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END OF LIFE IN EUROPE: AN EMPIRICAL ANALYSIS

Abstract: The goal of this study is to find covariates impacting most profoundly on the risk of death. Individuals aged 50 and more, observed in the Survey on Health, Ageing and Retirement in Europe, are examined. The data include 1,692 deceased individuals who took part in up to 3 waves of data collection. Our results, relying on the proportional hazard model, show that the impact of health and demographic factors on the risk of death is more pronounced than that of social factors. It is found that economic factors are statistically insignificant for the risk of death, checking other factors in the model.

Keywords: risk of death, proportional hazard, mortality.

1. Introduction

The purpose of this study is to analyze a broad set of covariates that may affect the risk of death among adults and assess which of the covariates have the most pronounced impact on the risk of death. Since the mortality patterns among adults and children are substantially different, our analysis focuses on individuals aged 50 and above. The selected age criterion (50+) results from the observation that the majority of occurrences of death concerns individuals aged 50 and above (96% of the total cases of death in the 27 countries of the European Union in 2008 according to Eurostat [2011]).

There are numerous studies investigating the risk of death, but few of them manage to control all the relevant variables due to limited data availability. Apart from the self-evident impact of age [Gompertz 1825], the following covariates have been found to affect the risk of death statistically in a significant way: gender [Leventhal 1994], education [Kunst, Mackenbach 1994], employment status [Sorlie, Rogot 1990], current and permanent income [Kaplan et al. 1993], behavioral risk factors (obesity, physical activity, alcohol consumption, and tobacco use) [for example, LaCroix et al. 1991], physical health [Korten et al. 1999], psychological health [Beck 1967], self-reported health [Mossey, Shapiro 1982], medical history [Pijls et al. 1993], physical activity [Rakowski, Mor 1992], health care services and medication use [Mutran, Ferraro 1988], and household structure [Berkman, Syme 1979].

Apart from these micro-level covariates, there are environmental and institutional factors that influence the risk of death. Kahn [2005] found that institutions play a significant role as far as the toll of mortality from natural disasters is concerned. One may presume that also other reasons of mortality depend on such institutions as public health and education systems, prophylaxis, and environmental pollution [Caselli, Vallin 2006]. Their impact is captured mostly by the utilization of health care services, medicines, and by health status. Other externalities coming from cultural factors, such as norms concerning smoking, eating, drinking, and physical activity are usually country-specific and can be controlled for at the country level.

The Survey on Health, Ageing and Retirement in Europe (SHARE) provides micro-level data suitable for the estimation of the risk of death, controlling for the above covariates and other factors. Using the SHARE data, we are able to identify those elements from the set of explanatory variables that most affect the risk of death.

This paper is organized as follows. Section 2 presents the data employed in the econometric inquiry using the methods described in Section 3. The econometric results are presented in Section 4 and discussed in Section 5. Section 6 concludes.

2. Data

Data from three biannual waves of the SHARE study conducted from 2004 to 2009 on individuals aged 50 and above from 14 European countries (Austria, Belgium, the Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, the Netherlands, Poland, Spain, Sweden, and Switzerland), and Israel were used. Our research sample covers individuals for whom it is known whether they were alive or not at the time of the data collection during each wave. 1,692 events of death among individuals who took part in the survey occurred between the adjacent waves of data collection, 1,537 of whom were covered by our research sample. 47,952 respondents interviewed either in wave 1 or in wave 2 were included in the research sample. Since wave 3 collects substantially different data from wave 1 and 2, the only information we used from wave 3 was the date of the interview for the living (survivors) and the date of death for the deceased.

The number of survivors covered in wave 2 is not equal to the number of all individuals interviewed in the previous wave, due to either a refusal to participate in one of the survey waves or the inclusion of individuals eligible from wave 2 only (refresher sampling and the inclusion of new countries in the survey).

Table 1 presents the characteristics of those individuals from the research sample interviewed in wave 1 (who either survived till wave 2 – the survivors; or died before wave 2 – the deceased) and those interviewed in wave 2 (for individuals who either survived till wave 3 or died before wave 3).

