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CHANGES IN THE NUMBER OF POPULATION IN POLAND DURING A 30 YEAR PERIOD

ABSTRACT. The paper concerns changes in the number, and gender and age structure of the population in Poland in the years 1999–2030, – elaborated on the basis of prognosis by the Central Statistical Office (GUS). This prognosis was elaborated for the new administrative division from 01. 01. 1999 and therefore it makes possible the analysis not only the changes in the total number of population in Poland, but also the changing spatial structures on province scale. We analysed the changes in the gender structure of the population in Poland and in three age groups: pre-productive, productive, and post-productive age for the years 2000, 2010, 2020, and 2030.

KEY WORDS: gender and age structure of population, population prognosis, natural and real increment, feminisation coefficient.

Population prognoses are important research tools of the predictable changes in the state and structure of the population. They have also practical meanings because they give information about changes that will take place in the number of different age groups of the population. The reliability of prognoses depends on the length of the period prognosticated and the assumptions accepted for the forecasting of the probably changes in demographic processes, fertility level and mortality in different age groups, and the directions and size of the population migration. The prognosis elaborated by the Main Statistical Office for the years 1999–2030 presents the results for the new administrative division from 1st January 1999, i.e. for 16 provinces and 373 districts.

The most important assumptions of the Polish population projection until 2030 are among others: forecasting the slowdown of the decrease of the fertility level during the next five years, stabilisation, and then, a slight increase of the birth-rate. Concerning mortality the lengthening of life longevity is assumed, according to the model of 15 European countries but with some delay (about 30 years). In the field of domestic migration, the growth up to about 600 thousand a year was predicted at the beginning and an insignificant decrease at the end of the period prognosticated. The increase of the migration balance from the country to towns as far as till 2020 was also forecasted, later a slow decrease. The acceptance of the assumption for foreign migration raises the greatest doubt. It has been assumed that the surplus of labour forces resulting from the growth of the population number in the productive age will not be reflected in the size of emigration, but in that of the temporary stays. It has also been assumed that the negative migration balance will gradually decrease, and in 2030 it will even have a small positive value.

CHANGES IN THE NUMBER OF POPULATION IN POLAND

Approaching the discussion of the changes in the number of population in Poland on the basis of the prognosis by the CSO we should state that in 1998 the number of population in Poland reached its maximum after the World War II, i.e. 38,667 thousand inhabitants. 1999 was the first year with negative real increment of population which equalled 13,400 persons, and the real increment was only 587 persons. According to the prognosis, the number of population in Poland will decrease during about 5-6 years down to 38,635 persons in 2005, i.e. about 33 thousand fewer than in 1998 when the prognosis began. After 2006 the number of population will gradually increase and in 2017 it will reach 39 million. This means a small, only 1%, growth as compared to 1998. After a few years stagnation on the level of a little above 39 million inhabitants, from 2021 the number of population will decrease down to 38,025 thousand in 2030, i.e. by 642 thousand persons, 1.7%, less than in the base year 1998.

The number of urban population in 1998 was 23,923 thousand, and during the period forecasted it will grow by about 465 thousand (i.e. almost 2%). During the first three years, the number of urban population will decrease, but during the next 20 years the number of the inhabitants in towns will grow until 2022, then again, it will decrease down to 24,388 thousand in 2030. These changes will result in the growth of the share of the urban population from 61.9% of the total population in 1998 up to 64.1% in 2030. The number of rural population in 1998 equalled 14,744 thousand persons. According to the prognosis, it will decrease in the studied period. Initially, this process will be relatively slow (of the order of some or dozens of thousands), by the end of the late twenties it

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will have reached dozens of thousand persons a year. In 2030 the number of rural population is expected to be 13,637 thousand persons, i.e. over 1.1 million persons fewer than in the base year 1998. It indicates a decrement by about 75%. Hence, the decrement in the total number of population in Poland is supposed to result from the decreasing number of the urban population.

