Health and Economic Risks of Longevity in European Countries

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Abstract

The article deals with the health risks of longevity and their economic consequences in the European countries. It uses various international comparisons to identify longevity factors, the healthy life expectancy and the most common causes of illness and mortality among the elderly. It also focuses on the economic consequences of population aging, especially in relation to long-term care funding and their prognosis. The results of factor and cluster analysis allow a comprehensive comparison of European countries according to the quality of life, health and serious illnesses of people age 65 and over.

Key words

Elderly people, causes of death, health expenditures, comparisons, multidimensional analysis.

JEL Classification: C38, I14, I15, J14

1 Introduction

Statistics concerning causes of death among persons aged 65 or over (the elderly) are of increasing interest. A dramatic change in the nature and delivery of healthcare over the past century has resulted in much longer life spans and a greater prevalence of chronic illnesses. This in turn has led to increased demand on healthcare systems, particularly for long-term care. Public health programmes throughout the EU are often targeted at reducing mortality among people aged less than 65 through preventive measures, for example, the promotion of healthier lifestyles through improved nutrition, lower tobacco and alcohol consumption, an increase in physical activity or a reduction of professional risk (Swiss Re, 2014).

The percentage of the population aged 65 or over in the EU-28 is projected to increase, on average, from 18.9% of the total population in 2015 to 29.0% of the total by 2058, thereafter dipping slightly before rising again to reach 29.2% in 2081 (European Commission, 2015).

The financing and provision of effective care services for the elderly will be one of the most challenging issues facing society, driven by various demographic and societal trends. Public spending on long-term care (LTC) will increase significantly in the coming decades, straining government budgets in advanced economies. In emerging markets, public finances are less stressed but the low starting point of LTC spending and the immense growth of funds needed will still be a huge challenge (Eurostat Statistics Explained, 2017; Eurostat, 2016).

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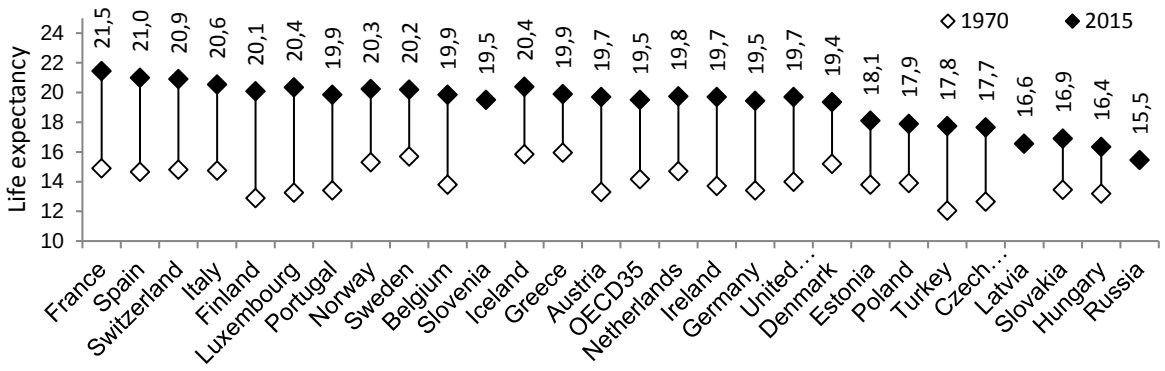
2 Description health risks of elderly people

Life expectancy at age 65 has increased significantly for both men and women over the past few decades in European countries (Figure 1). Some of the factors explaining these gains in life expectancy at age 65 include advances in medical care combined with greater access to health care, healthier lifestyles and improved living conditions before and after people reach age 65.