The major difference between the two groups of analyzed individuals (that is, the survivors and the deceased) is their age. The group of individuals who died after

taking part in the interview comprises of individuals older by 12 years on average than the individuals assigned to the group of those who survived to the following wave of data collection. The survivors were 64 years old on average in wave 1 and 65 in wave 2. The deceased were 76 years old on average at the moment of their last interview. Furthermore, there were more women among the survivors than among the deceased. Women made up 42% of all individuals who died between waves 1 and 2, and 44% of all individuals who died between waves 2 and 3. The differences in terms of age and gender between the groups of the survivors and the deceased support the fact that the younger are less likely to die than the older, and that women live longer than men on average. The difference in age and gender between the two groups contributes to the differences in the other variables presented in Table 1.

In addition, the deceased were more often widowed than the survivors. Thus, they lived with fewer cohabitants in their households (often alone) than the survivors. The proportion of childless individuals was slightly higher among the deceased (15% in wave 1 and 14% in wave 2) than the survivors (13% and 12%, respectively). The proportion of working individuals among the survivors (30% in wave 1 and 19% in wave 2) was substantially greater than among the deceased (6% and 4%, respectively). Also, the survivors were more often socially and physically active than the deceased. Interestingly, both the deceased and the survivors performed more often physical than social activities.

Not surprisingly, the deceased reported poor or fair health (68% in wave 1 and 73% in wave 2) more frequently than the survivors (32% and 34%, respectively). The deceased were also more often hospitalized (32% in wave 1 and 2) than the survivors (13% in wave 1 and 14% in wave 2). The deceased contacted a specialist doctor or general practitioner more often than the survivors, but no difference can be observed as far as consultations with specialists are concerned. The deceased reported being substantially more severely limited in daily life activities than the survivors.

Four measures of physical condition are reported in Table 1. These are: average grip strength (a strong predictor of functional limitations and disability [Rantanen et al. 1999]), Body Mass Index (BMI, i.e. a division of a self-reported weight by self-reported height squared; a measure of being under- and overweight ([World Health Organization 2000]), average years of smoking, and alcohol consumption in the last 6 (in wave 1) or 3 (in wave 2) months. The substantially smaller grip strength observed among the deceased (26 kg in wave 1 and 25 kg in wave 2) than the survivors (31 kg and 32 kg, respectively) indicates that the deceased were in worse physical shape than the survivors at the time of the interview. The BMI was smaller for the deceased than for the survivors by 1 point. Individuals aged 50 and above had smoked for more than 12 years on average, and the deceased had a longer smoking history than the survivors. This difference is especially pronounced in wave 1. Possibly, the heaviest smokers did not survive till wave 2. The percentage of individuals who consumed any amount of alcohol was 52% in wave 1 and 48% in wave 2 among the deceased, which was smaller by 16 percentage points in wave 1 and by 21 percentage points in wave 2 than among the survivors.

Table 1. Descriptive statistics of the survivors and the deceased individuals aged 50 and above in Europe in 2004–2007

		Wave 1 (2004/06)			Wave 2 (2006/07)		
		Survivors	Deceased		Survivors	Deceased	
Average							
	Age	63.95	76.02	***	64.61	76.38	***
	Household size	2.25	1.98	***	2.25	2.02	***
	Years smoked cigarettes	13.05	18.72	***	11.71	12.71	
	Grip strength	30.97	25.68	***	31.59	25.07	***
	Body Mass Index	26.38	25.49	***	26.76	25.74	***
	Number of limitations	0.19	1.10	***	0.19	1.36	***
	Contacts with a doctor	6.75	11.43	***	6.49	11.72	***
	Contacts with a gen. practitioner	5.49	8.69	***	5.12	8.73	***
	Contacts with a specialist	1.27	1.32		1.29	1.26	
Percentage							
	Female	55.88	42.52	***	55.96	44.22	***
	Married	74.26	56.69	***	74.87	59.52	***
	Never married	5.31	6.69		4.62	5.29	**
	Divorced	6.14	4.62		6.56	4.50	
	Widowed	14.29	32.01	***	13.95	30.69	***
	Working	30.09	5.76	***	19.38	4.41	***
	Retired	46.56	73.12	***	49.46	75.41	***
	Homemaker	16.25	12.16	**	13.34	9.63	***
	Childless	12.70	15.20	*	11.77	14.46	***
	Living alone	19.55	31.53	***	19.21	31.24	***
	Very good or excellent health	30.28	7.09	***	28.78	8.53	***
	Fair or poor health	31.80	68.21	*	33.84	72.98	***
	Hospitalized	12.68	31.68	***	13.72	31.63	***
	Socially active	51.71	26.76	***	48.52	25.35	***
	Physically active	89.63	59.27	***	89.72	54.57	***
	Consumed alcohol	67.97	52.08	***	69.44	48.38	***
Number of individuals		30.467	628		33.98	909	

