THE AGING OF THE POPULATION IN THE NORTH PART OF POLAND

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Abstract

Changes in population are caused by many factors related to the historical past, geographical location, natural and socio-economic conditions. To direct factors affecting both the population and the structure of the population by age is natural increase and net migration. When there is a high population growth and positive net migration favorably affect the structure of the population by age. While the decrease in the birth rate and an excessive outflow of the population and contribute to the negative changes the age structure expressing the aging population. The phenomenon of population aging is caused by the increase in the number of population in the retirement age and reducing the population of pre-working age. At the same time the aging of the population also have implications in terms of socio-economic development. The purpose of this article is to examine the structure of population by age and determination of problem areas and their causes. The area of research involves the north part of Poland with particular emphasis on the period 2002-2014.

Key words: demographic, the aging of the population, the north part of Poland

JEL Code: J10, J11

Introduction

The region of northern Poland includes the following voivodships: Warmińsko-Mazurskie, Pomorskie, Kujawsko-Pomorskie and Zachodniopomorskie. Characteristically, the north part of Poland is highly diversified, in terms of both natural conditions and socio-economic development (Gwiaździńska-Goraj, Jezierska-Thole, 2013). It is listed among areas with unique natural values and extraordinary landscape features, as a result of which nearly 33 % of its area is covered with various forms of protection. With regard to the landform, there are three distinguishable areas in the north part of Poland: coastal belt, lake belt and lowland belt. It is commonly assumed that the lake regions and shoreland feature the most attractive landscape. The whole area studied is also characterised by large differences in socio-economic development, with the highest level of development found in cities and towns

where voivodship authorities are based and within their operation zones (Gwiaździńska-Goraj, Jezierska-Thole, 2013). However, as far as the spatial diversification of the region is concerned, the highest level of socio-economic development has been recorded in the Pomorskie Voivodship and the lowest one in the Warmińsko-Mazurskie Voivodship. The main aim of this paper is to present the study of the population structure by age and then to delineate the areas where ageing of population is the most advanced. Moreover, the analysis of ageing of population was also dealt with by other authors: (Kurek, 2008, Gwiaździńska-Goraj, 2011, Szymańska, Biegańska, 2014, Grzelak-Kostulska, 2016). The research was conducted in several stages, the first of which involved analysing the age structure of biological groups in the north part of Poland in 2002 and 2014. The specially-chosen diagnostic indicators showing ageing of population were analysed in terms of their spatial patterns and change dynamics. The next stage entailed delineation of the areas where the ageing process is the most advanced in the north part of Poland. For the purposes of this study the vital statistics and balance of migration were assumed to be the underlying factors shaping the population age structure, by the same token, affecting the ageing process itself. A high birth rate with a concomitant positive balance of migration have a favourable impact on the population age structure. While a decreasing birth rate and an excessive outflow of people are detrimental to it, which is reflected in ageing of that population (Gwiaździńska-Goraj, 2011). The final stage of the research relied in juxtaposition of the birth rate per 1,000 people with the balance of migration per 1,000 people in 2014 recorded in the areas with the most advanced process of population ageing.

1 Population structure by age in the north part of Poland

Population aging is a trend that began several decades ago. This phenomenon results in an share of older people represented within the age structure of the whole population (Hronova, Srpova, Kunz, 2016). Changes related to the population age structure constitute a crucial element in the studies of population processes. Most often the analyses of age structure are based on biological or economic criteria. The biological age groups include: children (aged 0-14), adults (aged 15-64) and the elderly (aged 65+). In the economic classification population is divided into the following age groups: pre-working age (0-17 years), working age (women aged 18-59, men aged 18-64) and retirement age (women aged 60+, men aged 65+) (Kurek, 2008, Gwiaździńska-Goraj, 2011, Szymańska, Biegańska, 2014, Grzelak-Kostulka, 2016).

