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Determinants Of Healthy Ageing For Older People In European Countries – A Spatio-Temporal Approach

Abstract

The European Commission (EC) has identified active and healthy ageing (AHA) as a major societal challenge mutual to European countries. This issue has increased in importance due to the progressive ageing observed in European societies, that force authorities to take initiatives for support the activity of the elderly. One of the initiatives, widely recognised is The European Innovation Partnership on Active and Healthy Ageing, which strive to enabling EU citizens to lead healthy, active and independent lives while ageing.

The positive effect of actions for the AHA will be extension of the life in good health duration of EU citizens by two years by 2020. This is an important issue, as in 2013, women who have reached the age of 65 years in UE28 were facing on average 21.3 years of further life years and only 8.6 years (on average this amounted for 40.4 % of life expectancy) accounted for living in health, whereas for males, this ratio was estimated on 8.5 years in health of the anticipated further 17.9 years (47.5% of further life duration).

Life expectancy in good health in older age is influenced by many different factors, i.e. cultural, social, economic and accessibility to health services and the quality of provided treatment. The last aspect is related to both the economic development of the country and the health care system management. The significant factor that has been increasingly emphasised in documentation of

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World Health Organisation or European Commission, concerns the investment in public and individual health.

Taking into account the multivariate impact of objective and subjective factors on life expectancy in good health of elderly, the Authors decided to conduct the multidimensional comparative analysis for EU countries, including Norway, Switzerland and Iceland as well. Among the objective factors Authors distinguished: proportion of population (men and women) aged 65 years and more, economic development of the countries measured by GDP per capita, healthy life years expectancy in absolute values for males and females at 65 years, health care expenditures in PPS per inhabitant aged 65+, whereas the group of subjective characteristics consisted of: self-perceived health for people aged 65+ and self-reported unmet needs for medical services.

The article aims to investigate the relationship between the length of the further life in healthy for men and women aged 65 years and selected factors in European countries in the period 2005–2012. For this purpose, following methods were used: 1/ spatial distribution of characteristics – rates of change in selected periods: 2005 and 2012, 2/ tests for dependencies using correlograms and Spearman's rank correlation coefficients, 3/ cluster analysis: on the basis of Ward's methods spatial similarities (among countries) were indicated. As the source of data the Eurostat database were used.

Keywords*: active aging, aging in good health, health care*

1. Introduction

Active and healthy ageing (AHA) is one of the main social challenges that current economies are facing nowadays. It is not surprising that as a result of changes on the labour market, technological progress, innovation (also and especially in field of medicine) people live longer. Late entering the labour market, the decline in fertility, changes in priorities of households, or inadequate family and social policy result in low replacement rate of generational causes the progressive ageing of the societies. This problem becomes more significant, while directives and agreements (i.e.: The European Innovation Partnership on Active and Healthy Ageing) enables citizens of European Union to lead a healthy, active and independent life while ageing (Moulaert, Biggs 2013).

The length of human life is undoubtedly associated with the health state and this correlation is indisputable (Eurostat, 2015). Therefore nowadays often life expectancy is identified with living (and ageing as well) in good health.

Taking about life expectancy one should perceive it as a multifactorial category. It is influenced by many characteristics: subjective and objective, cultural, social, economic, etc. Not without significance here is the impact of accessibility to health services and their quality, the organisational system of NHS or the investments in public and individual health (emphasised in many documents).

Article aims to investigate the relationship between the length of the further life in healthy of population aged 65+ and selected factors in European countries in the period 2005–2012. For this purpose statistics, spatial statistics and econometrics and multivariate statistics analysis methods were adopted. Using the Ward's clustering method and Moran's *I* statistics for global and local autocorrelation it was possible to indicate groups of countries that were in similar situation as far as the quality of elderly is concerned.

2. Diversification of ageing process of European societies

Population ageing is a global phenomenon that can be expressed by the significant demographic changes currently observed around the world indicating a sharp increase in the number of elderly people aged 60 and up. According to the United Nations (UN) (United Nations, 2015, p. 2), the number of older people will increase from 901 million in 2015 to a predicted 2.1 billion in 2050. The global population is about to increase 3.7 times within a hundred years (1950–2050), but the population of people aged 60 and more is likely to increase tenfold. Extending life expectancies may increase the share of people aged 80+ significantly. According to the forecasts, this growth in the last periods of 2050 can be twenty-six-fold. This process is called *double ageing* – its measure is not only the growing numbers of older people, but also a high increase in the rate and participation of the group aged 80 years and more (United Nations, 2015, p. 2).

In developed European countries, an intensified ageing process has been observed for a long period of time. Currently, there is no country in Europe that is not experiencing a growing number and proportion of elderly among its residents. The data officially published by various agencies shows that by 2030, one-quarter of Europe's population will be over 60 years of age. The impact of these processes, in principle, can be already observed in all areas of socio-economic development, from individuals and households to the broader social perspective as well. Countries' economic development, public finances, labour, markets for goods and services are and shall remain under this influence. The main reason for this phenomenon is believed to lie not only in increased longevity, but also in decreasing fertility rates and external migration (*Healthy*

Ageing for all in the 21st Century – Discussion Paper. Government of Newfoundland and Labrador, 2006, p. 1).

Longer life expectancy, which has been observed since the beginning of the twenty-first century, is a great achievement of civilisation, but also implies questions about the quality of extended life. Gerontology research shows that involution processes intensify over the years of human life. For this reason, all the activities of individuals and various institutions responsible for public health should aim to create conditions to maintain proper health:[1] the later years of life should be lived out healthily, and older people should receive support to enable them to live actively and with dignity. The importance of this issue has been already highlighted in the document *The 2002 Madrid International Plan of Action on Ageing* (*MIPA*) adopted during the Second World Assembly on Ageing, which indicated the need to ensure that the ageing generations would benefit from countries' socio-economic developments in order to gain equal access to health care and welfare.