Note: difference between the deceased and the survivors: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Grip strength measured as a geometric mean of the second records for the left and right hands, in kg. Limitations cover activities of daily living [Katz et al. 1963]. Contacts with physicians and hospitalization that took place during the last 12 months in wave 1 and since last interview in wave 2. Individuals in a registered partnership are classified as married. The employed and self-employed are classified as working. Health is self-reported. Social activity covers any type of voluntary work, attendance of a course or club, or involvement in any organization. Physical activity covers any type of activity demanding moderate to vigorous effort. Alcohol consumption in the last 6 or 3 months in wave 1 and 2, respectively. Reference group: unemployed, disabled, permanently sick or other not working and not retired individuals in good health having at least one child.

Source: authors' own calculation based on SHARE wave 1 and 2, release 2.4.0; and wave 3, release 1.

Table 2 presents information on self-reported financial difficulties and real assets, computed based on the collected data on wealth components. Information on the average total household monthly income is available for wave 2 only. The data presented in Table 2 reveal that the financial situation (both self-perceived and that measured with real assets and household income, if possible) of the deceased was worse than that of the survivors. The average household monthly income of the deceased observed in wave 1 is lower than the average household income of the survivors by 36%. Real assets are significantly larger for the survivors than for the deceased in both analyzed waves. Also, a subjective measure of the economic situation indicates that making ends meet is easier for the survivors than for the deceased. The percentage of the survivors declaring that they are making ends meet easily or fairly easily exceeds the percentage of such deceased by 4 percentage points in wave 1 and by 9 percentage points in wave 2.

Table 2. Financial situation of the survivors and the deceased individuals aged 50 and above in Europe in 2004–2007

		Wave 1 (2004/05)			Wave 2 (2006/07)		
		Survivors	Deceased		Survivors	Deceased	
Average							
	Real assets	137.559	88,585	***	180,911	121,258	***
	Household income	–	–		4907.12	3143.11	
Percentage							
	Makes ends meet easily	26.22	24.06		26.03	21.18	***
	Makes ends meet fairly easily	34.42	32.83		33.73	29.80	***
	Makes ends meet with some difficulties	27.46	29.07		28.43	33.03	***
	Makes ends meet with great difficulties	11.89	14.04		11.80	15.98	***
Number of individuals		22,369	399		20,433	557	

Note: difference between the deceased and the survivors: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Financial values reported in Euros after exclusion of outliers. Real assets computed for 3,799 (7,552) survivors and 281 (242) deceased in wave 1 (in wave 2).

Source: authors' own calculation based on SHARE wave 1 and 2, release 2.4.0; and wave 3, release 1.

To sum up, the deceased were substantially older than the survivors. There were more men, and people who were retired, widowed, living alone, and socially and physically inactive among the deceased than among the survivors. There were also more individuals in fair or poor health, hospitalized, and contacting doctors and general practitioners among the deceased than among the survivors. The deceased were characterized by smaller grip strength, smaller BMI, and more limitations in daily life; they consumed alcohol less frequently, and had smoked cigarettes for

more years than the survivors on average. Moreover, the available data on finances and self-reported financial difficulties imply that the deceased were in a worse financial situation than the survivors on average.