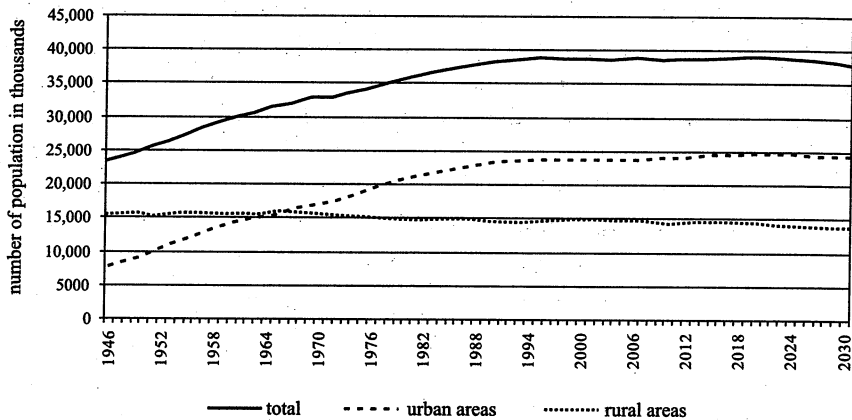


Fig. 1. Courses of the population number in Poland: total, in urban and rural areas in the years 1946-2030

Here, we can note that such a scenario of the development of number of urban and rural population will be probable if the premises as to the growth of migration balance from villages to towns during the prognosticated prove accurate. This component of the prognosis is the most uncertain due to the difficulties in the forecasting the socio-economic situation in the country.

CHANGES IN THE NUMBER OF POPULATION ACCORDING TO VOIVODESHIPS

The new administrative division of the country has been in force since 1 January 1999. For the base year 1998, the number of population was calculated for 16 voivodeships. At that time the highest numbers of population were recorded in the voivodeships: Mazowieckie (5,067 thousand) and Śląskie (4,882 thousand). The Małopolskie and Wielkopolskie voivodeships recorded more than 3 million inhabitants. Fewer people lived in the Opolskie (1,090 thousand) and Lubuskie (1,023 thousand) voivodeships.

There will be only insignificant changes in the hierarchical system according to the number of population in the studied period. The order of the six first provinces will not change. The Lubelskie voivodeship will fall from the 7th to

the 9th position and the Opolskie from the 15th to the 16th. The Lubuskie and Podkarpackie voivodeships will rise in the hierarchy from the 16th to the 15th and from the 9th to the 8th position, respectively.

Until 2030 the number of population will have enlarged in comparison to the base year only in four voivodeships: Małopolskie, Pomorskie, Wielkopolskie and Podkarpackie. In four other voivodeships: Lubuskie, Mazowieckie, Warmińsko-Mazurskie and Zachodniopomorskie, the number of population will remain nearly at the same level (+/- 20 thousand), while in the remaining eight voivodeships a decrement is forecasted. The highest decrement of the order of 250 thousand persons is supposed to occur in the Śląskie and Łódzkie voivodeships.

Table 1. Percentage of the total population in pre-productive age of the voivodeships

| % | YEAR | 2000 | 2010 | 2020 | 2030 |
|--------------------|------|---------|--------|---------|---------|
| 16-18 | | | 10, 13 | | 1, 9, |
| | | | | | 10, 13, |
| | | | | | 14 |
| 18-20 | | | 1, 4, | 1, 7, | 2, 3, |
| | | | 5, 7, | 8, 9, | 4, 5, |
| | | | 8, 9, | 10, 12, | 6, 7, |
| | | | 12, 14 | 14 | 8, 11, |
| | | | | | 12, 15, |
| | | | | | 16 |
| 20-22 | | 10 | 2, 3, | 2, 3, | |
| | | | 6, 11, | 4, 5, | |
| | | | 15, 16 | 6, 11, | |
| | | | | 15, 16 | |
| 22-24 | | 8, 9 | | | |
| | | 12, 13 | | | |
| 24-26 | | 1, 2, | | | |
| | | 4, 5, | | | |
| | | 6, 7, | | | |
| | | 11, 14, | | | |
| | | 15 | | | |
| 26-28 | | 3, 16 | | | |
| Average for Poland | | 24.1% | 19.2% | 19.8% | 18.1% |

Explanations: voivodeship: 1 – Zachodniopomorskie, 2 – Pomorskie, 3 – Warmińsko-Mazurskie, 4 – Podlaskie, 5 – Lubuskie, 6 – Wielkopolskie, 7 – Kujawsko-Pomorskie, 8 – Mazowieckie, 9 – Dolnośląskie, 10 – Łódzkie, 11 – Lubelskie, 12 – Opolskie, 13 – Śląskie, 14 – Świętokrzyskie, 15 – Małopolskie, 16 – Podkarpackie