The key issue thus becomes the quality of life in old age, and is interpreted quite broadly. There are many factors determining older persons' welfare. It was pointed out that in countries where the share of consumption financed by public transfers is relatively high (at least to the level of 30% of the total consumption expanses of the elderly), older people tend to be in a better position than adults in the younger age groups (United Nations, 2015, p. 6). The World Health Organisation (WHO) emphasises the need to adapt National Health Systems to the challenges of the deepening processes of ageing. The special attention is paid to the fact that it is not the lengthening of human life that causes excessive growth of expenditures on health, but the costs associated with the technical advances in health care, increase of the income of older people and expenses caused by cultural norms. The literature indicates that the rising costs associated with a prolonged life of humans are conditioned, above all, by the scale and severity of disability occurring among the elderly, and the severe disability usually leads to their long-term care dependency on others. In addition, disability shortens the duration of healthy life-years by period of disability itself (World Health Organisation, 2015, p.14–34).

Worldwide research shows that the time of disability, shortened life span in health in 2013, on average by 9 years. This means that in Europe, for average of 76 years of life expectancy this period decreased by about 12%. In general, lost in healthy life years due to disability is higher in countries with a higher life expectancy at birth than for instance in Africa (here, life expectancy at birth is

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[1] Health status can be assessed by both objective and subjective measures (indirectly illustrating the health needs of the elderly).

shorter and reaches approximately 58 years; the number of years lost due to disability amounts to 8 years, which states for 14% of the average life expectancy) (United Nations, 2015, p. 8).

3. The idea of active ageing

Ageing consists of both individual and social dimensions. It is essential to keep the management of this stage of the life cycle in the hands of the elderly and enable them to actively participate in socio-economic life. To make the efforts successful, there must be an adequate support policy in place that covers the performance of many public and private subjects at both the national and local level (i.e.Courtin, Jemiai, Mossialos 2014). This idea requires accurate areas of activity, measuring their effects, implementing innovative solutions, as well as exchanging knowledge and experience.

The concept of *active ageing* came about in the twentieth century. Its origins can be traced to 1982, when the UN General Assembly convened the first global congress dedicated to ageing. During the meeting, the document called "Vienna International Plan of Action on Ageing" was formulated and adopted (for more on the development of the concept see Urbaniak 2014, pp. 54–56). From 2012,[2] the issue of active ageing was the subject of many studies and initiatives.[3] Because successful ageing requires good health, more and more discussions centre on active ageing in health, as clearly emphasised by the WHO definition published in *Active Ageing. A Policy Framework of 2002*. This publication stated that the action framework for active ageing policies and programmes promoting mental health and social relationships are as important as those relating to improving physical health (WHO, 2002, p. 11).

The intensive ageing of the population of the European Union raises new development challenges due advancements in technique and technology in various fields, including but not limited to healthcare. For example, these include social innovations relating to social services for the ageing population. Their aim is to improve the social aspects of active and healthy ageing. The European Commission (EC) has identified active healthy ageing as a key challenge for every country in the EU, whilst giving Europe the chance to become the leading innovative force in the search for answers to the challenges resulting from ageing populations. The search for solutions (from formulating a concept to implementation) supports the idea of

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[2] 2012 (European Year 2012) was declared as the international year of the elderly.

[3] There are many definitions of active ageing, see e.g.: http://50plus.gov.pl/-/starzec-sie-aktywnie-czyli-jak-ksztaltowac-wlasny-rozwoj-w-starszym-wieku-59811, [accessed: 06.07.2016].

active, healthy ageing as established by the *European Innovation Partnership on Active and Healthy Ageing*, an initiative announced as part of the Innovation Union (2010), one of the seven flagship initiatives of the Europe 2020 strategy. This strategy is designed to enhance the dissemination of the three dimensions of the concept of active ageing:

- promoting the idea among the inhabitants of the EU,
- improving the sustainability and efficiency of social and healthcare systems,
- promoting and developing the business aspects of the concept to support the silver economy.

The primary objective and measurable results of the activities being undertaken is to increase the average healthy lifespan by two years by 2020. The achievements of countries seeking to improve the welfare of ageing residents, as broadly interpreted, are evaluated using the Active Ageing Index (AAI) developed by a research team directed by A. Zaidi from the European Centre for Social Welfare Policy and Research in Vienna (UNECE/ European Commission 2015). The performance of each country is assessed on the basis of the computed values from index for every two years since 2012 for data from two preceding years. There are three essential areas of active ageing: professional activity, social activity, and independent and secure living. It should be emphasised that health aspects are not examined in the area of professional and social activities. The indicators assessed in the area of independent and secure living include measures which are associated with the health status and the healthcare, such as:

- percentage of people aged 55 years and older undertaking physical exercise or sport almost every day,
- percentage of people aged 55 years and older who report no unmet needs for medical and dental care during the 12 months preceding the survey.

Among the factors determining the environmental opportunities and conditions for implementing the above-mentioned three areas of active ageing were indicators relating to the health of ageing people:

- expected years of life expectancy for persons aged 55 or over; the remaining life expectancy (RLE) achievement of 50 years at age 55 – the goal is to capture the life expectancy aspect in determining the capacity for active ageing,
- share of healthy life years (HLY) in the remaining life expectancy at age 55 – the goal is to capture the proportion of years spent in good health in the remaining life expectancy at 55 as an indicator of the capacity for active ageing,
- mental well-being – the goal is to capture the mental well-being of older population aged 55+, so as to complement the measure of physical health captured via the healthy life expectancy measure, with the help of an index that measures self-reported feelings of positive, happy moods and spirits.

The results of the AAI for the years 2010–2014 indicated the undivided primacy of the two Scandinavian countries, Sweden and Denmark, among the 28 EU Member States. In this ranking Poland took the penultimate place, ranking only ahead of Greece. In some countries, improvements were visible in the field of active and healthy ageing; the greatest progress was observed in Italy, Luxembourg, as well as in Croatia and Malta.

There are many measures that can be used in evaluations of social health in EU countries (reports prepared under the auspices of the EC list as many as 29 indicators useful in evaluating the level of health protection, thus allowing for the progress of the ageing population in the area of health to be assessed (European Commission, 2015, p. 28–29). It should be stressed here that this is not a full list of factors used to capture the multidimensional processes of ageing in good health. The measurement tool for active ageing in the EU mentioned above only takes into account some determinants to health.