3. Method

In order to estimate the determinants of death, we apply the Cox proportional hazard model [Cox 1972]. This semi-parametric method used to analyze survival data does not need the specification of the survivor function. Only the covariates are parameterized in order to test their influence on the probability of failure, i.e. the event of death. In particular, there is no assumption about the baseline hazard function, that is, a hazard function for the standardized set of coefficients ($\boldsymbol{x} = 0$). The baseline hazard function is assumed to be the same for each observation, and the covariates affect it multiplicatively. The hazard function of individual j at time t is equal to

$$h(t, x_j) = h_0(t)\exp(x_j\beta_x), \tag{1}$$

where β_x is a vector of unknown coefficients, and $h_0(t)$ is the baseline hazard function.

The analyzed population is divided into two groups. In the group of the deceased we observe individuals' "failure" (that is, the event of death). The other group, consisting of the survivors, contains "censored" individuals. In the former group, the time of the failure is known. In the latter group, it is known that the failure time is greater than the censoring time, that is the time when they were last observed. Thus, in the analysis, we have individuals who died during the time of the three waves of SHARE and respondents who are still alive. The dependent variable is a dummy variable coded 1 in the period when the individual died and 0 if the individual was alive at the end of the survey.

Four groups of covariates are included in the study:

1. Economic characteristics: working status (whether the respondent is employed or self-employed; dummy variable), logarithm of real assets (calculated as a sum of the reported value of cars, real estate, and businesses for those who reported all these values), logarithm of the average household monthly income (during the last 12 months, available in wave 2 only), and if the household is able to make ends meet (with great difficulty or with some difficulty, fairly easily or easily; dummy variables).

2. Social characteristics: rooms per household member, living alone (dummy variable), area (rural, urban; dummy variables), social activity (dummy variable).

3. Demographic characteristics: age, gender (dummy variable), and education (according to the International Standard Classification of Education (ISCED) levels 0–1 (none, primary), 2 (lower secondary), 3–4 (upper secondary, post-secondary non-tertiary), 5–6 (first stage of tertiary, second stage of tertiary); dummy variables).

4. Health condition: self-reported health (excellent or very good, good, fair or poor; dummy variables), being sad or depressed last month (dummy variable), years

of smoking (including non-smokers), alcohol consumption (during the previous 6 or 3 months in waves 1 and 2, respectively; dummy variable), physical activity (dummy variable), number of contacts with a doctor (during the previous 12 months), grip strength (geometric mean of the second measurement for the left and right hands), BMI, hospitalization (during the last 12 months; dummy variable), and having had surgery (during the last 12 months; dummy variable).

Four models are estimated using alternative measures of the financial situation. Model 1 employs data on education and whether one is working; Model 2 uses data on self-reported difficulties making ends meet; Model 3 uses data on monthly household income; and Model 4 uses data on real assets.

4. Results

The econometric results presented in Table 3 show that the risk of death depends on basic demographic characteristics, which are age and gender. We find that the women observed in our research sample died older than men. Also, younger individuals were statistically significantly less exposed to the risk of death than older individuals. Similar results were found in numerous studies (see, for example, [Ho 2008; Buckley et al. 2004]). The well-known difference between men and women's mortality patterns (for example [Newman, Brach 2001]) could not be fully covered in our analysis as we conducted it for men and women together. This is due to the capacity of our data being insufficient to investigate separately the mortality of men and women. The number of observations in our models is limited to those respondents who were observed at least twice in the survey.

Another demographic characteristic that might affect the risk of death is living in a rural or urban area. The impact of the place of living is ambiguous as, on the one hand, individuals living in a rural area have more restricted access to health care services, but on the other hand, they are exposed to less environmental contamination [Gartner et al. 2011]. Our results imply that living in a rural area increases the risk of death. This result is statistically significant in Models 1, 2, and 3.

The information on medical treatment included in the estimation covers the individuals' number of contacts with doctors, having had surgery, and being hospitalized. Only hospitalization turned out to statistically significantly reduce the risk of death. The standard determinants of the risk of death (BMI, smoking, alcohol use, and physical activity) in our survey are expanded to include social activity and the measurement of grip strength. The results are consistent with other studies [Schrijvers et al. 1999], except for alcohol use.

