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## **Subjective and objective health of the population aged 50+ and the welfare state regimes in 16 European countries**

### **Abstract**

Health at 50+ issues are particularly important now, when the inevitable increase in the old-age dependency ratio calls for governmental involvement in measures that are aimed at mitigating the negative effects of population aging in Europe. The investigations of differences between the subjective and objective health measures in a welfare state regime perspective have not been conducted before although it can be assumed that such analyses might provide valuable information about the impact of welfare regime on health as well as about the interchangeability between the self-reported and measured health.

The main objective of this study was to determine whether the type of welfare regime influences the subjective and objective health of the population aged 50+. Hierarchical logistic regression models were applied to examine this subject. Analyses were conducted for 16 European countries (N=57236) classified into four different types of welfare regimes: social democratic, post-socialist, conservative-corporatist and Mediterranean. The empirical results suggest that the type of welfare regime helps to explain the variations in the subjective health between countries as well as the differences between individuals. However, it does not explain the differences in objective health when analyzing all socio-economic groups collectively. Analyses performed within defined socioeconomic groups showed that the types of welfare regimes differentiated between both subjective and objective health in the majority of defined groups, however, the health of those least well-off in all of the analyzed welfare regimes was found to be similar. The different results obtained for both subjective and objective health in post-socialist and Mediterranean countries suggest that these two types of measurement should not be used interchangeably.

**Keywords:** subjective health, objective health, welfare state regime, aging, logistic regression, multilevel analysis, SHARE

**JEL:** I10, I14, I18

## Introduction

The importance of health is universally accepted. Yet, ill health is not only of a huge discomfort for the individual but will often impact on the labor market or affect the decision to take early retirement. Therefore, it is not surprising that health is not only of interest in its own right, but is also one of the key focal points for policy makers [Morris, Devlin, Parkin 2011]. For this reason the health of the population as well as health determinants demand the attention of economists. As Europe has to deal with an ever-growing aging population, health issues have raised new and important concerns. According to the report “*The 2012 Ageing Report: Underlying Assumptions and Projection Methodologies*” issued by the European Commission and Economic Policy Committee (2011), in the European Union the number of people aged 65+ is predicted to grow from 87,5 million in 2010 to 150,2 million in 2050 and 152,6 million in 2060. Old-age dependency ratio (65+/(15-64)) for the European Union is forecasted to double from 26% in 2010 to 52,5% in 2060. In Poland the number of people aged 65+ is expected to increase from 5,2 million in 2010 to 10,6 in 2050 and 11,3 in 2060. Old-age dependency ratio (65+/(15-64)) in Poland is predicted to increase from 19,0% in 2010 to 53,8% in 2050 and 64,8% in 2060. Demographic total age-dependency ratio (0-14 plus 65+/(15-64)) in Poland is forecasted to grow from 40,2% in 2010 to 75,9% in 2050 and 87,3% in 2060. Since people are tending to live longer it is crucial to increase a healthy life expectancy in order to mitigate the negative consequences of population aging. Yet any increase in life expectancy that is unaccompanied by improvements in health might have serious consequences for a country’s economy. If life expectancy is increasing but people still tend to fall ill at the same age, this means that the old age borderline is invariable. Such demographic changes may lead to longer life in poor health and, as a consequence, an increase in public spending on such things as health care and social benefits. For that reason European states should be aware of the economic importance of health, especially in the current situation, and introduce policies aimed at improving the health of their citizens. The experiences of different European countries show that one of the ways to deal with the increasing number of retired people was through raising the age of retirements. However, it seems obvious that the changes in retirement age alone are not sufficient to counteract the negative effects of population aging and policies aimed at increasing a healthy life expectancy are needed, especially when one bears in mind the fact that, nowadays, people tend to have fewer children and are less willing to get married or live with older generations, what implies a decreasing level of a support within families and the need for greater support from society. Therefore, a better understanding of the health determinants as well as the sources of health inequalities are needed, and cross-country comparisons of health and health determinants operating at both micro and macro levels might provide valuable information about the mitigation of health inequalities, the maintenance of good health as well as the potential areas of state intervention.

Thus the understanding of health inequalities and health determinants among people aged 50+ are now more important than ever.

In this article a multilevel comparative analysis of subjective and objective health of people aged 50+ in selected European countries representing different welfare regimes is conducted. Population health is analyzed at both micro- (demographic, socioeconomic, characteristics) and macro-levels (country, welfare state regime). The introduction of a welfare regime perspective results from the existence of empirical evidence for the relationship between the welfare state regime and health [Navarro et al. 2006, Eikemo et al. 2008a, Bambra et al. 2009, Rostila 2007, Richter et al. 2012]. What is more, although the population health, as well as the health inequalities, between the welfare state regimes in Europe has already been empirically researched, there are no studies investigating differences between the subjective and objective health measures in a welfare state regime perspective. The analyzes are performed for both subjective and objective health measurements in order to determine whether the type of welfare state regime impact on health depends on the type of health measurement. This problem seems to be very important as the cross-country comparisons of health are usually conducted as a result of self-reported health surveys, however, it is not clear whether the subjective and objective health measurements can be used interchangeably. So, the main goal of this study is to determine whether the types of welfare regimes influence the subjective and objective health of the population aged 50+. The research thesis states that both subjective and objective health depends on the type of welfare regime. Additionally, it is assumed that the type of welfare regime differentiates between subjective and objective health in the same socioeconomic groups and between different countries representing different regimes.