Life expectancy in the health of the elderly is affected by many different characteristics. In addition to basic biological ones, cultural, social and economic factors should also be considered (including the financing and organisation of healthcare as well as the quality of and access to health services). An individual's age is influenced by amount of exposure to external risk factors, the effects of which accumulate over time, such as an unhealthy diet. At least twelve interrelated factors determining the health of the population can be identified, and those features concern the elderly as well. Among these determinants, it is possible to distinguish: resourcefulness, individuals' economic status and social support received as well as factors having relatively little influence on health, such as gender, biological and genetic factors, and the national environment (Government of Newfoundland and Labrador, 2006, p. 5).

The research results confirmed that the course of the ageing process is affected by personality and cognitive ability, while individual differences are not only connected to health-related behaviours, but also reflect techniques for coping with stress, for example, which impacts age-related health problems (Contrada, Cather & O'Leary 1999; Hampson & Friedman 2008). In a study by a group of Danish researchers, it was suggested that there is a clear differentiation in personality when evaluated by a five-factorial personality model (Big Five) in the 49-63 age group in terms of gender, years of education, belonging to a professional group and cognitive abilities, which should be taken into account in analyses of the state of health and the course of ageing. The biggest differences relate to extraversion and openness to experiences (Mortensen et.al, 2014, pp. 22, 34).

4. Impact of the financial crisis on changes in the financing of healthcare

The global phenomenon of the growing share of older people reaching late life years in the world's population has resulted in actions taken to make these "extra" years pass in good health, if possible.[4] The increase of disability due to advanced age results in higher costs for health systems and social security, forcing those responsible for the public budgets to face difficult existential issues.

It is not without significance that a feature increasingly emphasised in various documents from the WHO and EC, for example, concerns investment in public and individual health throughout a person's life. Expenditures on health care are parabolic in shape, meaning that the levels are high in the early and later years of life. The limitations brought about by the last financial crisis may have a negative impact on the successful ageing of current and future generations. Austerity measures aimed at health systems in many countries affected the most vulnerable patients, including older people. There were only two countries in the European Region (Ireland and Greece), where changes in public spending on health *per capita* (NCUs) were greater than historical rates in 2009–2012. Clearly, the share of public expenditure on health in 2011, compared to 2007, dropped down. Importantly, these decreases were not always commensurate with the severity of the crisis that the country experienced. In contrast, the scale of privately-funded health care has increased in some countries and decreased in others. It was noted that the biggest declines in spending came from individuals (out-of-pocket payments) and occurred in countries that were most affected by the crisis, such as Ireland (Thomson et.al., 2014, pp. 9–22).

At least three strategies for reducing health expenditures can be observed. Countries such as Great Britain and Sweden concluded that the financial crisis provided a good opportunity for structural reforms. However, in Greece and Ireland, these changes were short-term in character and were caused by the necessity to save. In other countries, the reforms were a combination of systemic and current changes. The financial crisis also radically changed the EU's commitment to carrying out domestic reforms of health systems in the Member States. Instead of enhancing the incentives of free co-operation and sharing best practises, the changes focused mainly on saving money. This resulted in cutting funding for countries receiving financial assistance from the EU and the International Monetary Fund (IMF). Greece, Ireland, Cyprus, Portugal, as well as

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[4] By 2030, Europe will be home to 15.5% of the world's population aged 60 or older, while in Asia this rate is predicted to reach 60.2%; in the 80+ group, more than every fifth citizen will live in Europe and every second in Asia. This implies that the issue of having a healthy life in older age will be faced mainly by less developed regions [United Nations, 2015 World Population Prospects: The 2015 Revision, http://esa.un.org/unpd/wpp/], accessed: 07.07.2016.

Latvia, Hungary and Romania received financial assistance conditionally, when complying with the terms contained in the Memorandum of Understanding. The Memorandum also included specific recommendations such as the introduction of a programme to reduce spending on pharmaceuticals by extensively using generic medicines or reducing price discounts. Greece, Ireland, Portugal and Romania were obligated to reduce the number of hospitals, hospital beds and specialists financed by their public health systems (Stamati, Baeten 2015, pp. 183–214). As previously mentioned, the saving activities were an opportunity for some countries to implement systemic changes such as extending health coverage to groups without the right to healthcare, which mainly concerned the poor and children. In Estonia, for instance, long-term unemployed was supported by primary care services (Thomson et.al., 2014, p. 19).

5. Research methods, methodology, data bank and results

The analyses concerned selected indicators assumed to be making an impact on healthy ageing in European countries. Statistical data was collected from the Eurostat database for the years 2005–2012.

Our study aims to investigate the relationship between the length of further life in health for men and women aged 65+ and selected factors, with the main assumption that there are similarities between the analysed countries. This led to conclusions that healthy ageing was influenced by similar factors in the selected areas, which could further indicate clusters of similar values. The healthy life years variable (in absolute values for males and females at 65 years) was selected as a dependent variable in the research. The data set consisted of the following variables definitions and abbreviations:

- healthy life years in absolute values for males and females at 65 years (**HL(F or M)_65**),
- proportion of the population (men and women) aged 65 years and more (**PROP_POP**),
- healthcare expenditures per inhabitant aged 65+ in PPS USD (**EX_65_PPS**),
- subjective self-perceived health for men and women aged 65+: assessment – "bad or very bad" (**HE_B**; **HE_BM**; **HE_BF**),
- self-reported unmet needs for medical services (**UN**).

For the purpose of the analysis, we used the following methods:

- spatial distribution of determinants: rates of change in selected period of 2005 and 2012,

- tests for dependencies: Spearman's rank correlation coefficients and correlograms (Spearman's rank correlation coefficient assessed the relationship between two variables, which can be described using a monotonic function; the sign of Spearman's coefficient indicated the direction of association between a pair of variables),

- spatial dependency diagnosis: based on the scheme of adjacency, the analyses indicated spatial clusters on the basis of Ward's methods and Moran's *I* statistics for global and local spatial autocorrelations (univariate approach; to determine the degree of spatial association row-standardised spatial weight matrix **W** of first order and queen contiguity was used).