In addition, being underweight affects risk of death more severely than being overweight, which we find in our study, since the coefficient on BMI is negative and statistically significant in Models 1, 2, and 3. Respondents with a longer smoking history were statistically significantly slightly more likely to die younger in Models 1, 2, and 3. The greater the grip strength is, the lower the risk of death. This impact

Table 3. Econometric results of the hazard of death for individuals aged 50 and above in Europe

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.
Age	0.07***	0.01	0.07***	0.01	0.06***	0.01	0.05***	0.01
Female	–1.01***	0.18	–1.02***	0.18	–0.74*	0.35	–1.26***	0.33
Rural area	0.23+	0.14	0.24+	0.14	0.81***	0.25	0.07	0.27
Years smoked cigarettes	0.01*	0.00	0.01*	0.00	0.01*	0.01	0.01	0.01
Consumed alcohol	–0.13	0.14	–0.14	0.14	0.25	0.27	–0.21	0.27
Socially active	–0.25+	0.14	–0.25+	0.14	–0.71*	0.31	–0.11	0.24
Physically active	–0.40**	0.15	–0.38*	0.15	–0.43	0.28	–0.63+	0.33
Grip strength	–0.02**	0.01	–0.02**	0.01	–0.02	0.01	–0.03*	0.01
Body Mass Index	–0.45***	0.13	–0.44***	0.13	–0.75***	0.24	–0.17	0.23
Contacts with a doctor	0.00	0.01	0.00	0.01	0.01	0.01	–0.01	0.02
Had surgery	0.46	0.31	0.47	0.31	0.07	0.49	0.89	0.60
Depressed	–0.03	0.03	–0.03	0.03	–0.00	0.06	–0.03	0.06
Good health	0.52*	0.24	0.55*	0.24	1.35+	0.78	0.08	0.32
Fair or poor health	1.05***	0.23	1.09***	0.23	2.61***	0.74	0.41	0.33
Hospitalized	–0.28+	0.15	–0.27+	0.15	–0.09	0.27	–0.58*	0.27
Rooms per hh member	–0.10+	0.06	–0.12+	0.06	–0.24+	0.13	–0.01	0.11
Living alone	0.54***	0.16	0.55***	0.16	0.83**	0.30	0.36	0.31
Lower secondary education	–0.31	0.19	–0.33+	0.19	–0.57	0.43	–1.12**	0.43
Upper secondary education	–0.03	0.16	–0.05	0.16	0.14	0.28	–0.14	0.29
Tertiary education	–0.11	0.22	–0.16	0.22	0.07	0.43	–0.75*	0.38
Working	–0.31	0.29						
Makes ends meet easily			0.03	0.23				
Makes ends meet fairly easily			0.10	0.20				
Makes ends meet with some difficulties			–0.15	0.20				
Ln hh income					0.11	0.10		
Ln real assets							0.01	0.06
Chi 2	510.31		511.65		191.89		127.80	
Deceased	269		269		76		86	
N	8682		8674		2405		3378	

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reported coefficients.

Reference groups:

Model 1: unemployed, disabled, permanently sick or other not working and not retired men in excellent or very good health living in an urban area with primary education.

Model 2: men in excellent or very good health living in an urban area with primary education, who are able to make ends meet with great difficulty.

Model 3, 4: men in excellent or very good health living in an urban area with primary education.

Source: authors' own analysis based on SHARE wave 1 and 2, release 2.4.0; and wave 3, release 1.

is statistically significant in Models 1, 2, and 4, controlling for other covariates, including age. This finding is supported by Mackenbach et al. [2005], who showed that grip strength declines over the entire age range. Furthermore, alcohol use is found to be statistically insignificant in our study, which might be credited to the imperfections of the questionnaire concerning alcohol consumption, as the frequency and amount of alcohol consumed cannot be checked properly. Both social and physical activity reduce the risk of death, which was found in other studies as well (see, for example, [Kaplan et al. 1993; Lissner et al. 1996]). The impact of physical activity is more pronounced than the impact of social activity in Models 1, 2, and 4, as shown in Table 3.