Tab. 1: Population structure by biological groups in 2002 and 2014

Specification		Population structure by biological groups in %					
		aged 0-14		aged 15-64		aged 65 +	
		2002	2014	2002	2014	2002	2014
Poland	total	17.8	15.0	65.2	62.8	17.0	22.2
	city	15.9	14.0	67.4	62.1	16.7	24.0
	village	20.9	16.5	61,7	63.9	17.4	19.6
the north part of Poland	total	18.6	15.3	66.0	63.4	15.4	21.3
	city	16.6	14.1	67.5	62.4	15.9	23.5
	village	22.4	17.6	63.3	65.1	14.2	17.4

Source: Own elaboration based on www.stat.gov.pl

Upon the study of the population structure by biological groups between 2002 and 2014 both in Poland and in the region under analysis unfavourable changes in the proportions between the three biological groups of population were discovered. Noticeably, the population below 14 years of age is on the decrease, which is due to a lower birth rate and that, in turn, makes the other two groups grow. Of no inconsequential value is here the historical factor. Indeed, significant changes in the number of population in the north part of Poland, related to population structure and distribution, noted in the past resulted from resettlements and re-drawing of the political borders after World War II, upon which the area of the north part of Poland demographically became younger than the rest of the country. One of the key elements in the analysis of ageing are the facts on 65+ population structure, namely: information about health and social care. Elder people form a significant economic power that is still increasing (Šimková, Sixta, 2015). Upon the analysis of the above-mentioned group it has transpired that its ratios to other age groups in Poland and in the north part of Poland are similar. However, the comparison of change dynamics between 2002 and 2014 has clearly shown the deterioration in the structure, which can be ascribed, for example, to extended longevity.

Tab. 2: Population structure by economic groups in 2002 and 2014

Specification		Population structure by economic groups in %					
		pre-working age		productive age		retirement age	
		2002	2014	2002	2014	2002	2014
Poland	total	22.7	18.0	62.2	63.0	15.1	19.0
	city	20.6	16.7	64.7	62.8	14.8	20.6
	village	26.0	20.1	58.4	63.3	15.6	16.6
the north part of Poland	total	23.7	18.5	62.7	63.5	13.6	18.0
	city	21.4	17.0	64.5	63.1	14.0	20.0
	village	28.0	21.2	59.4	64.4	12.6	14.3

Source: Own elaboration based on www.stat.gov.pl

When it comes to the analysis of the ageing process from the economic point of view, it is important to determine the relations between non-working and working population in order to adjust social policy to the processes observed. Between 2002 and 2014 both in Poland as a whole and in the north part of Poland negative changes occurred in the proportions between the three economic groups of population. Conspicuously, the population at the pre-working age shrank due to a lower birth rate, which, in turn, meant strengthening of the other groups, i.e. population at the working and retirement age.

2   Areas with advanced level of ageing in northern Poland and causal analysis

In order to demonstrate how advanced the population ageing process was in 2002 and 2014 in the north part of Poland two indicators were used:

- old age-rate: proportion of people aged 65+ in the total population (Kurek, 2008, Szymańska, Biegańska, 2014, Grzelak-Kostulka, 2016);

$$old\ age\text{-}rate = \frac{people\ aged\ 65+}{total\ population} \times 100 \qquad (1)$$

- ageing index: shows the relation between the proportion of the elderly and the young, thus the index proves the advanced nature of the ageing process Kurek, 2008, Szymańska, Biegańska, 2014, Grzelak-Kostulka, 2016.

$$ageing\ index = \frac{people\ aged\ 65+}{people\ aged\ 0\text{-}14} \times 100 \qquad (2)$$