5.1. Basic data summary

It was observed that there is a great differentiation in geographical distribution by sex for the number of years that a person at age 65 is still expected to live in healthy conditions (Fig. 1 for 2012).

Figure 1. Healthy life years expectancy at age of 65 (number of years that a person is still expected to live in a healthy condition) by sex in 2012
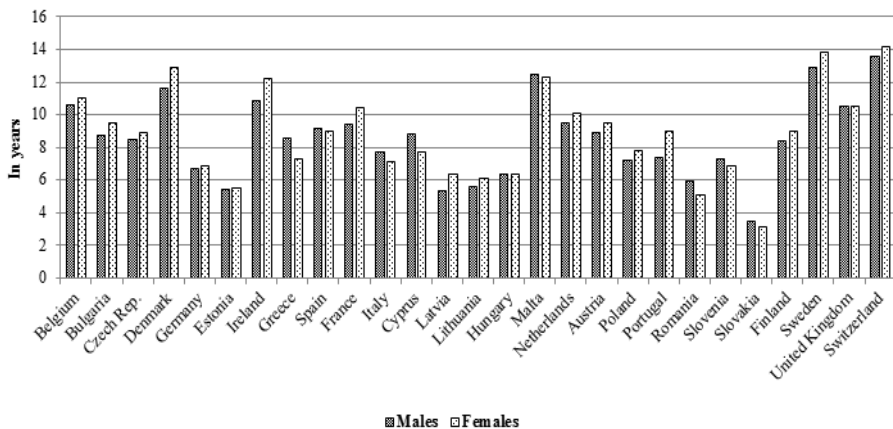
Source: developed by Authors on the basis of Eurostat data.

On the basis of Eurostat data it was possible to distinguish countries characterised by the relatively short and long life expectancies for males and females at age 65 (Table 1).

Table 1. Healthy life expectancy at age 65 for males and females

less than 10 years		more than 10 years	
Males	Females	Males	Females
Bulgaria, Czech Rep., Germany, Estonia, Greece, Spain, France, Italy, Cyprus, Lithuania, Latvia, Hungary, Austria, Poland, Portugal, Romania, Romania, Slovenia, Slovakia, Finland	Bulgaria, Czech Rep., Germany, Estonia, Greece, Spain, Italy, Cyprus, Lithuania, Latvia, Hungary, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland	Belgium, Denmark, Ireland, France, Malta, Netherlands, United Kingdom, Iceland, Luxembourg	Belgium, Denmark, Ireland, France, Malta, Netherlands, United Kingdom, Iceland, Luxembourg

Source: developed by Authors, on the basis of Eurostat data.

The EU's current population structure is characterised by a high proportion of people aged 65+ (Fig. 2). The process of demographic ageing in European countries is deepening, indicating the increasing population share of people aged 65+. The highest rates in 2005 were between 18.3–18.6% (Germany and Greece), and rose to 19.7–20.6% in 2012.
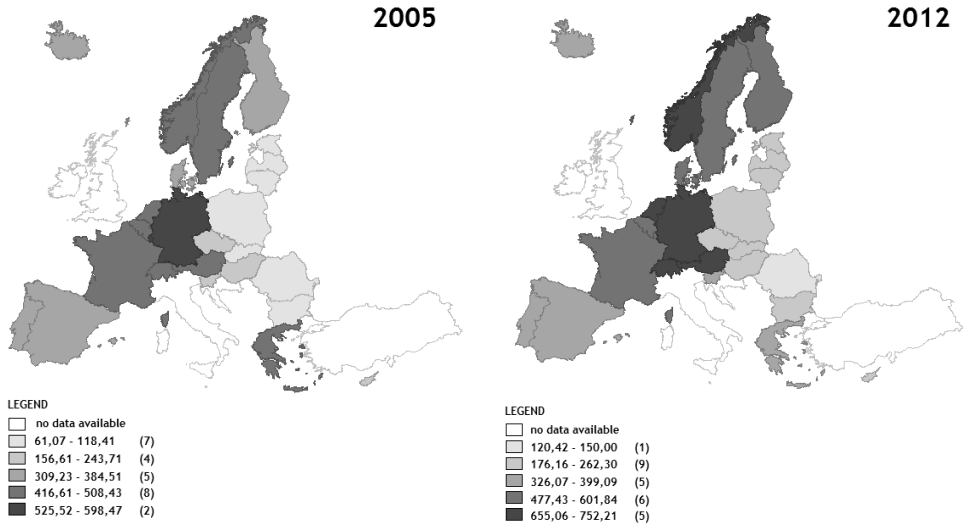
Figure 2. Share of population aged 65+ in selected countries (in %)
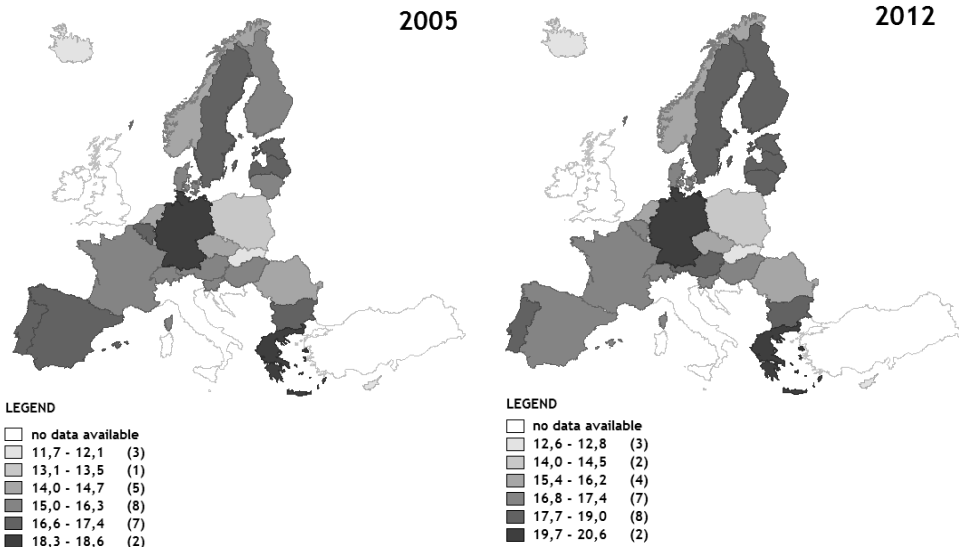
Source: developed by the authors on the basis of Eurostat data.