## Theoretical framework

### a) Cross-country health comparisons

Yang, Eldridge and Merlo [2009] claimed that in health analyzes, often the macro-level effects such as the public health system or residing geographical areas are neglected, but the understanding about the influence of macro-level effects on health might provide additional information for policy-makers. Therefore, taking into consideration the micro-level and macro-level influences on health, they have suggested multilevel analyzes of health. Such multilevel analyzes have already been performed by these authors [Yang et al. 2009] but only as regards the life expectancy, which is not an ideal indicator of health status. Still the distinction has to be made between living with good health and living with poor health, as whilst people may live long lives it does not always follow that they are healthy individuals [Murray and Lopez 1997]. In addition to the shortcoming of life expectancy usage, previous studies often used self reported health measures [Espelt et al. 2008; Hebert et al. 2001; Wróblewska 2010]. However, there might be differ-

ences in the way which individuals from different groups (socioeconomic, educational, national) assess their health [Dowd and Zajacova 2007; Desesquelles et al. 2009] and, therefore, the use of both subjective and objective health measurements is recommended. A study in which both these aspects were analyzed was a research on cross-country health comparisons performed by Ploubidis and Grundy [2010] using a second wave of SHARE data (Survey of Health, Ageing and Retirement in Europe) for 13 European countries for respondents aged 50+. As a result of having based their research on subjective and objective health indicators, the authors were able to pay greater attention to the identification of the determinants of health status that work on both a micro-level and macro-level (gender, age, living arrangements, years of education as individual level predictors and categorical indicator of obesity, the GINI coefficient, GDP per capita, social trust and a binary regime typology as country level predictors). The results obtained showed that 21 percent of variations in health was explained by the differences between the countries analyzed and the most significant national characteristic was the level of egalitarianism – the lower the social inequalities the better the physical health. According to the authors, the results they obtained indicated the existence of systemic differences in physical health between European countries; therefore, domestic policies aimed at reducing the income inequalities as well as the promotion of health have the potential for improving the population's health. It is worth highlighting the fact that in their research, Ploubidis and Grundy (2010) combined the subjective and objective health measurements into a latent variable; therefore, they did not investigate the differences between subjective and objective health. The authors identified a negligible effect of regime typology on health, however, in their statistical model they applied the binary variable for the type of welfare regime type, thus this analysis did not allow for comparisons between different types of welfare regime. For these reasons the disparities between the subjective and objective health measurements, particularly from the perspective of welfare state regime are still worthy of research.

## **b) Welfare state regimes and health**

According to Esping-Andersen [1990, 1999] there are three worlds of welfare capitalism and all of them are characterized by different forms of social security. These three worlds are the liberal, the conservative-corporatist and the social democratic. In the liberal regime the state provides only modest benefits, which implies the citizens' dependence on their family in crisis situations. This regime type entails high income inequality as compared to the conservative-corporatist or social democratic regimes. Representatives of the liberal regime are the United Kingdom and Ireland. The conservative-corporatist type is characterized by a strong church influence and the predominance of the traditional family unit. The state guarantees social benefits based on one's status in society and previous earnings, leading, as a result, to moderate class inequalities. The conservative-corporatist regime is characterized by Luxemburg, Switzerland, the Netherlands,

Austria, Germany, France and Belgium. The social democratic regime is represented by Denmark, Norway and Sweden and Finland. In this regime type social security levels are the highest. The state cares for children, the dependent and the aged, resulting in low inequality levels and solidarity. According to Ferrera [1996] and Bonoli [1997], a fourth type of welfare state regimes exists – the Mediterranean type represented by Spain, Italy, Greece and Portugal. In this regime the social security system is underdeveloped which implies greater individual dependence on the family. Additionally, researchers suggest the existence of a fifth type of welfare state regimes including Central and Eastern Europe post-socialist countries represented by Poland, the Czech Republic and Hungary. In this type of regime social benefits are very low and, as a consequence, lead to high levels of poverty and income inequalities [Standing, 1996; Esping-Andersen, 1999; Kovacs, 2002; Fenger, 2007; Rostila, 2007].

Apart from the welfare state typologies based on the decommodification, private-public mix and social stratification different typologies referring to the health care and elderly care were suggested by researchers. Basing on the studies performed by Alber and Köhler [2004], Anttonen and Sipila [1996], Kautto [2002], Rostgaard [2002] – the following European care regimes were distinguished by Knipscheer [2007] (based on the following key factors: family care roles, care expenditure, public-private mix, female employment, share of home, residential and monetary care provision): Scandinavian (remarkable public investments in residential care, a residual role of family, high rates of female employment; representative: Sweden), Subsidiarity (primary responsibility allocated to families, availability of care insurance schemes funding care services rendered by nongovernmental organizations; representative: Germany), Liberal (the populations more dependent economically are provided with the public care, private care providers for other users; representative: United Kingdom), Family based (limited public responsibilities, limited formal service provision, a central role of kinship networks, low female employment; representatives: Italy, Greece) and Transition (similar to family-based countries, but with more severe financial constraints; representative: Poland). Lamura [2007] suggested different welfare regime typology based on the focus on elderly care (demand for care, provision of informal care, provision of formal care) and distinguished the following welfare state regimes: Public-Nordic (demand for care: medium, provision of informal care: low, provision of formal care: high; representatives: Denmark, Sweden, Netherlands), Standard Care Mix (demand for care: medium/high, provision of informal care: medium/low, provision of formal care: medium; representatives: Germany, Austria, France, Italy, UK), Family based (demand for care: high, provision of informal care: medium, provision of formal care: low; representatives: Spain, Portugal, Greece, Ireland), Transition (demand for care: low, provision of informal care: high, provision of formal care: medium/low; representatives: Poland, Hungary, Czech Republic), Baltic (demand for care: low, provision of informal care: high, provision of formal care: very low; representatives: Estonia, Lithuania, Latvia).

Many empirical studies provided evidence for the relationship between welfare state regime and health [Navarro et al., 2006; Eikemo et al., 2008a; Bambra et al., 2009; Richter et al., 2012]. What is more, in the majority of performed studies it was proved that populations of countries representing the social democratic welfare regime type were better off in terms of health as compared to countries representing other welfare state regime types. The research conducted by Eikemo et al. [2008a] proved that a type of welfare regime accounted for about 50% of the country-level variation in the self-assessed health between European countries; what is more, populations in countries representing social democratic (Scandinavian) and liberal (Anglo-Saxon) welfare regimes were identified as having better self-assessed general health as compared to Mediterranean (Southern) and post-socialist (East European) welfare regimes. However, according to Eikemo et al. [2008b], although the best results concerning self-reported health are identified in the social democratic regime, the income-related health inequalities are the lowest in the Bismarckian (conservative-corporatist) welfare regime and not in the social democratic one.