Another set of explanatory variables uses self-perceived information on health and depression. The results show that individuals who declared being in fair or poor health were statistically significantly more likely to die than individuals who declared being in excellent or good health. The substantial impact of the self-perceived health status on the risk of death, checking for objective health measures, is found both in developed [Idler, Benyamini 1997] and developing countries [Frankenberg, Jones 2004]. We find depression to be statistically insignificant, which is partially the result of a correlation between depression and the self-perceived health status, and partially the result of the fact that the physical repercussions of depression are controlled by other covariates.

Living conditions, measured as the number of rooms per household member, show that the more rooms per person, the lower the risk of death. To the best of our knowledge, there are no studies investigating the impact of the number of rooms per person in a household on the risk of death of adult Europeans; the impact of living conditions has been so far underappreciated. Another issue of living arrangements is whether one lives alone. Our results show that living alone statistically significantly enhances the risk of death in Models 1, 2, and 3. This may be due to the fact that living with family members solves most daily life's difficulties due to the availability of help from them, which was found by Ho [2008]. Not living alone also means that in cases of emergency, there is someone to provide or call first aid. We find these results very important for policy makers, because we observe an increase in the percentage of one-person households worldwide (for example in Europe [Hall et al. 1997], Australia [Wulff 2001], and in the U.S. [Kobrin 1976]).

In our study, an emphasis was put on the measures of the individuals' economic situation. Different measures were employed in the estimations (household income, real assets, education, working status, and self-reported difficulties in making ends meet). However, none of these turned out to statistically significantly affect the risk of death. These results are surprising, as most research suggests that income remains a strong independent determinant of death, controlling for other relevant covariates (see, for example, [Stronks et al. 1997; Backlund et al. 1996; Lynch 2006]). These and other results obtained in our estimation will be discussed in the following section.

5. Discussion

The fact that none of the measures of the economic situation of individuals from the research sample statistically significantly affects the risk of death does not necessarily imply that the economic situation is irrelevant to the risk of death. The question underlying the basic measure of one's current economic situation, i.e. the household income, was asked in wave 2 only. Therefore, using this measure in the estimation severely reduced the number of observations in Model 3. The current income, even though correlated with permanent income, does not reflect the lifelong economic situation, which affects health [McDonough et al. 1997]. Not only the average level of permanent income, but also its dynamics throughout the lifetime, matter as far as the risk of death is concerned, as stable income reduces the risk of death [McDonough et al. 1997]. These dimensions of the economic situation are not controlled for in Model 3.

In order to obtain a proxy lifelong income, we decided to use real assets calculated based on the data on primary and other residences, own businesses, and vehicles. Using this variable in Model 4 dramatically reduced the research sample, but it still reduced it less than using household income. The coefficient on the logarithm of real assets was found statistically insignificant in Model 4. A possible explanation for the lack of significance might be the incomparability of financial values between countries, due to differences in purchasing power and the availability of health care services. Therefore, the use of lifelong income does not provide much insight into our understanding of whether there is a relation between risk of death and economic situation.

It is important to remember that our approach to the analysis of the risk of death is general rather than country-specific. However, the institutional environment and other externalities differ among countries, and empirical studies prove them to be relevant for life expectancy [Wilkinson 1996]. We are aware of the oversimplifications resulting from such an approach, but the number of observations within the SHARE countries leaves too little freedom to conduct a separate analysis for each country. We tested whether dummy variables controlling for countries are jointly statistically significant, and there was no statistical basis to reject the null hypothesis.

A potential solution to the problem of a between-countries comparison was the use of standardized education (ISCED levels of completed education) and employment status (working) as a proxy for lifelong income in Model 1. There are numerous studies revealing a statistically significant relation between education and mortality [Schrijvers et al. 1999] and between labor activity and mortality [Martikainen, Valkonen 1998]; however, no consistent patterns for education levels and working status are found in our study.