The old age-rate for Poland in 2002 equalled 17.0, while in 2014 it amounted to 22.0, which indicates progressive ageing. Calculated for the north part of Poland, the rate was at 15.4 and 21.3, respectively, which reflected the general nation-wide tendency. The ageing index for Poland in 2002 equalled 95.3 and grew to 148; the respective values for the north part of Poland were: 82.7 and 138.3. The results exemplify deteriorating relations between the ratio of people aged 65+ to people aged 0-14 − thus, they point to an advanced level of ageing. Embarking on the study of the ageing process the researcher should not ignore the dynamics. Therefore, the demographic ageing coefficient was used (Szymańska, Biegańska, 2014, Grzelak-Kostulska, 2016):

$$DAC = \left[U(0-14)t - U(0-14)t+n \right] + \left[U(\geq 65)t+n - U(\geq 65)t \right], \qquad (3)$$

where:

U (0-14) t - share of the population aged 0-14 at the beginning of the period considered,

U (0-14) t + n - share of the population aged 0-14 at the end of the surveyed period,

U (≥65) t - proportion of the population aged 65 and over at the beginning of the period considered,

U (≥65) t + n - proportion of the population aged 65 and over at the end of the surveyed period.

Between 2002 and 2014 it amounted to 8.1 for Poland and to 9.2 for the north part of Poland, so it can be concluded that population is ageing faster in the studied area. Naturally, the group structure and pace of ageing are spatially diversified, that is why the indicators described above have been examined at the level of voivodships and then at the level of poviats.

Tab. 3: Meters of state and pace of advancement of the aging process in 2002 and 2014

| Specification		Years	old age-rate	ageing index	demographic ageing coefficient
the north part of Poland		2002	15.4	82.7	9.2
		2014	21.3	138.3	
Voivodships	kujawsko-pomorskie	2002	16.2	98.2	9.0
		2014	23.9	172.4	
	pomorskie	2002	15.3	81.6	8.1
		2014	20.9	128.4	
	warmińsko-mazurskie	2002	14.8	75.3	9.6
		2014	20.2	130.6	
	zachodnio-pomorskie	2002	15.4	86.9	10.2
		2014	22.3	154.3	

Source: Own elaboration based on www.stat.gov.pl

The analysis of the ageing process based on the values of the old age-rate and ageing index for all voivodships between 2002 and 2014 demonstrated its advancing nature. The lowest ratio of people aged 65+ in the two years studied was recorded in the Warmińsko-Mazurskie Voivodship; the highest ratio was found in the Kujawsko-Pomorskie Voivodship. Similarly, both in 2002 and in 2014 the least favourable proportions between people aged 65+ and population aged 0-14 were discovered in the Kujawsko-Pomorskie Voivodship, while the most favourable were in the Warmińsko-Mazurskie Voivodship in 2002, though in 2014 the Pomorskie Voivodship took the lead. In terms of the pace of ageing, between 2002 and 2014 the process was at its slowest in the Zachodniopomorskie Voivodship and at its fastest in the Pomorskie Voivodship. What was of non-negligible importance to the result of the Pomorskie Voivodship was that it includes the Tri-City agglomeration (Gdańsk, Gdynia, Sopot) where population ageing is well-advanced, so the mean-average value of the index must be lower there.

With a view to presenting the spatial diversification of the ageing process in the north part of Poland, the analysis focused on *poviats.* The study covered 85 *poviats* located in the north part of Poland, out of which 13 were townships and 72 were country districts. The *poviats* with an advanced level of ageing were defined by means of two indicators: old age-rate for 2014 and ageing index for 2014. Further, for the purposes of comparison, the indicators were standardised, added and averaged. Depending on the results achieved upon these calculations, a *poviat* fell into one of five classes: from class I – the most advanced level of population ageing, V - the least advanced level of population ageing to class. Out of the 85 studied *poviats* there were 18 categorised as class I, 16 as class II, 14 as class III, 19 as class IV, and 18 as class V.