Moreover, empirical evidence for the relationship between social capital and health exists [Hyppä et al, 2001; Kawachi et al., 1999; Rostila 2007]. There are theories saying that social capital can influence health on both an individual level as well as a contextual level (societies, communities, countries, welfare state regimes). According to Rostila [2007], contextual social trust may explain the health inequalities between welfare regimes in Europe. The author analyzed the relation between welfare regimes, social trust and self-rated health and found a large variation in social trust between welfare regimes in Europe, as well as an association between social trust and self-reported health (at the population level). The findings suggested that a relationship existed between the post-socialist type of regime and individual self-reported health and also that contexts characterized by the lower levels of social trust (for instance post-socialist) were more damaging to the health of people with low social trust at the individual level. Rostila [2007] also identified that the population of post-socialist welfare regime had a high relative risk of poor self-rated health, as compared to the social democratic regime.

### **c) Subjective and objective health measures**

In the Preamble to the Constitution of the World Health Organization, health was defined as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” [WHO, 1948]. This definition is very broad and does not provide information about how health should be operationalized. Since numerous concepts of health measurements have been developed by researchers, the selection of the most appropriate in the given setting is not always straightforward. The aim of this section is to present and discuss the features as well as the advantages and disadvantages of self-reported and objective health measurements which are described in current literature.

In the most general terms health measurements can be divided into subjective and objective [Thomas and Frankenberg, 2000]. Objective measurements are those unaffected by the individual's subjectivity and perception. Existing beyond the individual, they are independent of the respondent's beliefs and moods. Conversely, subjective measures reflect the individual's personal opinions and are inextricably bound up with the life of the aforementioned individual. Subjective health measurements reflect the individuals' opinions about their health, while objective health measurements are derived from medical examinations (and use precise clinical measurements). Subjective measurements come from surveys and often concern health in general (e.g. a typical survey question could be: What is your health in general?) or refer to specific illnesses – self-reported chronic health conditions (e.g. a typical survey question could be: Do you suffer from hypertension?). On the other hand, objective health measurements are the results of medical examinations (e.g. systolic and diastolic blood pressure). Objective health measurements seem to be more reliable than self-reported measurements as the latter can suffer from errors in reporting. There are many reasons for such errors [Murray and Chen, 1992]. Respondents might vary greatly in reporting on their health differently depending on their differing conceptions of "health", expectations of health, as well as their comprehension of the survey questions [Bago d'Uva et al., 2008]. Moreover, health might be misreported by individuals as an excuse for non-participation in the labor market or the basis for claiming sickness or disability benefits. Even self-reported chronic health conditions are not free from these reporting errors as many people may not be aware of particular medical conditions, for instance, hypertension, cardiovascular disease, diabetes, cancer [Baker et al., 2004].

Because of the bias in reported health as a result of these errors, measured health seems to be more accurate; however, it is not clear whether these two indicators are interchangeable. A few studies in the past have provided evidence of the high correlation between subjective and objective health measurements [Idler and Benyamini, 1997; LaRue et. al., 1979; Ferraro, 1980]. However, more up-to-date studies have found remarkable disparities between reported and measured health. One example is the study of Johnston, Propper and Shields [2007, pp. 10–12] who analyzed the income/health gradient based on data coming from a Health Survey conducted in England. The income/health gradient was firstly examined for self-reported hypertension and then for diagnosed hypertension (the result of an examination performed by a qualified nurse). Researchers found that in case of hypertension the analyses based on a self-reported ailment did not lead to the same results as the analyses performed for the measured systolic and diastolic blood pressure (objective health measures). The discrepancy between the subjective and objective measures resulted from the reporting errors – both false negatives (respondents claiming no hypertension whilst, in fact, being hypertensive) and false positives (respondents claiming to be hypertensive whilst having systolic and diastolic blood pressure within normal ranges). The results obtained showed that 7,1%



of respondents reported being hypertensive, while in fact 34,7% had high blood pressure. The level of false negatives and false positives was equal to nearly 87%, and 4% respectively. These findings provide evidence for the disparity between the subjective and objective health indicators. Even though the self-reported health measurements referring to chronic health conditions such as hypertension or obesity appear to be more valid and precise than self-reported general health status, the findings of Johnston, Propper and Shields [2007] reveal the shortcomings of such indicators. Gupta, McDade and Adam [2011, pp. 26–28] while performing analyses of data collected from American respondents have also identified disparities between objective and subjective hypertension (self reported high blood pressure as against measured systolic and diastolic blood pressure) as well as obesity measurements (self reported obesity as against measured BMI) and found that individual characteristics such as age, gender, mental health and race are significant predictors of these disparities. The differences between self-reported and objective measures were higher for hypertension than for obesity and this can be attributed to the fact that obesity is more visible and easily identified as compared to hypertension.

The problem of reporting errors connected with self-reported health is very worrying, the more so as these errors tend to differ systematically with the socioeconomic and demographic characteristics commonly used as explanatory variables in models predicting health or assessing health inequalities. According to Lindeboom and van Doorslaer [2004] there is an evidence for such a reporting bias based on gender and age. One of the methods of reducing the reporting errors from subjective health measurements is offered by health-related 'vignettes' [Salomon et al., 2004]. In this method respondents are provided with a short description of the health of a hypothetical individual and their task is to rate the health status of this person using a predefined numerical rating scale (usually a five point scale of general health status: poor, fair, good, very good, excellent). This concept relies on the assumption, which does not necessarily hold true, that individuals assess their own health in much the same way as one another.

Subjective health indicators might also pose problems when comparing health in different countries. Firstly, the health surveys conducted there often contain slightly different questions that are not necessarily comparable. Secondly, even if the surveys contain the same questions, the response to them may vary greatly from country to country because of cultural differences [Groot, 2000; Jürges, 2007]. Finally, the problem of language is of crucial importance as it is hardly possible to formulate the exact same question from language to language as some meaning is always lost or changed in translation. The philosophers Edward Sapir [1929] and Benjamin Lee Whorf [1940] actually believed that language shapes man's perception of reality and that language and grammar are components of the mental process. Thus, they shape the way people view and interpret the world around them. Sapir and Whorf also assumed that

languages were never entirely translatable. From this point of view it seems impossible to reliably compare the self-reported health measurements between countries as language may actually influence our perception of health. Consequently, we may conclude that there are not only cultural differences that may have a profound influence upon the concept of health, but also the languages themselves may prevent the questions from having an equivalent meaning from country to country with an adverse consequence on the comparability of the results. This skeptical perspective cannot, however, prevent researchers from a cross-country comparative study of subjective health measurements as they are able to provide a remarkable insight into the impact of a country's policies and characteristics on the health of the population as well as help to identify opportunities for the reduction of inequalities in health. They may also reflect non-measurable chronic health conditions. What is more, the collection of self-reported health measurements is relatively cheaper as compared to the collection of clinical measurements that usually require qualified staff or specialized equipment devices. Fortunately, "vignettes" seem to provide at least some solution to the problems connected with self-reported health measurements, as the assessments of the health of a hypothetical person performed by respondents in different countries might be used to define benchmark scales. The distributions of responses from different groups (e.g. countries) can then be reinterpreted on such benchmark scales [Kapteyn et al., 2007].