Table 2. Percentage of the total population in productive age of the voivodeships

| % | YEAR | 2000 | 2010 | 2020 | 2030 |
|-----------------------|------|----------------------|--------------------------------|-----------------------------------|--|
| 56-57 | | | | | 10, 12, 13 |
| 57-58 | | | | 10 | 4, 8, 9, 13 |
| 58-59 | | 4, 11, 16 | | 8, 9, 13, 14 | 1, 2, 3, 5, 6, 7, 11, 15, 16 |
| 59-60 | | 14 | | 1, 2, 4, 5, 6, 7, 11, 12 | |
| 60-61 | | 8, 15 | | 3, 15, 16 | |
| 61-62 | | 2, 3, 6, 7, 10 | | | |
| 62-63 | | 1, 5, 9, 12 | | | |
| 63-64 | | 13 | 4, 8, 11, 14, 15 | | |
| 64-65 | | | 7, 10, 16 | | |
| 65-66 | | | 2, 3, 5, 6, 9, 12, 13 | | |
| 66-67 | | | 1 | | |
| Average for Poland | | 61.2% | 64.6% | 59.2% | 57.9% |

Explanations: voivodeship: 1 – Zachodniopomorskie, 2 – Pomorskie, 3 – Warmińsko-Mazurskie, 4 – Podlaskie, 5 – Lubuskie, 6 – Wielkopolskie, 7 – Kujawsko-Pomorskie, 8 – Mazowieckie, 9 – Dolnośląskie, 10 – Łódzkie, 11 – Lubelskie, 12 – Opolskie, 13 – Śląskie, 14 – Świętokrzyskie, 15 – Małopolskie, 16 – Podkarpackie

In the spatial structure, this indicates the highest decrement of population in the central part of Poland on the south-western borders and in the central and northern part of the so-called eastern wall. Naturally, the image of changes will be different for the urban and rural population. In general the growth of the urban population is expected, but not in all of the voivodeships. The largest decrement will appear in the towns of the voivodeships: Śląskie (243 thousand) and Łódzkie (79 thousand), and also in Opolskie, Dolnośląskie and Świętokrzyskie. In the remaining voivodeships the number of urban population will increase, the biggest growth in absolute values will be in the voivodeships: Mazowieckie (178 thousand), Wielkopolskie (141 thousand), Podlaskie (104 thousand) Lubelskie (100 thousand, and Warmińsko-Mazurskie (96 thousand).

Taking into account the index of changes in the number of population in the period 2000–2030, the highest increment of urban population in percentage occurs on the eastern border of the country. The whole western part of Poland will show a decrement, while the north-western part will indicate a moderate increment. In 1998 the mostly urbanised voivodeships were: Śląskie (79.6% of the population lived in towns) and Dolnośląskie (71.6%). By the end of the period prognosticated the Zachodniopomorskie voivodeship will have joined this leader group (above 70%). The Podkarpackie and Świętokrzyskie voivodeships will be further characterised by the supremacy of rural population.

The decrease of the total number of the population in the country will be caused by the decrease of the rural population. This concerns as many as 14 voivodeships. The largest decrements in absolute values occur in the voivodeships: Lubelskie (218 thousand persons), Mazowieckie (166 thousand) and Łódzkie (159 thousand), in further three voivodeships over 100 thousand persons, while the smallest, about 6 thousand persons, in the Lubuskie and Śląskie voivodeships. Only in two voivodeships a growth in the number of the population is expected, these are Małopolskie (by about 91 thousand persons) and Pomorskie (42 thousand).

Taking into account the index of changes in the number of population in the period 2000–2030 the highest decrements of urban population occur in the north-eastern and eastern parts of the country, and in the Łódzkie and Dolnośląskie voivodeships. In an extreme case, the decrement of the rural population will be as high as 27.4% in the Podlaskie voivodeships, and in seven voivodeships from 10% to 20%. Only in the Małopolskie and Pomorskie voivodeships the number of rural population will grow by about 5%.

The predicted changes will result in the growth of the share of urban population in the total number of population (except for the Małopolskie, Pomorskie, and Śląskie voivodeships).