The lowest value was calculated for the *poviat* of Kartuzy (-1.7), while the highest result was noted in the *poviat* of Sopot (5.1). The spatial patterns in the progress of ageing of population in the north part of Poland vary across regions and depend on the characteristics of the settlement unit. Ageing of population is highly remarkable mostly in townships and the least acute in country districts lying adjacent to the towns playing an important role in the region. The ageing process here follows the general trends. Due to the process of suburbanisation, the number of people aged 65+ is growing relatively in towns and cities as young population moves to suburban areas. In consequence, a favourable population age structure is being formed in the areas neighbouring large towns and cities. Such concentration of *poviats* with the lowest indicators – thus, with the least advanced ageing of population – has been recorded in the Pomorskie Voivodship, which is also characterised by the highest level of socio-economic development among the studied voivodships.
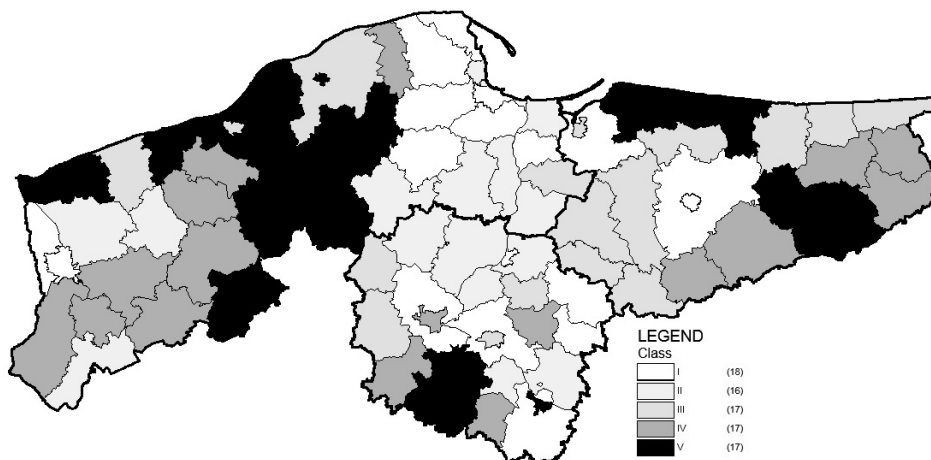
Fig. 1. State of the aging process in the north part of Poland in 2014
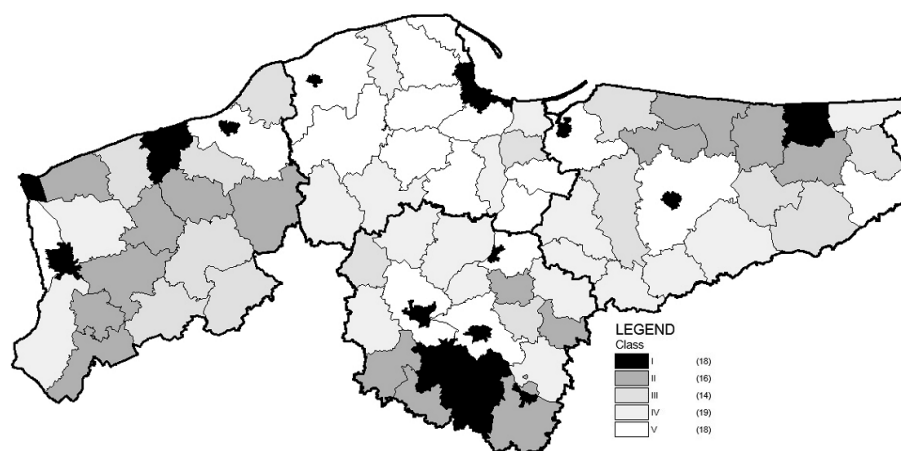
Source: Own elaboration based on www.stat.gov.pl