The differences between subjective and objective health measurements imply a non-interchangeability between them. The selection of health measurements depends greatly on the research context. The examination results seem to depict the health of the individual with greater validity. However, there are many claims that these objective measurements cannot fully identify all health-related conditions, such as mental health problems or chronic pain, which, whilst often difficult to measure, may have an adverse impact on labor market participation possibilities [Bound, 1991].

In addition to all problems connected with the self-reported health measurements and clinical outcomes, a further problem is raised, namely that of distinguishing between subjective and objective health measurements. According to Rothstein [1989] an instrument-obtained measurement is not always objective whilst that obtained by an individual is not inherently subjective. The distinction has to be made between the objectivity/subjectivity of the measurement process and objectivity/subjectivity of the phenomenon being measured. Yet there are objective phenomena that can be assessed subjectively (for instance, rotary forces produced by muscle contractions measured in a way with unreliable results) and on the other hand, there are subjective conditions that are assessed objectively (for instance, pain can be measured objectively despite being a subjective phenomenon). Therefore, although the differences between self-reported and medically-examined health appear to be straightforward this is not always the case.

## Data and methods

The analyzed data comes from the fourth wave of the Survey of Health, Ageing and Retirement in Europe (50+ in Europe)<sup>1</sup> made available in 2012. The SHARE survey was conducted using data from more than 50,000 men and women across 16 European countries. The respondents were representative of a European population aged 50+ in Denmark, Sweden, Austria, France, Germany, Switzerland, Belgium, the Netherlands, Spain, Italy, Portugal, the Czech Republic, Poland, Hungary, Estonia and Slovenia. For the purpose of this analysis these countries were classified into four different types of welfare regime: the social democratic (Denmark, Sweden); the conservative-corporatist (Austria, France, Germany, Switzerland, Belgium, the Netherlands); the Mediterranean (Spain, Italy, Portugal), the post-socialist (the Czech Republic, Poland, Hungary, Estonia, Slovenia). The actual number of participants comprised 57,236 subjects. The definition of SHARE Wave 4 study population was: “persons born in 1960 or earlier, and persons who are a spouse/partner of a person born in 1960 or earlier, who speak the official language(s) of the country and who are residents within private households, regardless of nationality and citizenship” [Malter et al., 2013]. In order to achieve representation of this population, a sample design was employed which involved baseline samples of the household population aged 50+ in each country and refreshment samples of the population of people who have become 50 since the baseline sample selection. The details of sample designs differed across countries, however all the designs used were based on the principles of probability-based selection as well as maximal population coverage [Malter et al., 2013]. Detailed description of a sample design in SHARE Wave 4 is included in the report “*SHARE Wave 4: Innovations & Methodology*” [Malter et al., 2013].

The health outcome measurements selected for study are self-reported health status (assessed by respondents as poor, fair, good, very good, excellent) and handgrip strength (the mean of two measurements for the dominant hand). For the purpose of analysis these health measurements were transformed into binary response variables (for self-reported health: “1” for good, very good and excellent health status, “0” for the poor and fair health status; for handgrip strength: the average values of two measurements were classified as weak, normal and strong handgrip strength based on the respondent’s gender and age. These were then transformed into a binary variable, taking the value of “1” for normal and strong handgrip strength and “0” for weak handgrip strength).

The predictors of subjective and objective health included the following: gender (“males” as reference); age group (50-59; 60-69; 70-79; “80+” as reference); years in education (below 8; 9-13; “above 14” as reference); the frequency of experiencing financial difficulties (often; sometimes; rarely; “never” as reference); marital status (married and living together with spouse; registered partnership; married, living separated from spouse; divorced; widowed; “never married” as reference); employment status (employed or self-employed (including working for a family business); retired; homemaker;

permanently sick or disabled; other (rentier, living off own property, student, employed in voluntary work); “unemployed” as reference); country; welfare regime (conservative-corporatist; Mediterranean; post-socialist; “social democratic” as reference).

In order to determine the impact of the welfare state regime typology on both subjective and objective health measurements two-level hierarchical logistic regression models were estimated [Richter et al., 2012, Dai et al., 2008]. Two-level hierarchical logistic regression model can be written in the following form:

$$\text{logit}(\pi_{ij}) = \alpha + u_j + \beta x_{ij},$$

and it is decomposed into:

- the level 1 part of the hierarchical logistic regression model:

$$\text{logit}(\pi_{ij}) = \alpha_j + \beta x_{ij},$$

- the level 2 part of the model:

$$\alpha_j = \alpha + u_j,$$

where:

$i = 1, \dots, I_j$  is the subject indicator,

$j = 1, \dots, J$  is the country indicator,

$\pi_{ij}$  is the probability of having good, very good, excellent self-rated health or normal, strong handgrip strength for subject  $i$  in country  $j$ .

In this hierarchical logistic regression model each country  $j$  had intercept  $\alpha_j$ . Country intercepts were treated as a random variable and they measured country effects. Random intercept for each country was a linear combination of an overall mean calculated for all countries ( $\alpha$ ) and a deviation ( $u_j$ ) from the overall mean. The random effect ( $u_j$ ) of country  $j$  on the mean was assumed to be normally distributed with zero mean and a variance ( $\tau_0$ ) to be estimated.

