWN.

Prskawetz A. and Fent, T., 2004: Workforce ‘Aging’ and
Economic Productivity: The Role of Supply and De-
mand of Labor: An Application to Austria. Work-
shop, ‘Workshops – Proceedings of OeNB Workshops’,
Current Issues of Economic Growth, No. 2, Oester-
reichische National Bank, pp 117-149.

Sanderson, W. and Scherbov, S., 2005: Average Remaining
Lifetimes Can Increase as Human Populations Age. In:

Sanderson, W. and Scherbov, S., 2007: A New Perspective
on Population Aging. In: Demographic Research, 16,
No. 2, pp. 27-57.

Sanderson, W. and Scherbov, S., 2008: Rethinking Age
and Aging. In: Population Bulletin, December, A Pub-
lication of the Population Reference Bureau, pp. 3-18.

Stonawski, M., 2007: Ludzie starsi na rynku pracy (Elde-
ry on the labour market – in Polish. In: Kurkiewicz, J. edi-
tor, Ludzie starsi w rodzinie i społeczeństwie, Kraków,

Testa, M.R., 2000: Fewer and older Italians, more prob-
lem? Looking for solutions to demographic questions,
Expert Group Meeting on policy responses to popula-
tion decline and population ageing, 16-18 October,
Population Division Department of Economic and So-
cial Affairs, UN Secretariat.
txt, DoA: 10.01.2012.

Hans-Peter M. Blank, Hans-Peter M., 2005: What does the
future hold for the elderly? (in Polish). In: Przegląd Ge-
ograficzny, T. 85, Z. 1, pp. 79-92.

Sanderson, W. and Scherbov, S., 2004: Fewer and older
Italians, more problems? (in Polish). In: Przegląd Ge-
ograficzny, T. 85, Z. 1, pp. 79-92.

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