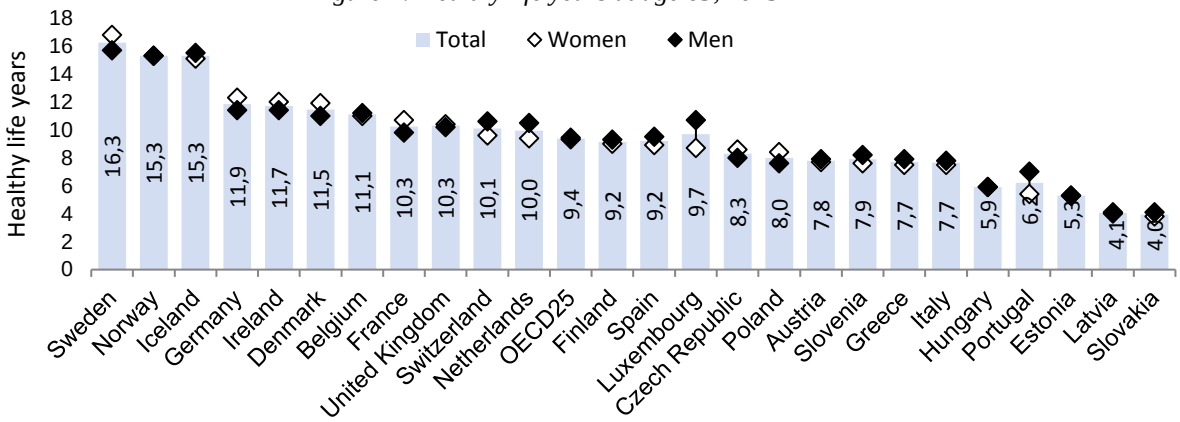
Figure 1: Life expectancy at age 65, 1970 and 2015



Source: Eurostat Statistics Explained 2017, self-processed in Excel

Increased life expectancy at age 65 does not necessarily mean that the extra years lived are in good health. In Europe, an indicator of disability-free life expectancy known as "healthy life years" is calculated regularly. Among European countries the average number of healthy life years at age 65 was almost the same for women and men, at 9.3 years for women and 9.4 years for men in 2015 (Figure 2). Life expectancy and healthy life expectancy vary by European countries. Nordic countries had the highest number of healthy life years at age 65 in 2015. In Sweden, women could expect to live an average of an additional 17 years, and men 16 years, free of disability.