CHANGES IN THE GENDER STRUCTURE OF THE POPULATION

According to the prognosis, the gender structure of the population in Poland will change only slightly. The share of men in the total number of the population was 48.6% in 1998. The number of women per 100 men equalled 105.7%. During the following decades, i.e. in the years 2010 and 2020 the number of men is supposed to remain at the same level, only in 2030 the share of men is predicted to decrease down to 48.5%. This means that the number of women will be 106.1 per 100 men. We can add here that this index will change depending upon the age of the population. In 1998 among persons of 40 years of age the supremacy of men was noted (96 women per 100 men). For persons of 40 years of age or older women were in majority due to higher mortality of men. The feminisation coefficient was 120.1 women per 100 men. For 2030 the prognosis predicts that the numerical supremacy of men will occur among persons up to 54 years of age (feminisation coefficient 96.8), while among the older persons, 55 and more years of age, there will be 127 women per 100 men.

The proportions between the number of men and women in the urban and rural population will form differently. At present there is a considerable numerical supremacy of women over men among the urban population. The feminisation coefficient in 1998 in towns was 109.4, and according to the prognosis, it will rise up to 110.7 in 2030. For the rural population these proportions were somewhat different. At the beginning of the forecasted period there was equilibrium of genders, after 2006 a slight supremacy of men is expected which will gradually decrease, so in 2030 there will be 98.5 women per 100 men.

CHANGES IN THE AGE STRUCTURE OF THE POPULATION

In this paper we will discuss the changes of the age structure of the population divided into three groups: pre-productive – 0-17 years of age, productive – 18-59 years for women and 18-64 years for men, and post-productive age – 60 or 65 years or more, respectively.

The predicted number of population in pre-productive age will decrease from 9.9 million persons in 1998 down to 7.4 million in 2012, this is almost 2.5 million fewer than in the base year. During the following eight years a small increase is supposed to reaching 314 thousand persons, then the number of population in this age group will fall again down to 6.9 million persons in 2030. During the whole forecasted period the decrement of population will be about 3 million persons, i.e. over 30%.

Table 3. Percentage of the total population in pos-productive age of the voivodeships

| % | YEAR | 2000 | 2010 | 2020 | 2030 |
|-----------------------|------|-----------------------------------|---|--------------------------------|--|
| 12-14 | | 1, 2, 3, 5, 6, 7 | | | |
| 14-16 | | 4, 9, 11, 12, 13, 15, 16 | 1, 2, 3, 5, 6, 7, 16 | | |
| 16-18 | | 8, 10, 14 | 4, 8, 9, 10, 11, 12, 13, 14, 15 | | |
| 18-20 | | | | 3, 6, 15, 16 | |
| 20-22 | | | | 1, 2, 4, 5, 7, 11, 12 | |
| 22-24 | | | | 8, 9, 10, 13, 14 | 1, 8, 9, 10, 12, 13, 14 |
| 24-26 | | | | | 2, 3, 4, 5, 6, 7, 11, 15, 16 |
| Average for Poland | | 14.7% | 16.2% | 21.0% | 24.0% |

Explanations: voivodship: 1 – Zachodniopomorskie, 2 – Pomorskie, 3 – Warmińsko-Mazurskie, 4 – Podlaskie, 5 – Lubuskie, 6 – Wielkopolskie, 7 – Kujawsko-Pomorskie, 8 – Mazowieckie, 9 – Dolnośląskie, 10 – Łódzkie, 11 – Lubelskie, 12 – Opolskie, 13 – Śląskie, 14 – Świętokrzyskie, 15 – Małopolskie, 16 – Podkarpackie

Among the urban population the fall in the number of population will be similar to that of the total population. In 2000 the state is 5.3 million persons and it will decrease, then after a transition increase in 2020, it will amount to 7.7

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million, then will decrease again to 4.3 million persons in 2030. It means that the decrease in the number of population in this group will be about 1.2 million persons.

