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POPULATION AGING AND SOME SOCIAL CONSEQUENCES OF THE PROCESS IN THE COUNTRY AND IN THE REGION

Summary. The paper describes the state of population aging in Poland and one voivodeship (Kujawsko-pomorskie) in the early 21st c., as well as showing how the process will develop in the next future, limited by the beginning of the 2030s.

Using the economic and biological age groups to describe the structure of population with respect to aging, we need to note that the shares of age groups are similar in the voivodeship and in the country, both today and throughout the Central Statistical Office's most recent population projection. The similar shares of the working age group and retirement age group in the analysed areas translate into almost identical potential support ratios for the country and the mentioned administrative unit and into their future trends.

Population aging considered in the cross section of urban and rural areas makes it evident that the process consequences (e.g. for the labour market, the social policy) will affect the urban population more strongly than the rural population.

Key words: Aging, regional approach, aging indices, problem of disability.

1. Introduction

The paper presents the state of population aging in Poland and one voivodeship (Kujawsko-pomorskie) in the early 21st c., as well as showing how the process will develop in the next future, limited by the beginning of the 2030s.

Let me start with several comments explaining the terms that will be used throughout the article, i.e. *population aging* and *state of aging*. The first term is usually interpreted as an increase in the number and percentage of older persons among the population living in the studied area [E. Rosset, 1959]. It therefore indicates the dynamics of the examined phenomenon, while the state of population aging is its product at a specific point in time or in space. The pace of aging as well as its state are measured using relevant statistical tools that, out of necessity, will be discussed in the next, descriptive part of the article. At this point, I would like to present more in detail the age limit separating the younger

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subpopulation from the older section of the population. Within the set of theoretical and methodological issues connected with population aging, the age limit allows identifying the group of older persons as an object of research.

In the discussions of demographic and biologic old age conducted both today and in the past, including very distant past reaching the ancient times, many relevant proposals were formulated. Their systemization as of 1950s was presented by Edward Rosset in his work titled: *Proces starzenia się ludności*, a fundamental contribution to this field to date [1959, pp. 108–134]. A dozen or so years later it was revised by Stefan Klonowicz, who introduced some modifications to it [1973, p. 338 and next]. In line with the proposals put forward by the representatives of various fields of knowledge (such as physicians-physiologists, gerontologists, biologists, anthropologists, philosophers, demographers, economists) that the two researchers included in their works, they proposed to divide the human life into shorter periods, the last of which (sometimes subdivided into two or more stages) was the period of old age. Most concepts that Rosset and Klonowicz discussed in their books pinpointed the lower limit of the period ending with death in the age interval 60–70 years. It is known, however, that some authors covered by their classification, such as Hippocrates, believed that growing old is a stage spanning several years (in this case from 56 to 63).

The progressive aging affecting both European populations and those living on other continents that was observed in the 1950s and at the beginning of this century has not substantially modified the opinions on the age to be considered the beginning of demographic old age (in its biological sense). The biological criterion applied in order to break down the population into more homogenous groups assumes that the older section of the population consists of persons aged 60+ or 65+. These critical years (65+ is used more often than the other limit) are commonly mentioned in both source publications and analytical studies. More detailed classifications break down the subpopulation of older persons into smaller units, distinguishing the groups of older and younger seniors, and within the latter group also the one-hundred-year olds and older persons. The more detailed divisions are also applied to groups selected using the biological criterion that precede the older section of population, namely children (0–14 years) and adults (15–64 years).

In dividing the population aged 65+ into younger and older persons, the first group is assumed to be those aged 65–74 years or 65–79 years.

The different approaches to setting the lower limit for the group of the oldest old as taken by the authors do not necessarily arise from methodological differences in defining the inter-group age limits. They are frequently imposed by the available source data and by their original grouping that prevents separating the group aged 80+ for some of the analysed areas (countries, voivodeships or powiats (counties)).

One reason for which isolating the “younger” and “older” old persons within the section of the older population is important in the studies of aging is, for instance, the expanding shares of the latter group (the so-called double aging process), which adds qualitative traits and circumstances to the discussed phenomenon (such as a growing percentage of the disabled persons and the expanding number of persons who need assistance in performing daily routines).