In this study the level 1 units in these models were respondents and the level 2 units were the 16 analyzed countries. For each of the health measurements five models were conducted. *Model 1* included no explanatory variables (intercept-only) and was used to break down the intercept variance into two levels (variance between individuals and variance between countries). *Model 2* included all predictors listed above except from the type of welfare regime and its purpose was to identify the impact of determinants other than welfare state regime on the subjective as well as objective health. *Model 3* was estimated for age group, gender and type of welfare regime in order to determine the differences in self-assessed and measured health between defined welfare regimes. *Model 4* was an extended model 2 with all the predictors listed above and it was used to identify the impact of welfare regime on health while accounting for various subject-level characteristics. Finally, *Model 5* was estimated by the group experiencing financial difficulties

and included the following predictors: age group, gender and type of welfare regime. The aim of *Model 5* was to determine whether the type of welfare regime differentiates between subjective and objective health in the same socioeconomic groups that are defined basing on the frequency of financial difficulties. In all of these models country effect was modeled as the level 2 unit.

The proportion of variance that was caused by the differences between countries was measured with the intraclass correlation coefficient (ICC). The ICC was calculated

with the use of a logistic models formula [Richter et al., 2012]:  $ICC = \frac{\tau_0}{\tau_0 + \pi^2}$  for country level;  $ICC = \frac{\frac{\pi^2}{3}}{\tau_0 + \frac{\pi^2}{3}}$  for individual level. All calculations were performed with the use

of the SAS® system (v9.3.1). The assumed significance level was equal to 0.05. The results obtained were generalized for the entire population based on the sample weights resulting from the sampling frame.

## Results

The aim of the results presented in this section is to verify if both subjective and objective health depend on the type of welfare regime as well as whether the type of welfare regime differentiates between subjective and objective health in the same socioeconomic groups and between different countries representing different regimes. Results are broken down into two sections: descriptive analysis and model application. Descriptive analysis section contains the cross-country comparisons of prevalence rates (PR) for poor, fair self-reported health, and weak handgrip strength by country and type of welfare regime. The aim of this section is to identify the major differences between European countries and welfare states as regards the self-rated and measured health conditions. In model application section the results of five hierarchical logistic regression models applied to SHARE data are presented and discussed.

### a) Descriptive analysis

In the cross-country comparisons of health many different indicators might be applied. Frequently used are prevalence rates that reflect the proportion of subjects in a population who have a disease or characteristic. Prevalence rates can describe both self-assessed health status as well as the measured health status.

Table 1 presents the prevalence rates (PR) for poor, fair self-reported health, and weak handgrip strength by country and type of welfare regime.

**TABLE 1. Prevalence rates (PR) for poor/fair self-reported health and weak handgrip strength by country and type of welfare regime**

	Poor, Fair self-rated health			Weak handgrip strength		
	PR Total	PR Males	PR Females	PR Total	PR Males	PR Females
Social democratic	<b>27,96</b>	<b>24,63</b>	<b>30,98</b>	<b>5,29</b>	<b>3,68</b>	<b>6,79</b>
Denmark	22,69	21,17	24,06	5,26	3,18	7,2
Sweden	30,97	26,6	34,94	5,31	3,96	6,56
Conservative-corporatist	<b>38,67</b>	<b>38,14</b>	<b>39,11</b>	<b>6,95</b>	<b>5,57</b>	<b>8,16</b>
Belgium	29,18	25,69	32,15	7,61	5,93	9,12
France	36,15	33,86	38	9,18	6,84	11,18
Germany	44,75	46,01	43,68	5,44	4,73	6,05
The Netherlands	30,17	28,55	31,62	5,86	4,45	7,19
Switzerland	18,96	17,52	20,22	7,32	5,67	8,81
Mediterranean	<b>44,62</b>	<b>37,49</b>	<b>50,47</b>	<b>13,39</b>	<b>9,57</b>	<b>16,82</b>
Italy	40,97	32,91	47,58	9,22	6,85	11,43
Portugal	60,72	50,05	69,31	12,62	7,93	16,66
Spain	46,13	41,07	50,3	18,87	13,53	23,44
Post-socialist	<b>54,94</b>	<b>52,02</b>	<b>57,16</b>	<b>8,8</b>	<b>6,01</b>	<b>10,9</b>
The Czech Republic	41,79	38,71	44,31	6,69	6,15	7,15
Estonia	69,84	67,61	71,22	9,58	7,51	10,82
Hungary	61,45	56,8	64,73	13,41	9,24	16,4
Poland	55,96	54	57,46	7,62	4,75	9,77
Slovenia	43,4	41,03	45,37	9,79	5,59	13,35
Total	<b>42,46</b>	<b>39,4</b>	<b>44,99</b>	<b>9,03</b>	<b>6,74</b>	<b>11</b>

Source: own calculation based on SHARE data.

Poor, fair self-rated health was reported by 27,96% of respondents in a social democratic welfare state regime, 38,67% in conservative-corporatist, 44,62% in Mediterranean and 54,94% in post-socialist welfare state regime. In the case of the objective health measurements (the weak handgrip strength) the lowest prevalence rates concerned social democratic and conservative-corporatist regimes (5,29% and 6,95% respectively), however, the highest prevalence rates were identified in the Mediterranean regime (13,39%). This ranking is valid for both genders. Prevalence rates calculated for self-rated health

are much higher than those computed for objective health measurements. This rule applies to all the analyzed countries. The difference between prevalence rates for subjective and objective health measurements is the lowest for Denmark and Sweden and the highest for post-socialist countries.

### **b) Model application**

In order to identify the impact of welfare regime on both subjective and objective health as well as to determine if welfare regime differentiates between subjective and objective health in the same socioeconomic groups, five hierarchical logistic regression models were estimated. The results of these models are presented and described in this section below.