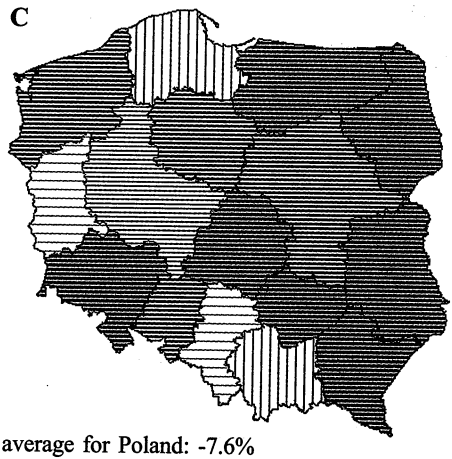
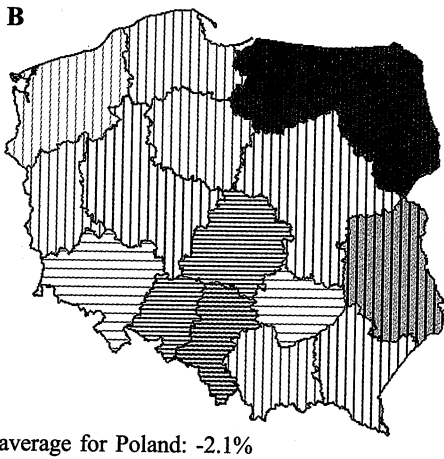
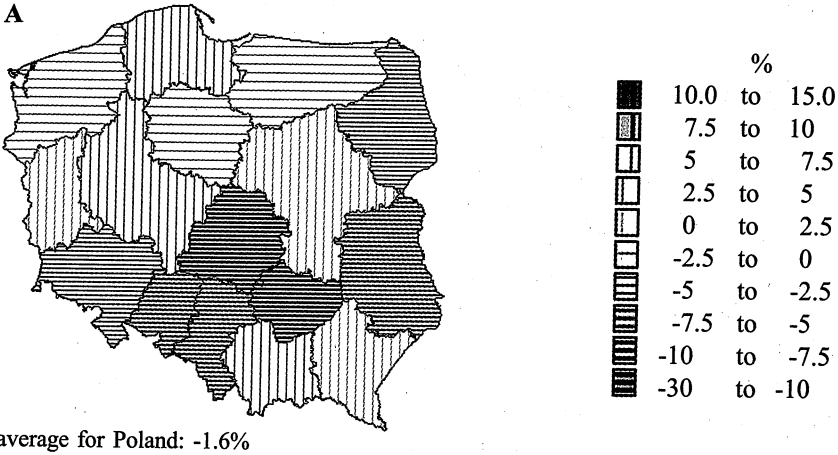


Fig. 2. Changes in the population number of the voivodeships in the period 2000–2030 A-total, B-urban, C-rural

The number of rural population in pre-productive age will decrease during the whole period prognosticated from about 4.0 million persons to 2.6 million, i.e. almost 1.4 million persons.

In 2000 the share of the population in pre-productive age in Poland was 24.1%, and this was the highest value for the whole period prognosticated. The

lowest shares occurred in the central voivodeships: Łódzkie and Mazowieckie, and three voivodeships in the south-western part of the country, the highest ones in the Podkarpackie and Warmińsko-Mazurskie, while in the remaining voivodeships they were similar to the national average. The mean value for Poland gradually decreased and after a transition increase to 19.8% in 2020 it will decrease again to 18.1%. The share of the pre-productive age group of the population also decreased in every voivodeship, but at the same time the difference between extreme values also decreased from 5.2 percent to 1.9. In 2030 the voivodeships: Łódzkie, Dolnośląskie and Śląskie were characterised by the lowest shares. The Świętokrzyskie and Zachodniopomorskie voivodeships joined this group. In the remaining voivodeships the share of children and youngsters was close to the national average.

The population group in the productive age will grow quite abruptly in the first decade of the forecasted period – more than 200 thousand persons a year, and after 2005 a little slower. From 2010 it will be falling during the next 20 years to reach the value of 2.2 million persons which means a 1.2-million decrease as compared to the base year (23.2 million). We should pay attention to the fact that the decrement will be caused by the vehement fall in the number of population in the age of 18-44 years. The decrement in the number of population in the productive age group will also be caused to a great degree by the demographical ageing of the population which at the same time will enlarge the group of population in the post-productive age. The number of population in the productive age will change in a similar way in towns. In 2000 it was 15.2 million persons and will grow to 15.8 million in 2010, then during the following twenty years, it will decrease down to 14.1 million persons. This means almost 1.1 million persons of total decrement in the number of population in the productive age.