In order to show the varying pace of ageing in the north part of Poland, a spatial analysis was conducted on *poviats* by means of demographic ageing coefficient measured for the period of 2002-2014. Depending on the index value, *poviats* were grouped into one of five classes: from class I – the slowest pace of ageing to class V – the fastest pace of ageing. The study covered 85 *poviats* and their classification was as follows: 18 *poviats* in class I, 16 *poviats* in class II, 17 *poviats* in class III, 17 *poviats* in class IV, and 17 *poviats* in class V. The spatial distribution of the above-mentioned indicator demonstrates that the highest dynamics of growth was mostly in *poviats* where ageing of population was not at an advanced level (Pomorskie and Kujawsko-Pomorskie Voivodships). On the other hand, a slow pace of the ageing process was characteristic of *poviats* located in the Warmińsko-Mazurskie and Zachodniopomorskie Voivodships. Certain regularity can thus be observed: a slower pace of population ageing occurs in the areas of the north part of Poland where the ageing is the most advanced. If the trend is maintained, it is likely that the ageing process will come to balance in *poviats* lying close to regional capitals and in peripheral *poviats.*

Fig. 2. Demographic ageing coefficient in the north part of Poland in period 2002-2014

Source: Own elaboration based on www.stat.gov.pl

For the explanation of the spatial patterns of the ageing process in the north part of Poland the results obtained for individual *poviats* were examined in relation to demographic factors and their impact on spatial distribution. First and foremost, the population structure by age is affected by migration processes and natural movement of people (Szymańska, Biegańska, 2014, Goraj, Gwiaździńska-Goraj,Cellmer, 2016). That is so because migration processes are, in fact, intrinsically selective (young people are the most common migrants), which is detrimental to the population age structure. However, natural movements of people

are related to the number of live births and deaths. To create a preferable situation, an increase in the number of births, with other factors unchanged, should result in a growth in the youngest population, which would lower the ratio of the oldest group. On the other hand, a decline in the intensity of births decreases the percentage of children in population – thus, giving a boost to the ratio of the elderly and that exacerbates the problem of ageing in population (Rydz, 2012, Gwiaździńska-Goraj, Goraj, 2015). Assuming that natural movements of people and the balance of migration contribute to ageing of population, calculations have been made of the mean-average of the balance of migration per 1,000 people and of the birth rate in 2014 for individual classes representing the summary index of ageing.

Tab. 4: Indicators balance of migration and natural increse in relation to individual classes representing the summary index of ageing in 2014 in the north part of Poland

Class based on old age-rate for 2014	Net migration per 1000 population	natural increase per 1000 population
I	2.8	3.1
II	- 2.1	1.4
III	- 3.3	0.2
IV	- 3.0	- 0.6
V	- 1.2	- 1.5

Source: Own elaboration based on www.stat.gov.pl

Basing on the data from the table, a strong correlation can be observed between the level of ageing in the north part of Poland and the birth rate per 1,000 people. When the ageing process is progressing, the balance of migration per 1,000 people falls. That regularity did not work for class V mostly, which stems from the fact that the class included townships – units featuring a high positive balance of migration per 1,000 people.

Conclusion

On the basis of the studies conducted it can be concluded that between 2002 and 2014 the area of the north part of Poland saw a growth in the indicators showing ageing of population; however, the results obtained are still more favourable than the national average. The demographic ageing coefficient for the north part of Poland was higher than the average value for Poland, which means that the population of the north part of Poland is ageing faster. The changes in the group proportions and pace of ageing differ across voivodships and *poviats.*

One can observe the following regularity: ageing of population is at the most advanced level primarily in townships, while it is at the least advanced level in the country districts lying adjacent to towns and cities of regional importance. At the same time, a slower pace of ageing occurs in the areas where ageing is the most advanced. In the future that phenomenon may lead to a relative balance in the ageing of *poviats* neighbouring regional capitals and peripheral *poviats*. The structure and pace of ageing are affected by many factors. It has been acknowledged that the demographic factor is one of the most important factors shaping the structure of population. The analysis which was carried out proves a stronger correlation of the level of ageing in the north part of Poland with the birth rate per 1,000 people than with the balance of migration per 1,000 people. The ageing of population calls for adjustments in social policy matching the phenomena observed; therefore, it is so significant to indicate areas where the process has reached the most advanced level.

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