Table 2 contains the results of Model 1 and Model 2. The intraclass correlation coefficient calculated for Model 1 indicates that 4,7 percent of the variation for good, very good and excellent health status results from the differences between countries. With regard to the normal and strong handgrip strength the 0,8 percent of the within-subject variation is attributable to national characteristics. Model 2 shows that for both subjective and objective health measures being a female and having less or equal to 14 years of education is negatively correlated with “good” health (good, very good, excellent health in case of self-reported health; normal, strong handgrip strength for objective measure). Additionally, both subjective and objective health deteriorates with age, however, in the case of self-reported health the deterioration is greater. With regard to the frequency of experiencing financial difficulties for both outcomes when compared to the reference category (“never”), the odds ratios are less than 1 in the case of the “often” and “sometimes” responses. However, they are greater than 1 for the “rarely” response. The different effects of some categories of the marital and employment status between the two health measurements were also observed. Compared to the never married group the odds ratios for “good” subjective health are less than 1. With regard to the normal or strong handgrip strength the odds ratios are above 1 for respondents married and living together with the spouse, in registered partnerships, and divorced. The influence of employment status on health also varies for some categories for the two analyzed health measurements. The “good” subjective health category is only negatively correlated with being permanently sick or disabled as compared to being unemployed. However, the “good” objective health category is negatively correlated with being permanently sick or disabled, being a homemaker or belonging to another employment status category as compared to the unemployed. The intraclass correlation coefficient (ICC) computed for Model 2 equals 4,4% and 1,7% for subjective and objective health, respectively.

Model 3 and Model 4 results are presented in Table 3. In case of Model 3 the intraclass correlation coefficient decreased to 1,3% for self-reported health and to 0,2% for handgrip strength as compared to Model 1. This means that the unexplained variation

between countries was reduced after the inclusion of welfare regime type in the model, therefore the regime type explains some part of the variation in both subjective and objective health between countries. With regard to the reported health, significant association was identified for post-socialist and Mediterranean regimes as compared to the social democratic regime and it was negative. The post-socialist regime had the lowest odds ratio for good, very good and excellent health status (OR: 0,270). Concerning the normal and strong handgrip strength, again a significant association was displayed for the post-socialist and Mediterranean regime, but in this case the Mediterranean regime had the lowest odds ratio (OR: 0,350).

Concerning Model 4 with all predictors (including type of welfare regime), as compared to Model 2 (all predictors without the type of welfare regime) the ICC decreased from 4,4% to 2,7% for self-reported health and increased from 1,7% to 2,2% for objective health, which means that in the model with all predictors, after controlling for the type of welfare regime, the unexplained variance was reduced in the case of reported health and increased for the handgrip strength, showing that the type of regime explains in some part the variation in subjective health, but not in objective health from country to country. Compared to Model 3 after the introduction of predictors such as marital status, frequency of experiencing financial difficulties, years of education and employment status the effects for the post-socialist and Mediterranean regimes became insignificant for the handgrip strength. However, the effect for the post-socialist regime was still significant in the case of self-reported health, but the association between this regime type and subjective health was reduced (OR: 0,358).

Tables 4 and 5 present the Model 5 results. With regard to good, very good and excellent reported health (Table 4) no significant differences between types of regime (as compared to the social democratic regime) were displayed for the group of people who often experience financial difficulties. In the socioeconomic group of people who sometimes experienced these difficulties significant differences between the social democratic and other welfare regime types were identified for the post-socialist type (OR: 0,345) and Mediterranean type (OR: 0,406). Significant associations were, however, found in the groups of those rarely and never affected by the financial difficulties, but only for the post-socialist regime (rarely – OR: 0,283; never – OR: 0,348). In terms of the normal and strong handgrip strength significant differences between the welfare regime types were displayed, similarly with the results for subjective health, but only for the groups of people who sometimes, rarely or never suffered from financial difficulties. In the former (“sometimes”) the odds ratios were significant for the post-socialist (OR: 0,531) and Mediterranean (OR: 0,328) regimes. Compared to the social democratic welfare regime all other regimes were significantly worse off in terms of the objective health amongst those rarely affected by financial difficulties and the Mediterranean regime had the lowest odds ratio (OR: 0,288). In the group of people who never experienced financial difficulties a significant association was displayed for the Mediterranean regime (OR: 0,465).



TABLE 2. Good, Very Good, Excellent self rated health and Normal, Strong handgrip strength – multilevel logistic regression Model 1 and Model 2

Fixed Effects	Good, Very Good, Excellent self-rated health		Normal, Strong handgrip strength	
	Model 1	Model 2	Model 1	Model 2
	OR (95% CI)	OR (95% CI)   P-value	OR (95% CI)	OR (95% CI)   P-value
<b>Females (“Males” as reference)</b>				
Females		0,832 (0,831-0,833)		0,738 (0,737-0,740)   <.0001
<b>Age group (“80+” as reference)</b>				
50-59		3,805 (3,795-3,814)		2,873 (2,863-2,883)   <.0001
60-69		3,238 (3,231-3,244)		2,855 (2,847-2,863)   <.0001
70-79		1,481 (1,478-1,484)		2,631 (2,624-2,639)   <.0001
<b>Years of education (“Above 14” as reference)</b>				
Below 8		0,511 (0,51-0,512)		0,453 (0,452-0,455)   <.0001
9-13		0,770 (0,769-0,771)		0,766 (0,764-0,769)   <.0001
<b>Financial Difficulties (“Never” as reference)</b>				
Often		0,354 (0,354-0,355)		0,949 (0,946-0,951)   <.0001
Sometimes		0,734 (0,732-0,735)		0,943 (0,941-0,946)   <.0001
Rarely		1,051 (1,049-1,053)		1,198 (1,194-1,201)   <.0001
<b>Marital status (“Never married” as reference)</b>				
Married and living together with spouse		0,856 (0,854-0,858)		1,315 (1,311-1,320)   <.0001
Registered partnership		0,905 (0,899-0,910)		1,453 (1,439-1,468)   <.0001
Married, living separated from spouse		0,565 (0,562-0,568)		0,979 (0,971-0,987)   <.0001

Divorced		0,882 (0,879-0,884)	<,0001		1,189 (1,184-1,195)	<,0001
Widowed		0,680 (0,678-0,682)	<,0001		0,802 (0,799-0,805)	<,0001
<b>Employment status ("Unemployed" as reference)</b>						
Employed or self-employed (including working for family business)		1,790 (1,785-1,795)	<,0001		1,501 (1,494-1,508)	<,0001
Retired		1,120 (1,116-1,123)	<,0001		1,151 (1,146-1,157)	<,0001
Homemaker		1,114 (1,111-1,118)	<,0001		0,863 (0,859-0,867)	<,0001
Permanently sick or disabled		0,149 (0,149-0,150)	<,0001		0,302 (0,300-0,303)	<,0001
Other (Rentier, Living off own property, Student, Doing voluntary work)		1,263 (1,256-1,270)	<,0001		0,975 (0,967-0,983)	<,0001
<b>Random effects</b>						
Intercept	0,3705	0,2841		2,3947	1,9907	
ICC	0,047	0,044		0,008	0,017	
Between-country variation	0,4049	0,3892		0,1589	0,2417	
-2log likelihood	154590000	65389729		136170000	59145051	
Country N	16	16		16	16	

Source: own calculation based on SHARE data.