While making analyses involving the age limits as defined by the biological criterion we need to bear in mind that they rather serve the purpose of systemization and are subject to discussion. Regarding the population that has been divided into more consistent groups by means of the economic criterion the situation is different. Then the lines dividing the particular groups are drawn in the relevant legislation, and the retirement age population is equated with the older section of the population, which is not entirely true, because in Poland, as in most countries in contemporary Europe and outside it, the upper limit of the working age (i.e. marking the beginning of the retirement age) is different for males and females.

The isolation of the age group 50+, which group has drawn nationwide discussion these days, involves the application of the economic criterion.

Although the upper age limit for the 50+ group has not been defined, its members are persons at the pre-retirement age rather than those past their retirement age.

The factors, causes and mass events that drive population aging are known to the researchers of the process and they are extensively and well reported on with respect to populations living in the particular countries and regions. Regarding Poland, the older persons' shares in the country's population have been growing in the last decades because of decreasing fertility and average life expectancy extending due to declining mortality, with birth decreases (the so-called aging from the bottom of the age pyramid) shaping the process dynamics more strongly than mortality changes.

Internal flows (migration) of the population and their diversification and magnitudes occurring in the recent years have been, and still are, a significant factor differentiating the state of population aging in the cross-section urban/rural areas.

2. Some consequences of population aging – general comments

This section analyses only some of the possible consequences of aging, mainly those affecting the economy and health, but also in terms of their relationship with the changing structure of households and families.

The studies of the trends occurring in the demographic structure prove that aging diminishes the potential labour force in the long term, as well as affecting

its quality, because of the swelling shares of the non-mobile group in the working age population [M. Lange, 2008].

Additionally, a larger number and a percentage of the retirement age population reduce the potential support ratio and increase the proportion of the retirees. This mechanism will be illustrated using the case of Poland and the Kujawsko-pomorskie voivodeship in the next, analytical part of this article.

The average life expectancy has been extending in the developed countries mainly due to lower mortality in the older age groups. Another effect of the process is persons living longer years in weaker health and with disabilities, which is characteristic of older persons rather than the younger age groups. These facts pose a challenge to the health care system, both nationwide and locally.

Another swelling problem related to population aging is the growing number and shares of small, one or two-person households in their total number run only by older persons. It is worth noting that most single-person households are formed by older women.

3. The state of population aging in Poland and the Kujawsko-pomorskie voivodeship (1990–2030/35)

The numbers provided in tables 1 and 2 illustrate the age structures of the populations in Poland and the Kujawsko-pomorskie voivodeship, as well as their changes over a span of several tens of years (for the voivodeship the period of analysis is ten years shorter). In both cases, the age groups were isolated using the biological criterion.

Tab. 1. The Polish population structure by biological-age group, years 1990–2035

Years	Total population (in thousands, as of Dec. 31)	Shares of particular age groups (%)			
		0–14	15–64	aged 65 years and older	
				total	in which the 80+ group
1	2	3	4	5	6
total					
1990	38 073	24.4	65.4	10.2	1.9
2000	38 254	19.1	68.6	12.3	2.0
2008	38 136	15.3	71.2	13.5	3.1
2010	38 092	15.0	71.4	13.5	3.5
2020	37 830	15.6	66.0	18.4	4.1
2030	36 796	13.7	64.0	22.3	5.5
2035	35 993	12.5	64.2	23.2	7.2
urban					
1990	23 546	23.3	67.6	9.1	1.7
2000	23 670	17.1	71.2	11.7	1.8

Table 1 (cont.)

1	2	3	4	5	6
2008	23 288	13.8	72.5	13.7	3.0
2010	23 145	13.8	72.4	13.8	3.2
2020	22 650	14.9	65.1	20.0	4.4
2030	21 800	13.2	63.1	23.7	6.2
2035	21 215	12.2	63.5	24.3	8.1
rural					
1990	14 257	26.2	61.8	12.0	2.3
2000	14 584	22.2	64.4	13.4	2.3
2008	14 848	17.5	69.3	13.2	3.3
2010	14 946	16.9	70.1	13.0	3.6
2020	15 180	16.7	67.4	15.9	3.8
2030	14 996	14.4	65.4	20.2	4.4
2035	14 778	13.0	65.3	21.7	5.8

Source: *Rocznik demograficzny 2008*, GUS, Warsaw 2008, *Prognoza ludności Polski na lata 2008–2035*, GUS, Warsaw 2009. Developed by the author.