Expenditures on health care in PPS USD per inhabitant aged 65+ significantly increased in many European countries between 2005–2012. The highest score of 526–599 USD was observed in two countries in 2005, with 655–752 USD noted in five places in 2012.

Figure 3. Expenditures on health care in PPS USD for per inhabitant 65+

Source: developed by the authors on the basis of Eurostat data.

Expenditures soared in six countries (Fig. 4): Romania and Slovakia (+49%), Lithuania (+48%), Poland (+46%), Bulgaria (+44%) and Estonia (+40%).

Figure 4. Expenditures on health in PPS USD for people aged 65+ and population proportion aged 65+ – rates of change between 2005–2012
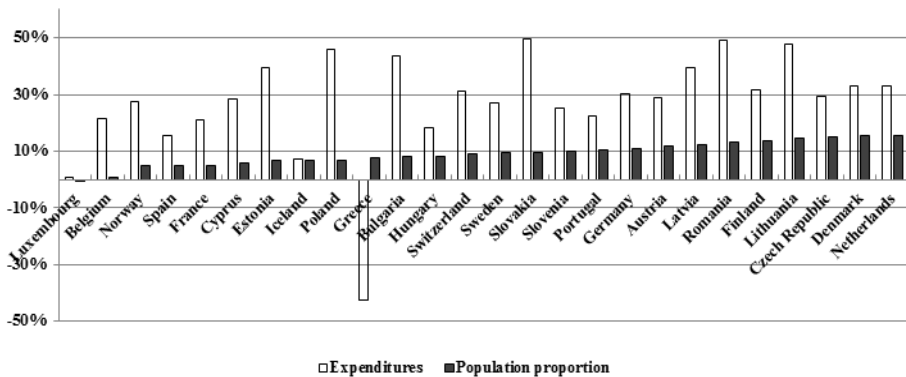
Note: Order of alignment: increasing rates of population proportion aged 65+.

Source: developed by the authors,on the basis of Eurostat data.

These increases were the consequence of the observed intensive ageing processes, although Poland should be treated as an exception here. Countries with the highest rates of change in population proportion aged 65+ between 2005–2012 (i.e. the Netherlands, Denmark, Czech Republic and Lithuania) were not the only ones to experience relatively high growth in expenditures on health for the 65+ population. Countries such as Slovakia, Bulgaria and Poland experienced relative growth in expenditures on health for the 65+ poplulation, despite the insignificant changes in the rates of population aged 65+. What is worth mentioning is that according to the data, Poland and Estonia were at this time (2005–2012) countries with the most rapid increases of self-reported unmet medical needs for those aged 65+.

5.2. Searching for dependency

Based on the obtained results (Tab. 2), it can be concluded that there was a positive relation between the number of years that men (in 2005: r_{xy}=0.412 and 2012: r_{xy}=0.661) and women (in 2012: r_{xy}=0.657) could expect to live in healthy conditions at age 65 and healthcare expenditures per inhabitant aged 65+ in PPS USD – this indicates that if the healthcare expenditures per inhabitant aged 65+ in PPS USD would increase, healthy life expectancy for men and women should increase as well.

Table 2. Dependencies for 2005 and 2012 – Spearman's coefficients matrices

YEAR 2005						
	EX_65_PPS	PROP_POP	UN	HE_B	HLF_65	HLM_65
EX_65_PPS	1.000	0.248	**-0.578**	**-0.720**	0.325	**0.412**
PROP_POP	0.248	1.000	0.251	-0.008	-0.059	-0.053
UN	**-0.578**	0.251	1.000	**0.669**	-0.329	**-0.435**
HE_B	**-0.720**	-0.008	**0.669**	1.000	**-0.648**	**-0.699**
HLF_65	0.325	-0.059	-0.329	**-0.648**	1.000	**0.931**
HLM_65	**0.412**	-0.053	**-0.435**	**-0.699**	**0.931**	1.000
YEAR 2012						
	EX_65_PPS	PROP_POP	UN	HE_B	HLF_65	HLM_65
EX_65_PPS	1.000	0.159	**-0.789**	**-0.764**	**0.657**	**0.661**
PROP_POP	0.159	1.000	0.160	0.087	-0.081	-0.142
UN	**-0.789**	0.160	1.000	**0.640**	**-0.618**	**-0.640**
HE_B	**-0.764**	0.087	**0.640**	1.000	**-0.780**	**-0.763**
HLF_65	**0.657**	-0.081	**-0.618**	**-0.780**	1.000	**0.961**
HLM_65	**0.661**	-0.142	**-0.640**	**-0.763**	**0.961**	1.000

Note: Coefficients statistically significant at α=0.05 level are indicated in bold. For histograms and correlograms, see Appendix 1.

Source: developed by the authors on the basis of Eurostat data.

In both analysed periods, a negative relation between the number of years that men or women at age 65 still expect to live in healthy conditions and self-assessment of their health as "bad or very bad" was identified. This indicates that if the number of years that men or women at age 65 still expect to live in healthy conditions were to increase, self-reported states of health by men and women aged 65+ as "bad or very bad" should be declining to the level of $r_{xy}= -0.648$ and $r_{xy}= -0.780$ for men and the level of $r_{xy}= -0.699$ and $r_{xy}= -0.763$ for women.

Correlations between self-perceived health statuses described as "bad or very bad" for men and women aged 65+ and self-reported unmet needs for medical services were positive in both 2005 and 2012. This could indicate that when men or women aged 65+ assess their health as "bad or very bad" (i.e. worsening, as more men and women are afflicted by "bad or very bad" states of health), the level of self-reported unmet needs for medical services for people aged 65+ are worsening as well.