TABLE 3. Good, Very Good, Excellent self rated health and Normal, Strong handgrip strength – multilevel logistic regression Model 3 and Model 4

Fixed Effects	Good, Very Good, Excellent self-rated health			Normal, Strong handgrip strength		
	Model 3		Model 4	Model 3		Model 4
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
<b>Females (“Males” as reference)</b>						
Females	0,881 (0,880-0,882)	<.0001	0,832 (0,831-0,833)	<.0001	0,631 (0,630-0,632)	<.0001
<b>Age group (“80+” as reference)</b>						
50-59	4,779 (4,773-4,784)	<.0001	3,805 (3,795-3,814)	<.0001	4,884 (4,875-4,892)	<.0001
60-69	3,889 (3,884-3,893)	<.0001	3,238 (3,231-3,244)	<.0001	4,111 (4,104-4,119)	<.0001
70-79	2,010 (2,008-2,013)	<.0001	1,481 (1,478-1,484)	<.0001	3,467 (3,461-3,473)	<.0001
<b>Years of education (“Above 14” as reference)</b>						
Below 8			0,511 (0,510-0,512)	<.0001		0,453 (0,452-0,455)
9-13			0,770 (0,769-0,771)	<.0001		0,766 (0,764-0,769)
<b>Financial Difficulties (“Never” as reference)</b>						
Often			0,354 (0,354-0,355)	<.0001		0,949 (0,946-0,951)
Sometimes			0,734 (0,732-0,735)	<.0001		0,943 (0,941-0,946)
Rarely			1,051 (1,049-1,053)	<.0001		1,198 (1,194-1,201)
<b>Marital status (“Never married” as reference)</b>						
Married and living together with spouse			0,856 (0,854-0,858)	<.0001		1,315 (1,311-1,320)
Registered partnership			0,905 (0,899-0,910)	<.0001		1,453 (1,439-1,468)
Married, living separated from spouse			0,565 (0,562-0,568)	<.0001		0,979 (0,971-0,987)
Divorced			0,882 (0,879-0,884)	<.0001		1,189 (1,184-1,195)

Widowed				0,680 (0,678-0,682)	<,0001				0,802 (0,799-0,805)	<,0001
<b>Employment status ("Unemployed" as reference)</b>										
Employed or self-employed (including working for family business)				1,790 (1,785-1,795)	<,0001				1,501 (1,494-1,508)	<,0001
Retired				1,120 (1,116-1,123)	<,0001				1,151 (1,146-1,157)	<,0001
Homemaker				1,114 (1,111-1,118)	<,0001				0,863 (0,859-0,867)	<,0001
Permanently sick or disabled				0,149 (0,149-0,150)	<,0001				0,302 (0,300-0,303)	<,0001
Other (Rentier, Living off own property, Student, Doing voluntary work)										
<b>Welfare regime ("Social democratic" as reference)</b>										
Post-socialist	0,270 (0,118-0,616)	0,0048	0,358 (0,132-0,975)	0,0454	0,524 (0,309-0,889)	0,0206	1,059 (0,407-2,751)	0,8984		
Conservative-corporatist	0,799 (0,356-1,789)	0,5547	0,765 (0,288-2,033)	0,5609	0,724 (0,432-1,212)	0,1974	1,045 (0,411-2,653)	0,92		
Mediterranean	0,361 (0,147-0,891)	0,0302	0,560 (0,188-1,669)	0,2697	0,350 (0,197-0,623)	0,0019	0,722 (0,255-2,047)	0,5089		
<b>Random effects</b>										
Intercept	0,03543		0,8145		2,0239		2,0174			
ICC	0,013		0,027		0,002		0,022			
Between-country variation	0,2057		0,302		0,08396		0,2743			
-2log likelihood	154780000		65389739		139500000		59145071			
Country N	16		16		16		16			

Source: own calculation based on SHARE data.

TABLE 4. Good, Very Good, Excellent self rated health – multilevel logistic regression Model 5

Fixed Effects		Good, Very Good, Excellent self-rated health									
		Model 5									
		Shortage of money									
		Often		Sometimes		Rarely		Never			
		OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
<b>Females (“Males” as reference)</b>											
Females		0,873 (0,872-0,875)	<,0001	0,809 (0,808-0,811)	<,0001	0,854 (0,853-0,856)	<,0001	1,004 (1,002-1,005)	<,0001		<,0001
<b>Age group (“80+” as reference)</b>											
50-59		6,428 (6,406-6,451)	<,0001	5,251 (5,238-5,264)	<,0001	8,435 (8,411-8,459)	<,0001	5,370 (5,358-5,381)	<,0001		<,0001
60-69		5,370 (5,351-5,389)	<,0001	3,396 (3,388-3,404)	<,0001	5,613 (5,598-5,628)	<,0001	4,292 (4,284-4,300)	<,0001		<,0001
70-79		2,799 (2,788-2,809)	<,0001	1,684 (1,680-1,688)	<,0001	2,614 (2,607-2,621)	<,0001	2,125 (2,121-2,128)	<,0001		<,0001
<b>Welfare regime (“Social democratic” as reference)</b>											
Post-socialist		0,510 (0,209-1,243)	0,1254	0,345 (0,174-0,686)	0,0055	0,283 (0,113-0,711)	0,0114	0,348 (0,157-0,771)	0,0135		0,0135
Conservative-corporatist		0,904 (0,379-2,156)	0,8043	0,792 (0,405-1,547)	0,4622	0,808 (0,329-1,983)	0,6142	0,898 (0,413-1,951)	0,7671		0,7671
Mediterranean		0,607 (0,230-1,604)	0,2847	0,406 (0,192-0,859)	0,0223	0,444 (0,163-1,211)	0,1034	0,515 (0,216-1,226)	0,1213		0,1213
<b>Random effects</b>											
Intercept		-1,4112		0,09239		-0,04029		0,06948			
ICC		0,017		0,006		0,019		0,011			
Between-country variation		0,2389		0,1416		0,2547		0,1904			
-2log likelihood		34715619		40913938		31361153		43929673			
Country N		16		16		16		16			

Source: own calculation based on SHARE data.