Tab. 2 The structure of the Kujawsko-pomorskie population by biological-age group, years 1990–2035

Years	Total population (in thousands, as of Dec. 31)	Shares of particular age groups (w %)			
		0–14	15–64	aged 65 years and older	
				total	in which the 80+ group
total					
2000	2 000	19.4	69.1	11.5	•
2008	2 068	15.8	71.7	12.5	2.8
2010	2 063	15.5	71.9	12.6	3.1
2020	2 041	15.9	66.1	18.0	3.8
2030	1 972	13.9	64.0	22.1	5.4
2035	1 921	12.8	64.2	23.0	7.1
urban					
2000	1 306	17.5	71.2	11.3	•
2008	1 259	14.2	72.5	13.3	2.9
2010	1 245	14.0	72.5	13.6	3.3
2020	1 191	14.7	65.1	20.3	4.3
2030	1 119	13.0	62.6	24.4	6.5
2035	1 075	12.0	62.8	25.2	8.5
rural					
2000	794	22.5	65.9	11.6	•
2008	809	18.4	70.2	11.4	2.8
2010	818	17.9	71.0	11.1	3.0
2020	850	17.7	67.6	14.7	3.1
2030	852	15.1	66.0	18.9	4.0
2035	846	13.7	66.1	20.2	5.3

Source: *Rocznik demograficzny 2001*, GUS, Warsaw 2001, *Prognoza ludności Polski na lata 2008–2035*, GUS, Warsaw 2009. Developed by the author.

The dynamics of population aging indicates that the shares of persons aged 65 years and older will double over the next thirty years in both the country and the voivodeship, whereas the shares of the other groups of the population (especially children) will clearly decrease in the same period (2000–2030).

According to the current estimates and the most recent GUS population projection, the absolute numbers of persons aged 65 years and older will be for Poland (in thousands),

2000 – 4 726

2030 – 8 195

and for the Kujawsko-pomorskie voivodeships these are 241,000 and 435,000, respectively. In the period in question, the number of the older persons will grow slightly faster in the voivodeship (1.80) than in the country (1.73).

Comparing the data presented in the tables we can note that the rates characterizing the age structures of populations in Poland and in the investigated voivodeship are similar for the most part, especially those characterising the total populations.

As far as the rural part of the Kujawsko-pomorskie voivodeship is concerned, its population will age somewhat more slowly in the next decades than all rural population in the country. This statement is supported by the voivodeship's shares of children that exceed the national average, as well as lower percentages of older persons in the final years of the projection (2030, 2035).

After the year 2010, the urban populations in the voivodeship and the country will age at a similar rate, which is likely to increase the shares of persons aged 65 years and older to around 25% in the year 2035.

The so-called double aging of the population will be manifested through the increasing percentages of the oldest old persons (80+). Between 2010 and 2035, the percentages will more than double in both the analysed areas, in each case exceeding 7%. In the towns of the Kujawsko-pomorskie voivodeship the share of the oldest old population will grow slightly faster than in the urban population in the country, especially after the year 2020. The share of the oldest old population living in the rural part of the voivodeship will grow slightly more slowly than its proportion in the country, reaching a relatively low value of 5.3% in the final year (2035) of the forecast (4% in 2030; this means that every fifth rural resident in the rural part of the Kujawsko-pomorskie voivodeship will be then 80 years or older). A meaningful conclusion to our discussion on populating aging in the voivodeship and the country is that the process' directions and intensity of changes until the final year of the forecast have been largely predetermined and the odds of their turning out inaccurate are low (much lower than for the projected changes in the number and percentage of children aged 0–14 years, for instance), because all persons to enter old age in the next decades are already facing it. It is therefore difficult to assume that their number might decrease

because of external migration. In the forthcoming years, the numbers of the persons will be determined almost exclusively by the mortality order. Besides, as shown by the numbers presented in the tables, in the next decade the population will age definitely faster and the shares of older persons will grow between the first and last year of the period by more than 5 percentage points (as many as 6 p.p. in the towns of the Kujawsko-pomorskie voivodeship), while in the current decade the increase will slightly exceed 1 p.p. (ca 2 p.p. in towns) in the country and the voivodeship. The outlined course of the process depends today, and will depend in the future, on persons born in the 1950s, approaching the limit of old age.

Using the economic-age groups (see table 3) to describe the structure of the population with respect to aging we need to note (in the same way as when applying the biological criterion) that the shares of particular age groups are similar in the voivodeship and in the country, both today and throughout the GUS population projection.