There were no significant dependencies between the proportions of people aged 65+ and other investigated characteristics such as the number of years of life in health or expenditures on health for 65+ in PPS USD.

The overall changes in tendencies between 2005 and 2012 were investigated taking the main categories into account. For this purpose, correlograms were constructed and summarised with the appropriate estimates (Tab. 3). The results presented above indicate that tendencies did not change for some categories between 2005 and 2012 – the high values of Spearman's coeff. indicate the distribution convergences of the selected factors. However, it should be highlighted that the distributions changed for healthy life years in absolute values for both men and women, which could be in favour of assumptions resulting from the adoption of EU policies for healthy ageing (the extension of life expectancy) that are assumed to increase further in future – this change should be perceived as of a good direction.

Table 3. Dependencies for 2005 and 2012 – Spearman's coefficients

Variable	Spearman's coeff.
Health care expenditures in PPS in USD per inhabitant aged 65+	0.923
Proportion of population aged 65 years and more	0.924
Self-reported unmet needs for medical services	0.879
Self-perceived health: bad or very bad for aged 65+	0.951
Healthy life years in absolute values for females at 65 years	0.689
Healthy life years in absolute values for males at 65 years	0.797

Note: all coefficients values were significant at α=0.05. For histograms and correlograms, see Appendix 2.

Source: developed by the authors on the basis of Eurostat data.

## 5.3. Searching for spatial similarities

Selected variables were investigated for global and local spatial associations. Testing for spatial autocorrelation allowed for spatial clustering of similar or opposite values within the adjacency scheme defined by the spatial weight matrix **W** to be identified. For some variables the results were significant and indicated positive spatial autocorrelations – the clustering of similar values in geographical space. The results are summarised on maps below and spatial associations were identified for:

- **healthcare expenditures** and **subjective self-perceived health for aged 65+** – the spatial clusters were almost identical, but the degree of association increased between 2005 and 2012 (higher positive Moran's *I* value),
- **self-reported unmet needs for medical services** – the spatial clusters' distribution between 2005 and 2012 changed and the degree of association decreased (lower positive Moran's *I* value).

Figure 5. Moran's *I* and LISA cluster maps

2005   2012

Subjective self-perceived health for people aged 65+: assessment of "bad or very bad"

Self-reported unmet needs for medical services
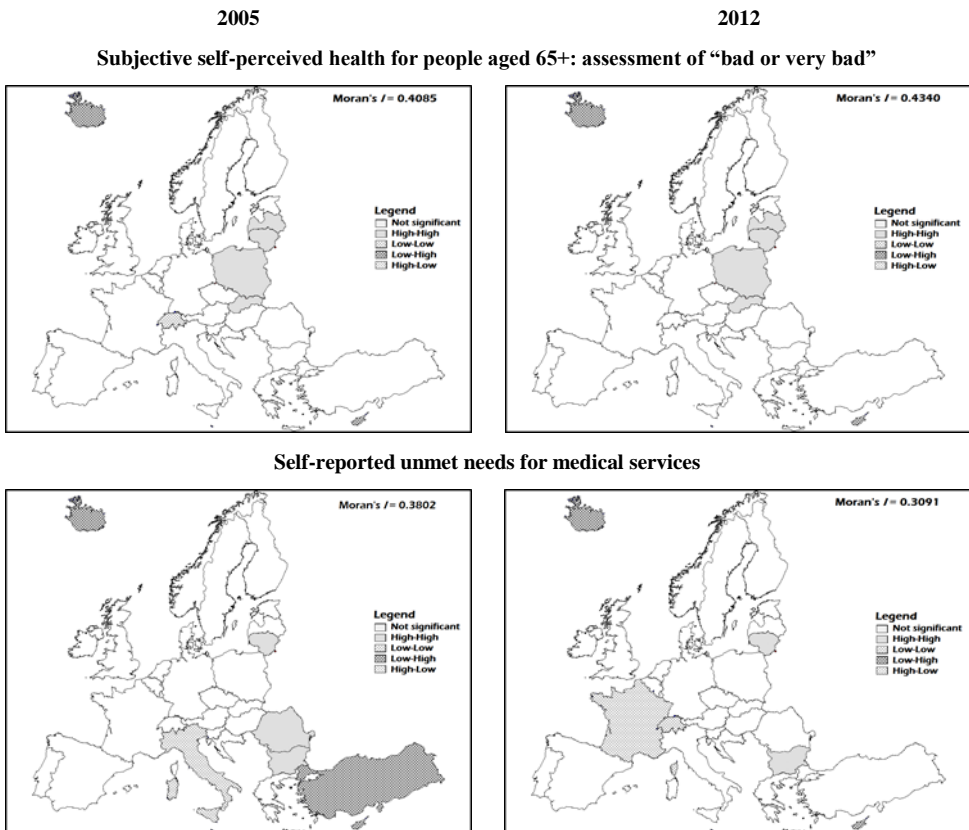
Health care expenditures per inhabitant aged 65+ in PPS USD
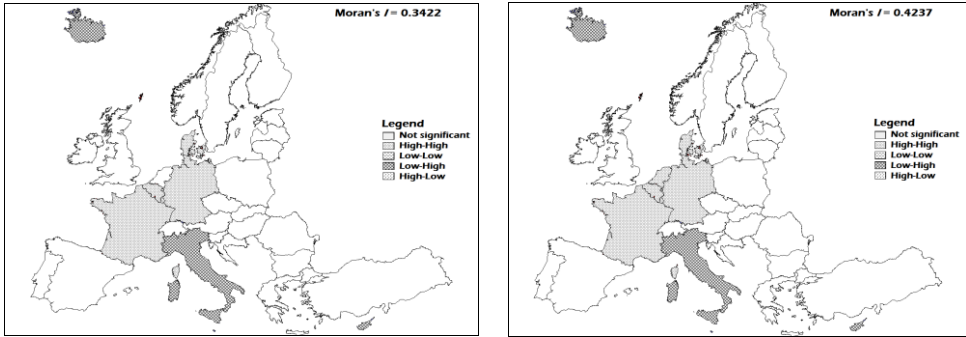
Note: Moran's I values significant for the pseudo p-value < 0.05.