Figure 2: Healthy life years at age 65, 2015

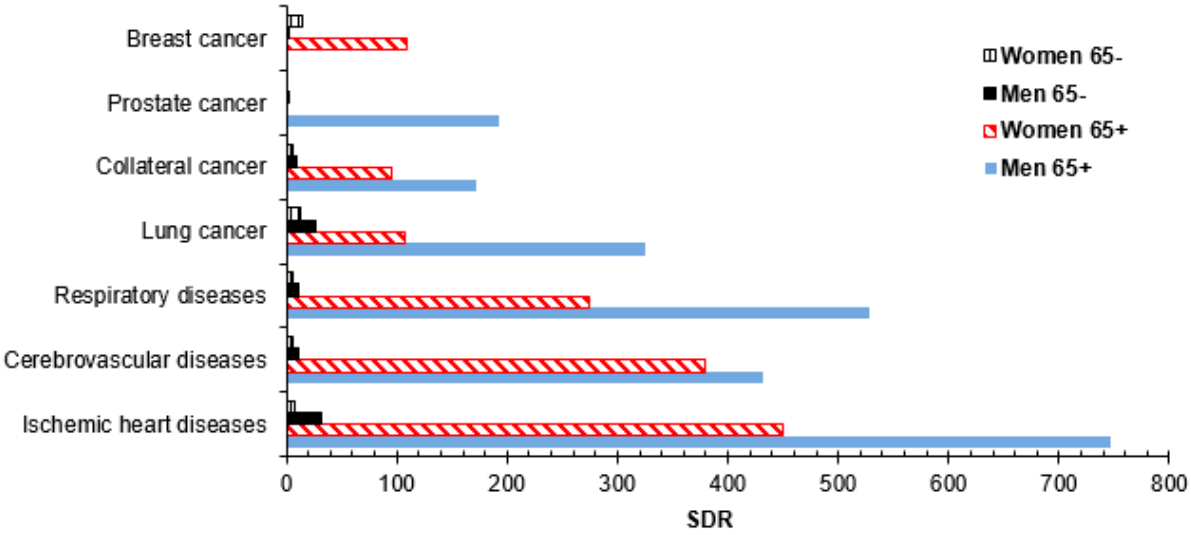


Source: Eurostat Statistics Explained 2017, self-processed in Excel

The latest information for EU-28 countries relating to causes of death is available for the 2014. The diseases of the circulatory system and cancer (malignant neoplasms) were the leading causes of death in the EU. Respiratory diseases were the third most common cause of death in the EU-28. Significant differences in mortality for serious diseases exist across European countries and also by demographic dimensions, including sex and age. To assess the inequalities in EU-28 members according to demographic characteristics with respect to mortality for serious diseases we have compared the standardised death rate per 100 000 inhabitants for

leading causes of death in EU. Mortality rates were monitored separately for men and women and for persons aged less than 65 years and aged 65 and over. Visualized standardized mortality rates for serious diseases make it possible to compare for two age categories - persons aged less than 65 years and persons aged 65 and over and for both gender groups (Figure 3).

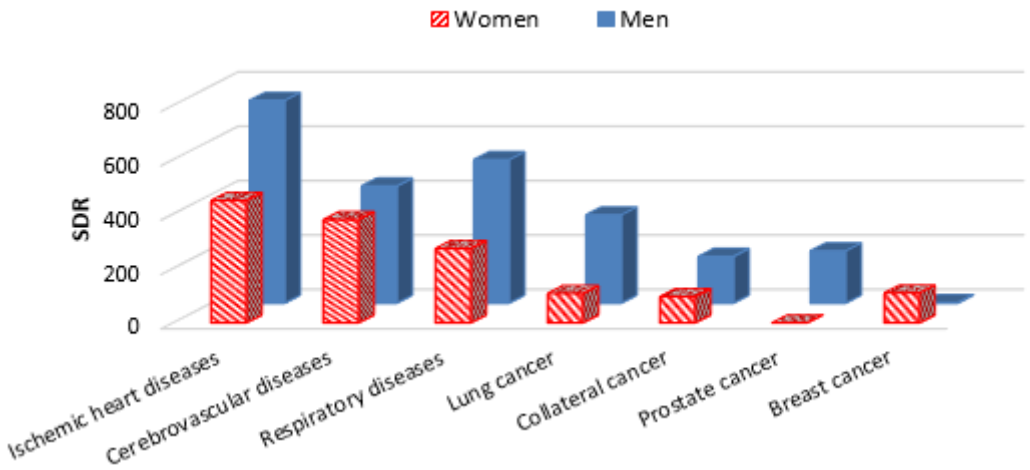
Figure 3: Comparison standardised death rate per 100 000 inhabitants by gender and age groups, EU-28, 2014



Source: Eurostat Statistics Explained 2017, self-processed in Excel

Standardized mortality rates for leading serious illnesses are significantly higher for people 65 years and over in EU-28. Differences in mortality rates by gender are also significant in both age groups, with higher rates of male mortality. Inequalities in mortality rates by leading causes of death at age 65 and over and by gender are also clear (Figure 4).

Figure 4: Comparison standardised death rate per 100 000 inhabitants by main causes of death at age 65+, EU-28, 2014