Tab. 3. Population structure in Poland and in the Kujawsko-pomorskie voivodeship by economic-age group, years 2007–2035

Years	Shares of particular age groups (%)					Support ratios ^a
	Pre-working age	working age			retirement age	
		total	including:			
			18–44	45–59/64		
Poland						
2007	19.7	64.4	40.1	24.3	16.0	4.0
2010	18.7	64.5	40.1	24.4	16.8	3.8
2020	18.4	59.5	37.2	22.3	22.1	2.7
2030	17.0	57.8	31.6	26.2	25.2	2.3
2035	15.7	57.6	30.1	27.5	26.7	2.2
Kujawsko-pomorskie						
2007	20.4	64.6	40.1	24.5	15.0	4.3
2010	19.4	64.6	40.2	24.4	16.0	4.0
2020	18.9	59.4	37.2	22.2	21.7	2.7
2030	17.3	57.7	31.8	25.9	25.0	2.3
2035	15.9	57.6	30.3	27.3	26.5	2.2

^a The working group to the retired group ratio.

Source: *Prognoza ludności Polski na lata 2008–2035*, GUS, Warsaw 2009, Developed by the author.

The similar shares of the working age group and the retirement age group in the analysed areas translate into almost identical potential support ratios for the country and the voivodeship and the ratios' future change trends. The ratios decline in each case. The intensity of the changes as analysed in the cross-section of towns and rural areas in the voivodeship confirms the earlier formulated conclusion that the urban population is likely to age faster than the rural population will (see table 4).

Tab. 4. Population structure in the Kujawsko-pomorskie voivodeship in the cross-section of towns and rural areas by economic-age group, years 2007–2035

Years	Shares of particular age groups (%)					Support ratios ^a
	Pre-working age	working age			retirement age	
		total	Incl.			
			18–44	45–59/64		
		urban				
2007	18.4	65.7	40.0	25.7	16.0	4.1
2010	17.5	65.0	39.8	25.2	17.5	3.7
2020	17.4	58.3	36.4	21.9	24.4	2.4
2030	16.2	56.3	30.7	25.6	27.5	2.0
2035	15.0	56.2	29.3	26.9	28.8	2.0
		Rural				
2007	23.6	62.8	40.3	22.5	13.5	4.7
2010	22.3	63.9	40.7	23.2	13.8	4.6
2020	21.0	61.0	38.3	22.8	18.0	3.4
2030	18.8	59.4	33.2	26.2	21.8	2.7
2035	17.1	59.3	31.7	27.6	23.6	2.5

^a The ratio between the working group and the retired group.

Source: *Prognoza ludności Polski na lata 2008–2035*, GUS, Warsaw 2009, Developed by the author.

Between 2010 and 2020, and especially after the year 2015, the phenomenon will be accompanied by the numbers of the working age population (i.e. the potential labour force) decreasing in both relative and nominal terms. According to the most recent GUS projection, in a space of 11 years the loss will exceed 2 million people countrywide (a fall from 24.6 million in 2009 to 22.5 million in 2020), i.e. 8.5%.

In the Kujawsko-pomorskie voivodeship, where the working age population reached its maximum numbers in this decade in the years 2008 and 2009 (two years running), amounting to 1,336,000, during the next 11 years its number will fall to 1,213,000, i.e. by 9.3%. These changes will be accompanied by variations in the sizes of the mobile and non-mobile groups – the first group's proportion in the potential labour force will decrease; this phenomenon (labour force aging) will become more noticeable between the years 2020 and 2030.

A more in-depth analysis of the rates illustrating the current state of population aging (as of 2007) in the powiats and subregions of the Kujawsko-pomorskie voivodeship and of their corresponding potential support ratios reveals that the values of the two measures are distinctly, strongly and negatively correlated (see table 5).

Tab. 5. The shares of persons aged 65 years and older (%) and the support ratios in the powiats of the Kujawsko-pomorskie voivodeship in 2007

Voivodeship, sub-region, powiat	Percentage of persons aged 65 years and older	Support ratios ^a
Voivodeship	12.5	4.3
Bydgoski subregion	12.5	4.3
Powiats: Bydgoski	9.9	5.4
Inowrocławski	12.2	4.4
Mogileński	11.6	4.5
Nakielski	10.6	5.1
Sempoleński	11.9	4.5
Świecki	11.2	4.9
Tucholski	11.4	4.7
Żniński	11.5	4.7
City of Bydgoszcz	14.8	3.7
Toruńsko-włocławski subregion	12.5	4.3
Powiats: Aleksandrowski	13.5	3.9
Brodnicki	11.8	4.4
Chełmiński	11.3	4.7
Golubsko-dobrzyński	12.2	4.3
Grudziądzki	10.6	5.0
Lipnowski	12.0	4.4
Radziejowski	14.0	3.8
Rypiński	12.9	4.0
Toruński	10.1	5.4
Wąbrzeski	12.4	4.3
Włocławski	13.5	4.0
Town of Grudziądz	13.7	4.0
City of Toruń	12.7	4.4
Town of Włocławek	12.6	4.3

^a The working group to the retired group ratio.