TABLE 5. Normal, Strong handgrip strength – multilevel logistic regression Model 5

Normal, Strong handgrip strength									
Model 5									
Shortage of money									
Fixed Effects	Often		Sometimes		Rarely		Never		P-value
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	
<b>Females (“Males” as reference)</b>									
Females	0,620 (0,618-0,621)	<.0001	0,662 (0,660-0,663)	<.0001	0,677 (0,675-0,679)	<.0001	0,574 (0,572-0,575)	<.0001	<.0001
<b>Age group (“80+” as reference)</b>									
50-59	4,037 (4,021-4,052)	<.0001	6,796 (6,771-6,821)	<.0001	7,531 (7,496-7,567)	<.0001	3,366 (3,355-3,377)	<.0001	<.0001
60-69	3,420 (3,407-3,433)	<.0001	4,527 (4,511-4,542)	<.0001	4,179 (4,162-4,196)	<.0001	4,582 (4,567-4,597)	<.0001	<.0001
70-79	2,571 (2,561-2,581)	<.0001	3,666 (3,652-3,679)	<.0001	4,037 (4,018-4,055)	<.0001	3,840 (3,828-3,853)	<.0001	<.0001
<b>Welfare regime (“Social democratic” as reference)</b>									
Post-socialist	0,929 (0,537-1,608)	0,7761	0,531 (0,259-1,091)	0,0796	0,438 (0,214-0,896)	0,0273	0,864 (0,502-1,487)	0,5689	0,5689
Conservative-corporatist	1,094 (0,641-1,868)	0,7197	0,749 (0,371-1,513)	0,3882	0,515 (0,256-1,035)	0,0607	0,873 (0,514-1,483)	0,5869	0,5869
Mediterranean	0,746 (0,410-1,357)	0,3071	0,328 (0,149-0,719)	0,0093	0,288 (0,132-0,628)	0,0046	0,465 (0,257-0,840)	0,0154	0,0154
<b>Random effects</b>									
Intercept	1,3139		1,9208		2,3334		2,0158		
ICC	0,002		0,007		0,007		0,002		
Between-country variation	0,09033		0,1559		0,1541		0,08855		
-2log likelihood	31097327		36395236		30088228		40476372		
Country N	16		16		16		16		

Source: own calculation based on SHARE data.

## Conclusions

The main objective of this study was to determine whether the type of welfare regime influences the subjective and objective health of the population aged 50+. The research thesis stated that both subjective and objective health depended on the type of welfare regime. Additionally, it was assumed that the type of welfare regime differentiated between subjective and objective health in the same socioeconomic groups from country to country, representing different regimes.

The results obtained in Models 3 and 4 (Table 3) showed that the type of welfare regime partly explained the variation in subjective health between countries and between individuals. However, it did not explain the differences in objective health when analyzing all of the combined socioeconomic groups. Regarding self-reported health, significant differences between the post-socialist regime and social democratic regime were identified (OR: 0,358). The population of post-socialist countries was worse off in terms of self-reported health as compared to the population of a social democratic regime. These findings are in line with the conclusions of Rostila [2007] who identified that the population of post-socialist welfare regime had a high relative risk of poor self-rated health as compared to the social democratic regime as well as partly in accordance with the conclusions of Eikemo et al., [2008a] who proved that populations in countries representing social democratic (Scandinavian) and liberal (Anglo-Saxon) welfare regimes had better self-assessed general health as compared to Mediterranean (Southern) and post-socialist (East European) welfare regimes.

Model 5 allowed for more exploratory analyses of the relationship between the type of welfare regime and health within socioeconomic groups. With regard to both self-reported and objective health no significant differences were observed between the types of welfare state regime within that group often experiencing financial difficulties, however, significant differences were observed for other socioeconomic groups. In the socioeconomic group of people who sometimes experienced financial difficulties those who were living in countries representing the post-socialist or Mediterranean regime types were worse off in terms of both self-rated health and handgrip strength. Significant associations were also identified in the group of rarely affected by financial difficulties: for the post-socialist regime in the case of subjective health and for the post-socialist, Mediterranean and conservative-corporatist regimes in terms of objective health. In the group of those never affected by financial difficulties significant differences between the regime type and health were observed for the post-socialist regime in the case of reported health and for the Mediterranean regime in terms of objective health. In all cases where the odds ratios were significant, the populations of post-socialist and Mediterranean regimes were worse off than the population of the social democratic regime with respect to both reported and measured health. What is more, in the analyzes of subjective health, lower odds ratios were

displayed for the post-socialist regime as compared to the odds ratio calculated for the Mediterranean welfare regime. However, in terms of objective health the odds ratios calculated for the post-socialist regime were greater than those displayed for the Mediterranean regime. This indicates that people living in post-socialist welfare state regimes were characterized by a worse subjective health, but better objective health as compared to Mediterranean countries. Differences between the results obtained for subjective and objective health are in accordance with the results obtained by Johnston, Propper and Shields [2007] as well as by Gupta, McDade and Adam [2011] who proved that self-reported health measures were not equivalent to the results of clinical evaluations.

The results obtained showed that the type of welfare regime differentiated between both the subjective and objective health in different socioeconomic groups, however, it had no impact on the health outcomes in population who often experienced financial difficulties; therefore, the health of the underprivileged in all the analyzed welfare regimes was similar. These results partially confirm the conclusions of Eikemo et al., [2008b] who claimed that although the best results concerning self-reported health were identified in the social democratic regime, the income-related health inequalities were not the lowest in this regime type. The conducted analyzes confirm that the type of welfare state regime is of key importance when it comes to health which is in accordance with the results obtained by Richter et al., [2012]. What is more, the different results obtained for subjective and objective health for post-socialist and Mediterranean countries suggest that these two types of measures should not be used interchangeably.

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## Notes

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