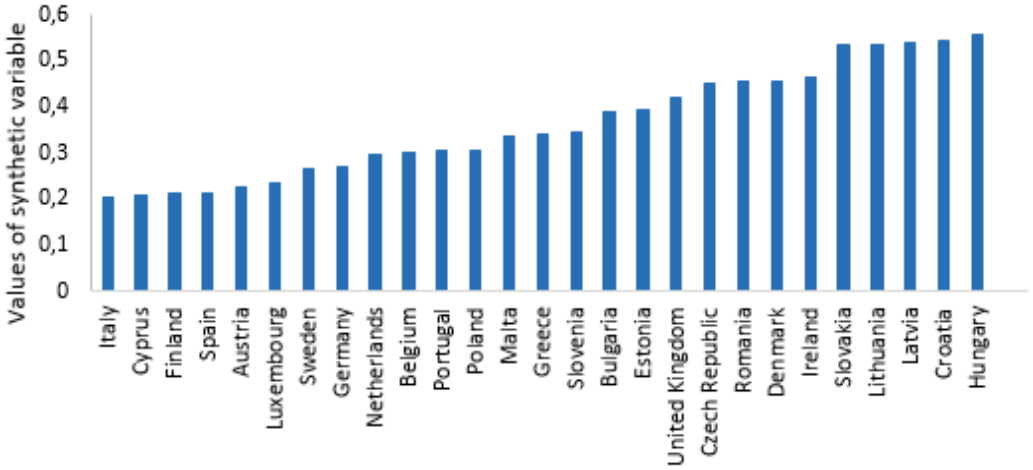
Source: Eurostat Statistics Explained 2017, self-processed in Excel

The population in the European Region is ageing rapidly: its median age is already the highest in the world, and the proportion of people aged 65 and older is forecast to increase from 14% in 2010 to 25% in 2050. People in nearly every part of the Region are living longer, but their chances of spending these later years in good health and well-being vary within and between countries. To assess the inequalities in EU-28 members according to mortality for serious diseases synthetic mortality indicator for causes of death at Figure 5 has been

constructed by standardization formula (1) using weights for the standardized values, taking into account the mortality rate for each of the main causes of death in EU-28. In this way, the different severity of the diseases was taken into account. For details see (Stankovičová and Vojtková, 2007).

$$u_{ij} = \frac{x_{ij} - min\{x_{ij}\}}{max\{x_{ij}\} - min\{x_{ij}\}} \tag{1}$$

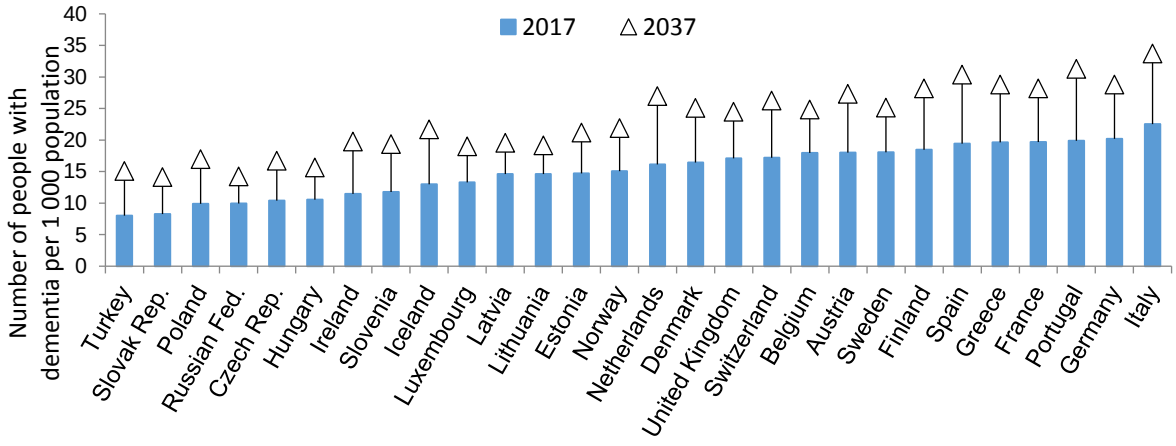
Figure 5: Ordering of EU-28 countries by the synthetic indicator of leading serious deceases for persons age 65 years and over



Source: Eurostat Statistics Explained, 2017, authors' calculations in Excel

Ageing populations mean that dementia will become more common in the future, and the most rapidly ageing countries will see prevalence more than double in the next 20 years (Figure 6). The dementia is one of the diseases that require long-term care and in the future it will entail considerable financial costs.