Source: www.stat.gov.pl/bydgoszcz. Developed by the author

Analysing how the presented values will change in the large towns of the voivodeship according to the projections to the year 2020 we can see that the correlation will maintain in the future too. Additionally (see table 6), the GUS population projection indicates that in 2030 the highest shares of older person (65+) will be noted in the urban powiats of Włocławek and Bydgoszcz (28.8% and 28%, respectively). At the same time, both towns will have the lowest support ratios.

The decline in mortality that has been recently observed in almost all age groups and the extending life expectancy are favourable and positive demographic phenomena in Poland. The already mentioned GUS Population Projection of 2008 assumes that the tendencies will continue in the next decades as well, extending the average life expectancy of a male baby born in an urban area of the country to 77.5 years in 2035, and to 82.8 years for a female newborn

(76.7 and 83 years, respectively, for the rural areas). Table 7 provides the most recent values of the parameters (as of 2008) for the country, the Kujawsko-pomorskie voivodeship and its subregions.

Tab. 6. The shares of persons aged 65 years and older (%) and the support ratios in the urban powiaty of the Kujawsko-pomorskie voivodeship, years 2010–2030

Years	Bydgoszcz		Grudziądz		Toruń		Włocławek	
	1	2	1	2	1	2	1	2
2010	15.2	3.4	13.9	3.7	13.2	3.9	13.2	3.7
2015	18.9	2.6	16.9	2.9	17.1	2.9	17.8	2.8
2020	22.9	2.2	20.9	2.3	21.3	2.3	22.4	2.2
2030	28.0	1.8	27.5	1.8	27.0	1.9	28.8	1.7

1 – the percentage of persons aged 65+;

2 – the support ratio.

Source: www.stat.gov.pl/bydgoszcz. Developed by the author.

Tab. 7. Average life expectancy in the Kujawsko-pomorskie voivodeship and its subregions in 2008 (years)

Country Voivodeship Subregion	Males			Females		
	Aged					
	0	30	60	0	30	60
Total						
Poland	71.26	42.63	17.89	79.96	50.78	23.09
Kujawsko-pomorskie	71.02	42.44	17.59	79.55	50.33	22.76
Subregions:						
Bydgosko-toruński	72.20	43.30	18.10	80.10	50.90	23.20
Grudziądzki	70.90	42.30	17.30	79.20	50.00	22.60
Włocławski	70.10	41.70	17.30	79.20	49.90	22.40

Source: *Trwanie życia w 2008 r.*, GUS, Warsaw 2009.

It is worth noting that the e_0 values are similar for Poland and the voivodeship, and that its values for the subregions show rather strong variations, suggesting that life expectancy was more favourable in the more urbanised parts of the voivodeship.

Population aging, where one of the factors is the value of e_x (average life expectancy) increasing in time, expands the number of the disabled persons and this consequence of the process needs consideration. That number will grow because disabilities are definitely more common in the older age groups, as proved by the National Population and Housing Census data of 2002 presented in table 8. Even a lower incidence of disabilities in the older age groups (60–74

years 75 years and older) resulting from improving health of the subpopulation is not likely to prevent the number of the disabled persons from growing, merely because of the scale of population aging, both countrywide and regionally.

Tab. 8. The incidence of disabilities (per 1,000 persons) by age group and place of residence in Poland and in the Kujawsko-pomorskie voivodeship in 2002

Country, voivodeship	Age groups						
	total	0–14	15–29	29–44	45–59	60–74	75 years and older
Poland							
total	143	27	33	68	238	371	484
towns	136	28	32	64	216	345	482
rural areas	153	25	34	74	284	415	486
Voivodeship. Kujawsko-pomorskie							
total	147	31	38	74	256	379	482
towns	143	32	37	70	237	354	488
rural areas	153	29	40	80	295	425	473

Source: NSPLiM 2002, *Osoby niepełnosprawne, ich gospodarstwa domowe oraz rodziny w latach 1988–2002*, GUS, Warsaw 2004.