Source: developed by the authors on the basis of Eurostat data in GeoDa.

As shown in the correlograms for 2005 and 2012 (appendices 1 and 2), it can be assumed that countries were more differentiated in 2012, resulting in a higher number of similarity clusters for that year.

Figure 6. Agglomeration analysis, cluster maps using Ward's method

2005   2012

Source: developed by the authors on the basis of Eurostat data in SPSS and GeoDa.

The cluster analysis highlighted nearly the same groups of similar countries. Here, some characteristics can be identified: the clusters consisted of richer or poorer countries; were similar for economies that entered the EU structures relatively late and; countries facing transformations in their health systems.

The results of the spatial autocorrelation and agglomeration methods indicated this diversity and a lack of significant changes for healthy ageing of elderly over time, which should be negatively rated.

5.4. Conclusions

Healthy ageing is perceived differently in different European countries. Accomplishing this process may vary, and the results for 2005 and 2015 conform the fact that differentiations between European countries are growing. The experience of various countries indicates that EU policy postulates for healthy ageing have been fulfilled by the local authorities in different ways and on different scales. Some countries faced an increase in their elderly population and simultaneously hate to lower healthcare expenditures.

The results of this analysis indicate that it is possible to divide European countries on the basis of similarities of the status people aged 65+. Agglomeration methods gave the opportunity to reflect on common policies that could be adopted by governments. For instance, Poland and Slovakia formed a cluster in 2005 and 2012; Latvia, Estonia, Bulgaria and Greece made up another cluster; Switzerland, Sweden and Norway formed a new cluster in 2012, Sweden was more similar to France and Spain in 2005. Identifying patterns of spatial similarities and dependencies between determinants could enhance the creation of accurate policies directed towards certain parts of Europe (places that are very similar due to the demographic, economic or social situation, for example).

Healthy active ageing is a noble goal, but encounters difficulties of an economic nature caused by the recent financial crisis. Because of the complex characteristics of the healthy ageing processes, the effects of changes shall be visible in a few years and it is not possible to fully identify them due to these multidimensional relationships.

Appendix 1. Spearman's correlograms for 2005 and 2012
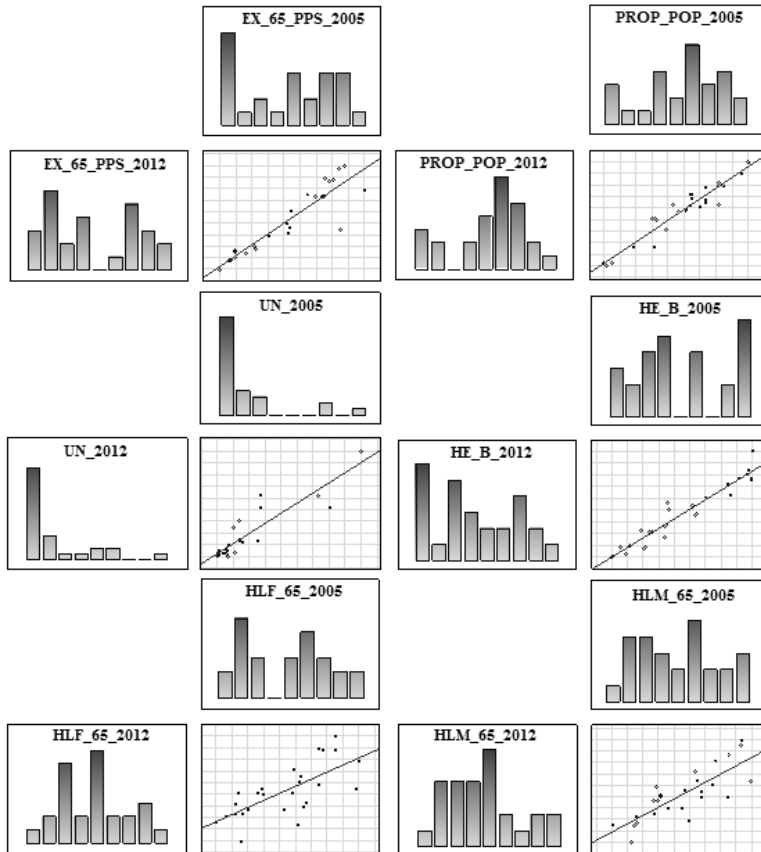
Correlogram for 2005
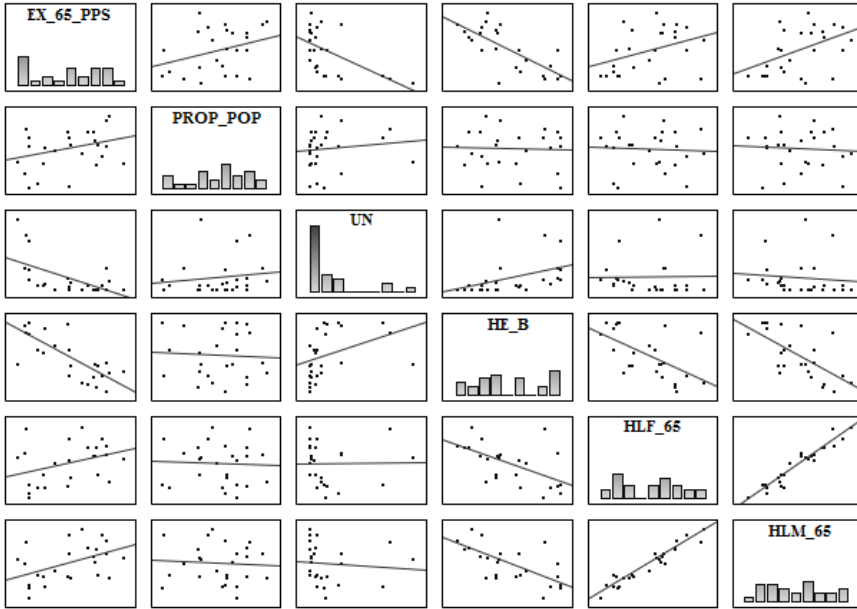
Correlogram for 2012
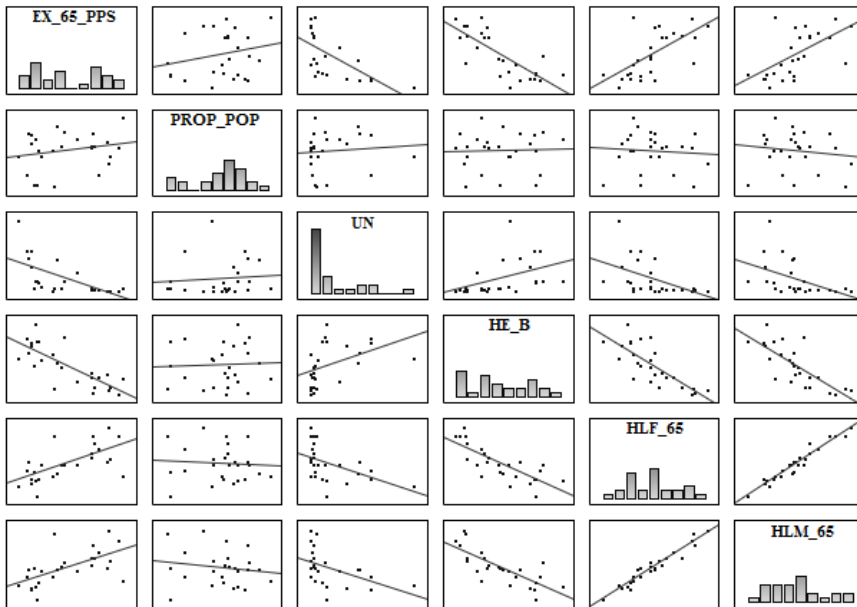
Source: developed by the authors on the basis of Eurostat data.