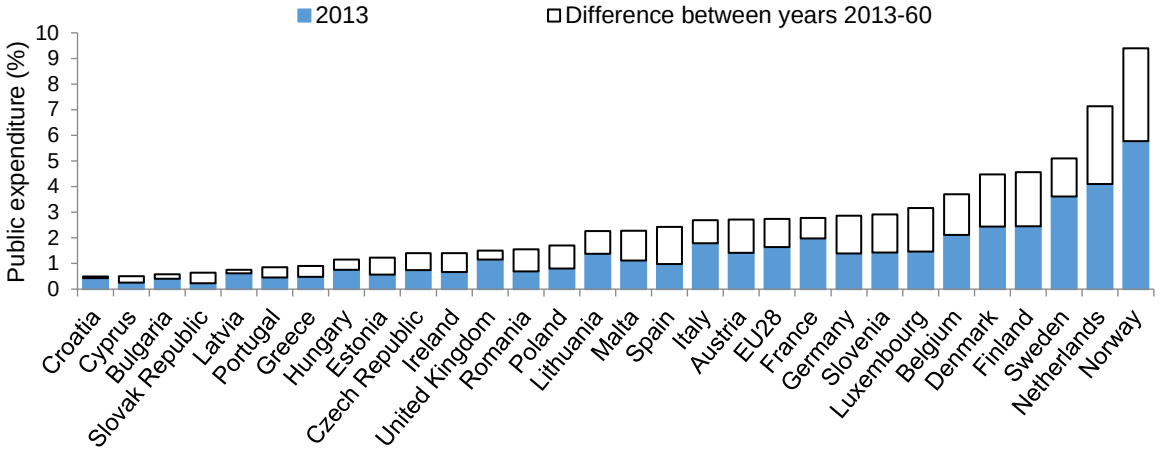
Figure 6: Estimated prevalence of dementia, 2017 and 2037



Source: OECD 2017, self-processed in Excel.

As people age, they are more likely to develop disabilities and need support from family, friends and long-term care (LTC) services. The ranking of countries according to the forecast of LTC expenditure and the differences across European countries is shown in Figure 7.

Figure 7: Prognosis of public expenditure on long-term care as a percentage of GDP, 2013 - 2060



Source: OECD/EU 2016, self-processed in Excel

Long-term care spending is a growing share in many EU countries. The projection model includes a number of factors determining long-term care expenditures. Aging populations may pose a risk to the sustainability of health care financing. It is estimated that the ratio of older people to workers will increase from 27.8% in 2014 to 50.1% in 2060. If life expectancy increases in line with the growing number of years of health, aging may not necessarily occur rising healthcare costs. Empirical research suggests that healthcare technologies are the main driver of growth in healthcare spending.

3 Multidimensional statistical analysis

This chapter summarizes and confirms the conclusions and knowledge of the previous chapters by applying selected multidimensional statistical analysis methods. For details see (Hair et al., 2007; Kopecká & Jindrová, 2017; Pacáková et al., 2016; Pacáková & Kopecká, 2018; Stankovičová & Vojtková, 2007). These methods are applied to a data matrix of nine indicators found in 30 European countries in 2015 from OECD data.

Following indicators were used for thirty European countries:

- GDP – GDP per capita (EUR), 2015,
- E1 – Health expenditure per capita (EUR), 2015,
- E2 – Health expenditure in relation to GDP, 2015,
- E3 – Long-term health expenditure per capita (EUR), 2015,
- E4 – Long-term health expenditure in relation to GDP, 2015,
- H1 – Life expectancy at age 65, 2015,
- H2 – Healthy life years at age 65, 2015,
- M1 – SDR – diseases of circulatory system at age 65+,
- M2 – SDR – malignant neoplasms at age 65+.

The results of the Correlation analysis in Table 1 show the correlation coefficients between each pair of variables. The results indicate a strong dependence of indicators of health status elderly persons in European countries, except malignant neoplasms at age 65+ indicator, on GDP and on health expenditures E1-E4.