The final attempt of assessing the relation between economic situation and the risk of death was to use the subjective information on difficulties in making ends meet in Model 2. A variable controls not only the income situation, but also the personality of the respondent. Our econometric results reveal no statistically

significant relation between the assessment of difficulties in making ends meet and the risk of death in Model 2. Unfortunately, this variable is not comparable between countries due to cultural differences in the perception of the difficulties and in the social norms on admitting to having such difficulties, which might be a reason for the lack of statistical significance.

To sum up, none of the measures of economic status influence significantly the risk of death. Possibly, this result is not an artifact of an incorrectly specified model. Perhaps there is no impact of economic status on the risk of death of individuals aged 50 and above in Europe, because in all the analyzed countries there is an extensive public health care system. In contrast to the U.S., European public healthcare provides necessary services to all individuals with public health insurance if hospitalization is needed.

Therefore, we believe that the question of the determinants of the risk of death needs further investigation. Apart from the problem of an appropriate measure of the economic situation, two other issues should be addressed. The data on alcohol consumption, even if comparable between the waves, seem to be underreported in our sample, compared to other sources measuring alcohol consumption in Europe [World Health Organization 2011]. Moreover, more extensive information on hospitalization could be used, as there are two dimensions of healthcare services: their availability and their effectiveness [Mutran, Ferraro 1988], and we do not know how many individuals in need of hospitalization were actually hospitalized, which would be crucial for assessing the risk of death [Schoen, Doty 2004].

6. Conclusion and ideas for further research

Our results obtained in the proportional hazard model imply that apart from age and gender, also health status, hospitalization, living alone, number of rooms per person, physical and social activity, BMI, and living in a rural or urban area have the most pronounced impact on the risk of death among individuals aged 50 and above in the SHARE countries. The economic situation, expressed as the self-reported financial situation of the household, current household income and real assets, does not affect significantly the statistical risk of death. Also, education and employment status seem to be irrelevant for the risk of death when social, demographic, and health covariates were checked. These results reveal that not only being rich and well-educated increases longevity, but that the determinants of risk of death are much more complicated than that.

Therefore, further research on the impact of the economic situation on the risk of death is needed. Since one's current health condition might be correlated with past income, there might be endogeneity in the estimated model. If that is the case, our obtained estimates are inconsistent. Unfortunately, this issue cannot be addressed using the SHARE wave 1 and wave 2 data. However, the life histories observed in SHARE wave 3 might solve the problem. Also, we aim to incorporate retrospective

data on economic, health, and demographic factors from the past in the model in our further research. This might also help avoid spurious regressions that might occur in estimations that check on the current situation only [Shahtahmasebi et al. 1992]. It is important to address this issue since the estimates of the impact of events from the past on the current risk of death are not yet well recognized by economics or demography. Such knowledge would be substantial as far as the prophylaxis, health, and social policies are concerned.

Additionally, the strong impact of demographic, social, and health covariates could be extended with information on the longevity of parents. Unfortunately, an extended capacity of the dataset is necessary for a deeper analysis of the differences between the analyzed countries. Since the mortality patterns differ between men and women, separate estimations for men and women should be conducted, provided the capacity of the dataset is sufficient.

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KONIEC ŻYCIA W EUROPIE: ANALIZA EMPIRYCZNA

Streszczenie: Celem niniejszego badania jest znalezienie czynników wpływających na ryzyko zgonu najsilniej. Zbadano osoby w wieku co najmniej 50 lat obserwowane w próbie Survey on Health, Ageing and Retirement in Europe. Wykorzystane dane obejmują 1692 zgony badanych, którzy wzięli udział w co najmniej jednej z 3 rund badania. Wyniki uzyskane w oparciu o model proporcjonalnego hazardu wskazują na czynniki zdrowotne i demograficzne jako istotniejsze od czynników społecznych determinanty ryzyka zgonu. Nie zaobserwowano statystycznie istotnego wpływu czynników ekonomicznych na ryzyko zgonu przy uwzględnieniu innych istotnych zmiennych w modelu.

Słowa kluczowe: ryzyko zgonu, hazard proporcjonalny, umieralność.