Appendix 2. Spearman's correlograms for 2005 and 2012

Source: developed by the authors on the basis of Eurostat data.

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Streszczenie

**DETERMINANTY ZDROWEGO STARZENIA SIĘ OSÓB STARSZYCH
W KRAJACH EUROPEJSKICH
– PODEJŚCIE PRZESTRZENNO-CZASOWEGO**

Komisja Europejska (EC) dokonała identyfikacji aktywnego i zdrowego starzenia się (AHA) jako jednego z głównych społecznych wyzwań charakterystycznych dla krajów europejskich. Problem ten nabiera na znaczeniu w sytuacji obserwowanego już od dłuższego czasu postępującego starzenia się społeczeństw europejskich, co zmusza władze do podjęcia inicjatyw na rzecz aktywnego i zdrowego starzenia się. Jedną z nich jest Europejskie Innowacyjne Partnerstwo na rzecz Aktywnego i Zdrowego Starzenia się (The European Innovation Partnership on Active and Healthy Ageing), które m.in. umożliwia obywatelom Unii Europejskiej prowadzenie zdrowego, aktywnego i niezależnego życia, w trakcie starzenia się.

Wiadomym, pozytywnym efektem działań na rzecz AHA będzie wydłużenie życia obywateli UE o dwa lata w dobrym zdrowiu do 2020 r. Jest to ważna kwestia, gdyż w 2013 r. kobiety, które osiągnęły średnio w UE28 65 lat miały przed sobą 21.3 lat dalszych lat życia, z czego tylko 8.6 lat tj. 40.4% przypadało na życie w zdrowiu, w przypadku mężczyzn relacja ta wynosiła 8.5 lat w zdrowiu do przewidywanych 17.9 lat dalszego życia (47.5%).

Na długość życia w zdrowiu osób w starszym wieku ma wpływ wiele różnych czynników, kulturowych, społecznych, ekonomicznych oraz dostępność do usług zdrowotnych i ich jakość. Ten ostatni aspekt jest związany zarówno z rozwojem gospodarczym danego kraju, ale także systemem organizacyjnym ochrony zdrowia. Nie bez znaczenia jest również

czynnik, coraz częściej podkreślanym w różnych dokumentach np. Światowej Organizacji Zdrowia (WHO), czy Komisji Europejskiej, a dotyczący inwestycji w zdrowie publiczne i indywidualne.

Zdając sobie sprawę z wieloczynnikowego oddziaływania na długość życia w zdrowiu w starszym wieku czynników obiektywnych i subiektywnych, Autorzy postanowili ograniczyć wielowymiarową analizę porównawczą dotyczącą krajów UE oraz Norwegii, Szwajcarii, Islandii do wybranych czynników. W grupie czynników obiektywnych wyróżniono: odsetek ludności (mężczyzn i kobiet) w wieku 65 lat i więcej, rozwój gospodarczy kraju mierzony poziomem PKB per capita, długość życia w zdrowiu w wartościach bezwzględnych dla mężczyzn i kobiet w wieku 65 lat, wydatki na opiekę zdrowotną w PPS USD na jednego mieszkańca w wieku 65+. Do czynników subiektywnych zaliczono: ocenę stanu zdrowia przez osoby w wieku 65+ oraz poziom niezaspokojonych potrzeb dla usług zdrowotnych.

Celem artykułu jest zbadanie związku między długością dalszego życia w zdrowiu kobiet i mężczyzn w wieku 65 lat a wybranymi czynnikami w krajach europejskich w okresie 2005–2012. W tym celu wykorzystano następujące metody: 1/ przestrzenne zróżnicowanie rozkładów cech – tempo zmian w wybranym okresie: 2005 i 2012, 2 /oceny zależności pomiędzy czynnikami określono na podstawie korelogramów oraz wartościach współczynników korelacji rang Spearmana, 3/ analiza skupień: wykorzystując metodę Ward'a wykazano podobieństwo przestrzenne (między krajami). Źródłem danych statystycznych był bank danych Eurostat.

Słowa kluczowe: *aktywne starzenie się, starzenie się w dobrym zdrowiu, opieka zdrowotna*