Table 1: Results of correlation analysis

	GDP	E1	E2	E3	E4	H1	H2	M1	M2
GDP	1	0,945	0,743	0,926	0,826	0,734	0,775	-0,764	-0,039
E1	0,945	1	0,840	0,903	0,834	0,713	0,781	-0,733	-0,040
E2	0,743	0,840	1	0,761	0,795	0,633	0,759	-0,692	-0,174
E3	0,926	0,903	0,761	1	0,960	0,657	0,781	-0,698	-0,008
E4	0,826	0,834	0,795	0,960	1	0,557	0,779	-0,644	0,022
H1	0,734	0,713	0,633	0,657	0,557	1	0,563	-0,790	-0,417
H2	0,775	0,781	0,759	0,781	0,779	0,563	1	-0,669	-0,112
M1	-0,764	-0,733	-0,692	-0,698	-0,644	-0,790	-0,669	1	0,138
M2	-0,039	-0,040	-0,174	-0,008	0,022	-0,417	-0,112	0,138	1

Source: authors' calculations, output from Statistica 12

By application of factor analysis we try to obtain a small number of common factors which account for most of the variability in the original variables. The MSA = 0.74 statistics show suitability of the origin indicators for factor analysis.

In this case, two factors have been extracted, since two factors have had eigenvalues greater than or equal to 1. Together they account more than 80.701 % of the variability in the original data. *Factor loadings* present the correlation between the original variables and the extracted factors and they are the key to understanding the nature of a particular factor. After *varimax rotation* have been obtained the factor loadings shown in Table 2.

Table 2: Factor loadings after VARIMAX rotation

Proměnná	**HDP**	**E1**	**E2**	**E3**	**E4**	**H1**	**H2**	**M1**	**M2**
F1	0,90	0,95	0,81	0,95	0,91	0,75	0,81	-0,78	0,05
F2	0,03	-0,03	-0,29	0,12	0,06	-0,52	-0,17	0,35	0,91

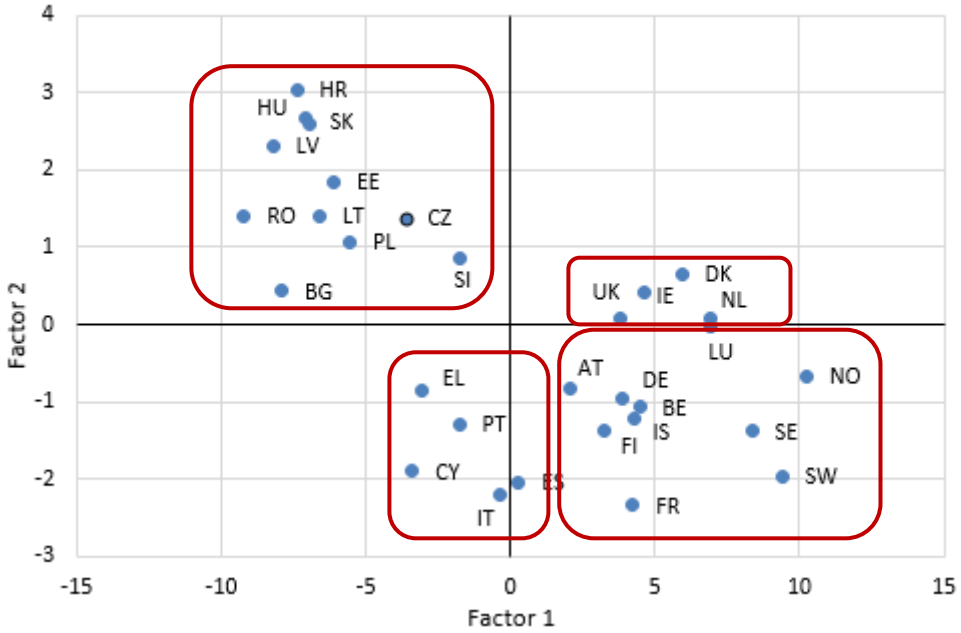
Source: authors' calculations, output from Statistica 12

Based on Factor loadings (Table 2) we can state that the first common factor F1 is strongly positive correlated with all expenditure indicators, even with H1 and H2, and strongly correlates with mortality M1. This factor explains up to 67.358% of the variability of the original 9 indicators and we can call it as a Factor of favourable living and health condition of elderly people. High values of F1 indicate a high level of life and health of seniors in a given country. Factor F2 strongly correlates only with indicator M2, so we can identify it as the Mortality factor for the malignant neoplasms of elderly persons. The higher its value, the higher the mortality rate M2 for malignant neoplasms of the elderly.