The last issue to be discussed in the context of population aging is the expected changes (rather certain) in the household structure. As projected, the likely phenomena will be the growing numbers and shares of single-person (i.e. non-family) households (see table 9) and a growing percentage of households formed by single sixty-year-olds and older persons (see table 10).

Tab. 9. Household structures in Poland and the Kujawsko-pomorskie voivodeship in the years 2005–2020 by number of household members according to the 2003 projection

Years	No. of households (in thousands)	% of households with the indicated no. of members						Average no. of household members
		Total	1	2	3	4	5	
Poland								
2005	13 851.1	100.0	26.0	24.8	20.7	16.8	11.7	2.714
2010	14 600.5	100.0	27.7	27.0	21.3	15.0	9.0	2.559
2015	15 079.8	100.0	29.4	28.4	21.0	13.9	7.3	2.458
2020	15 260.0	100.0	30.5	29.1	20.3	13.5	6.5	2.400
Kujawsko-pomorskie voivodeship								
2005	736.4	100.0	23.6	24.8	21.9	17.7	11.9	2.772
2010	780.7	100.0	25.6	27.2	22.4	15.7	9.0	2.605
2015	811.8	100.0	27.5	28.8	21.9	14.5	7.3	2.491
2020	826.1	100.0	29.2	29.4	21.0	13.9	6.5	2.422

Source: *Prognoza demograficzna na lata 2003–2030*, GUS, Warsaw 2004. Developed by the author.

Tab. 10. Single-person households formed by persons aged 60 years and older in the years 2010 and 2020

Years	No. of households (in thousands)		% of older persons in single-person households
	total	formed by persons aged 60+	
Poland			
2010	4 056.4	1 920.2	47.3
2020	4 656.7	2 629.9	56.5
Kujawsko-pomorskie voivodeship			
2010	200.2	95.8	47.8
2020	241.6	137.1	56.7

Source: *Prognoza demograficzna na lata 2003–2030*, GUS, Warsaw 2004. Developed by the author.

In both the country and the voivodeship, most single-person households will be formed by persons younger than 60 years of age as far as the year 2010. After a decade, in 2020, most such households will be run by persons aged 60+, in both the country and the voivodeship. Especially the growing number of the single-person households run by the oldest old (aged 80+) will create new tasks for the social welfare system, such as the necessary support for the persons to function.

4. Comments

Instead of summing up our discussion of the possible future course of population aging in the country and the voivodeship, I shall present several comments concerning the economic, social and health impacts of the phenomenon that will define social policy goals at the national and regional levels.

The forthcoming decrease in the potential labour force that may appear around the middle of the next decade will make it necessary to counteract the declining economic activity of persons at the pre-retirement age and those in the younger retirement age groups, etc. The labour market balance, which has been upset by the „shrinking” of the working-age group, can be restored by boosting the economic activity of persons aged 50–59 (females) and 64 years (males). This proposal may seem paradoxical considering the maintaining level of unemployment, which affects also persons aged 50+. A prerequisite for making the group more active in the labour market is increasing employment flexibility in both the country and regionally.

The expected rise in the numbers of single-person and two-person households formed by older and the oldest old persons and the likely growth in the number of older disabled persons will extend the range of responsibilities of the

institutional care system, as well as necessitating the customization and introduction of new relevant services to meet the expectations and needs of the beneficiaries.

Population aging considered in the cross section of towns and rural areas makes it evident that the process consequences, including those outlined in this article, will affect the urban population more strongly than the rural population, because of their concentration.

Bibliography

- Cieślak M., 2004, *Pomiar procesu starzenia się*, „Studia Demograficzne”, no. 2/146.
GUS, 2008, *Prognoza ludności Polski na lata 2008–2030*, GUS, Warsaw.
Klonowicz S., 1973, *Zdolność do pracy a wiek człowieka*, Książka i Wiedza, Warsaw.
Kowaleski J., Rossa A. /ed./, 2009, *Przyszłość demograficzna Polski*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź.
Lange M., 2008, *Rynek pracy w obliczu starzenia się ludności Polski*, [in:] Kowaleski J.T., Szukalski P., /ed./, *Starzenie się ludności Polski. Między demografią a gerontologią społeczną*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź.
Rosset E., 1959, *Proces starzenia się ludności*, PWG, Warsaw.