The number of rural population in the productive age was 8.5 million in 2000, and it will grow abruptly to 9.2 million in 2010, i.e. 0.7 million during the decade. After this period there will be a fall in the number of population down to 7.9 million persons. So during the whole period forecasted the number of rural population in productive age will still decrease by almost 0.6 million persons.

In 2000 the share of the population in the productive age in Poland was 61.2%. It will reach its highest value, 64.6%, in 2010, then will fall down to the value of 57.9%. The spatial structure of this phenomenon is very characteristic, and in general, we can state that the further to the east starting from the voivodeships on the western border the smaller the share of the population in the productive age becomes. The lowest shares below 59% of the total population for this population group were noted in the voivodeships by the so-called eastern wall. They were somewhat higher in the Mazowieckie, Świętokrzyskie and Małopolskie voivodeships, still higher in central Poland, and the highest along the western and south-western border of the country. The maximum value was noted in the Śląskie voivodeship (63.4%). In 2010 the spatial structure will remain

similar, only the values will be about 3 percent higher for different voivodeships. The maximum value occurs in the Zachodniopomorskie voivodeships. Together with the changes in the number of population in the productive age there will be changes also in the spatial structure of this phenomenon. The shares of this population group will decrease quite abruptly in the western part of Poland, where about 2010 they were the highest. In 2030 the picture will be characteristic, but diametrically different from the structure in 2000. The Świętokrzyskie, Łódzkie and Opolskie will form the core of the lowest shares (56.5%, 56.8% and 56.6%, respectively), the voivodeships with somewhat higher shares close to the national average from south-west and north-west will adjoin this group dividing the territory of Poland to north-western and south-eastern parts with values above the national average. We should also mention that the difference between the provinces in 2000 was 4.9 percent, and decreased down to 2.2 percent in 2030.

Due to the ageing of the population in demographic sense, and also due to the elongation of life longevity, the number of population in productive age in Poland will decidedly grow. In 1998 the number of this population equalled 5.6 million persons. During the whole forecasted period this number will increase to 9.1 million, i.e. by more than 3.5 million – 64%. In this number the highest increment, almost 2 million persons, will occur in the second decade of the period prognosticated.

Resulting from the changes in the age structure of the population, i.e. the decreasing number of the population in the pre-productive age and the increasing number of population in post-productive age, the so-called burden index of persons in the productive age will increase. In 1998 it was 66 persons, out of this 42 persons were in the pre-productive age and 24 in the postproduction age. In 2030 the burden index will increase to 72 persons, and the proportion of groups will change: 31 person in the pre-productive age and 41 persons in the post-productive age.

Among the urban population the growth of the population will be the highest in the group in post-productive age. The number of population in this group will increase from 3.4 million persons in 2000 up to 6.0 million in 2030, i.e. by over 2.6 million persons. The fastest increment will appear by 2010, by almost 0.7 million persons.

The growth of the rural population in the post-productive age will be slower, from 2.3 million persons in 2000 to 3.1 million in 2030, i.e. a little more than 0.8 million persons.

In 2000 the share of the population in the post-productive age in Poland was 14.7%, and the spatial distribution was characterised by the fact that the highest shares in this group occurred in the central voivodeships: Łódzkie, Mazowieckie and Świętokrzyskie. The values close to the national average Laid along the eastern and southern border of the country. The north-eastern voivode-

ships had the lowest share. The difference between the extreme values for the voivodeships was a percentage point of 4.3. During the following years the percentage of people in the productive age grew to 16.2% in 2010, 21.0% in 2020, and 24% in 2030. In the spatial structure of the voivodeships the changes at the beginning will be small. The bigger ones will be noted only in 2020, and they will concern quick ageing of the population in the north-western and south-western parts of the country. In 2030 the highest shares will occur in the central voivodeships (the maximum value in the Łódzkie voivodeships will amount to 25.8%), in three Silesian voivodeships and the Zachodniopomorskie voivodeship. In the remaining voivodeships the values will be below the average. The difference between the maximal and minimal values equals 3.3 percent. The Podkarpackie (22.5%), Małopolskie, Wielkopolskie and Pomorskie voivodeships will have the lowest shares in this population group.

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