The *Factor Scores* present the values of the rotated factor for each country. Graphical display of countries in a two-dimensional coordinate system with the axes of the selected two factors allows us to quickly assess the observed situation in each country and also compare the situation in different countries.

In the coordinate system of the factors F1 and F2 (Figure 8) four groups of countries were created. The first group with high values of factor F1 and low values of factor F2, including all the old EU countries, the second with low to medium values of factor F1 and medium to high values of factor F2, including the new EU members, the third group with the middle level of factor F2 and rather high value the factor F1, including United Kingdom, Ireland, Denmark and Netherlands and fourth group of the south countries of EU with the low values of factor F2 and medium level of the first factor F1.

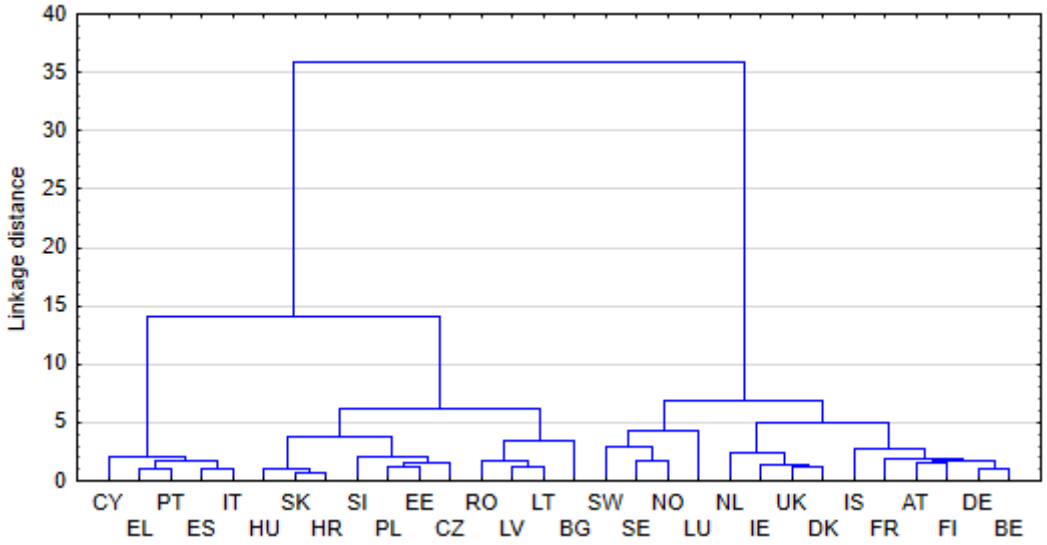
Figure 8: Displaying of the countries in coordinate system of F1 and F2



Source: authors' calculations, output from Statistica 12

Cluster analysis classifies individual countries into groups (clusters) according to their similarity. The results of cluster analysis based 9 variables, the same as in factor analysis, are consistent with the results of factor analysis, as we can see from *dendrogram* on Figure 9 as a results of Ward's Method with Euclidian distance between two different countries. The results of cluster analysis compared to factor analysis even more emphasize the marked differences in the living and health conditions of elderly people in the old and the new EU Member States.

Figure 9: Dendrogram, Ward's method, Euklidean distance



Source: authors' calculations, output from Statistica 12

Conclusions

Significant differences in health status of elderly persons exist between European countries. Health inequalities exist along demographic dimensions, including sex, age, geographic area and socio-economic status. Standardized death rates for leading serious deceases are

significantly higher for persons age 65 or over and for men in each country and are the highest in the former socialist countries,

Spending on long-term care has increased more than for any other type of health care, but spending varies considerably across countries. Aging populations may pose a risk to the sustainability of health care financing. If life expectancy increases in line with the growing number of years of health, aging may not necessarily occur rising healthcare costs.

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