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Health Services Utilization in Older Europeans: an Empirical Study

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Background and Purpose: Chronic diseases and associated co-morbidities are highly prevalent among elderly and are associated with an increase in health services utilization which in turn raises health care expenditures throughout industrialized societies. However, health care utilization in elderly is still inadequately understood, particularly regarding the differences among European jurisdictions. In our article, we use dataset of Wave 5 of SHARE survey to study the utilization of health care in older Europeans in 15 European countries.
Design/Methodology/Approach: We investigate relationships between factors such as age, gender, income, education and health variables and the utilization of various types of health services. We apply regression modeling to study the determinants of health utilization (different socioeconomic and health variables) of older people.
Results: We show some significant differences between determinants of health utilization in terms of probability and frequency of usage. We also explore patterns between welfare regimes, taking Eastern European jurisdictions as a reference category. Finally, we show that in a simple causal model the provision of formal and/or informal homecare serves as a complement to utilization of health care services.
Conclusion: Results of our article are important for the management of health care facilities in terms of health care usage by older people, and can be of value to health care providers and policy makers in the field.

Keywords: *health utilization, older people, SHARE, determinants, welfare regimes*

1. Introduction

Chronic diseases and associated co-morbidities are highly prevalent among elderly and are associated with an increase in health services utilization which in turn raises health care expenditures throughout industrialized societies. It has been widely recognized that health care service utilization among elderly depends on many factors. However, it is important to realize that older people in their consumption of health care services are not a homogeneous group as they may be particularly exposed to personal income and social inequalities. To better understand the factors that influence the use of health care resources among the elderly in 15 European countries, we use data from the fifth wave of European research on health, the process of aging and retirement in Europe, SHARE (Survey of Health, Ageing and Retirement in Europe)[1]. The data collected by the SHARE survey are particularly useful due to their multidisciplinary nature since they allow us to get a better insight into determinants of health services utilization of the older people which is – among others – important for future decisions in the field. Furthermore, we

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show that long-term care provision for older people acts as a complement to usage of institutional health care facilities which is important information for policy purposes, as the reforms of long-term and health care are under way in Slovenia and several other European countries.

In our study, we use Andersen's behavioral model of health service utilization (Andersen 1968; 1995; Andersen and Newman 1973) which is "a flexible framework that enables the study and selection of useful determinants of healthcare utilization" (Saeed, Oduro, Ebenezer and Zhao 2012). The model proposes that a sequence of factors influences the use of healthcare services. These determinants are categorized into three broad areas, namely predisposing factors (e.g. age, gender and educational level), enabling factors (e.g. income, settlement and availability of informal providers of long-term care) that influence ability of individuals to utilize services and need factors such a functional restriction and chronic disease that makes it essential to use health service (Willis et al. 2007).

The model we use is an Andersen's "initial" one, originating in the 1960's, not taking into account the possible recursive nature and reverse causality in the model (see Andersen 1995). Its structure is visualized in Figure 1. As stated by Andersen (1995, 1-2): "the model suggests an explanatory process or causal ordering where the predisposing factors might be exogenous (especially the demographic and social structure), some enabling resources are necessary but not sufficient conditions for use, and some need must be defined for use to actually take place". We, therefore, do not establish an explicit causal structure in the sense of causal inference (see e.g. Pearl 2009; Morgan and Winship 2007) but test the interrelationships/correlations in the model.

In their seminal study, Santos-Eggimann et al. (2005) have corroborated the notion that high level of health care utilization is correlated with an old age, the exception being the oldest age group (85+), which has for most part a lower utilization than younger age groups. They have also indicated that "women reported significantly more medical consultations and more medications than men" (Santos-Eggimann et al., 2005, 139) and that "there is a strong relationship between the level of education and several, but not all, indicators of health services utilization in Europe" (Santos-Eggimann et al., 2005, 139). Also, van Doorslaer, Koolman and Jones (2003), present new international comparative evidence on the factors driving inequalities in the use of general practitioner (GP) and specialist services in 12 EU member states. They find little or no evidence of income-related inequity in the probability of a GP visit in these countries. Conditional upon at least one visit, they even find evidence of a "pro-poor" distribution. By contrast, substantial "pro-rich" inequity emerges in virtually every country with respect to the probability of contacting a medical specialist. Despite their lower needs for such care, wealthier and higher educated individuals appear to be much more likely to see a specialist than those individuals who are less well-off.

In our study, we advance the methodology of Santos-Eggimann et al. (2005) by employing regression methods. Based on these methods, we are also able to make

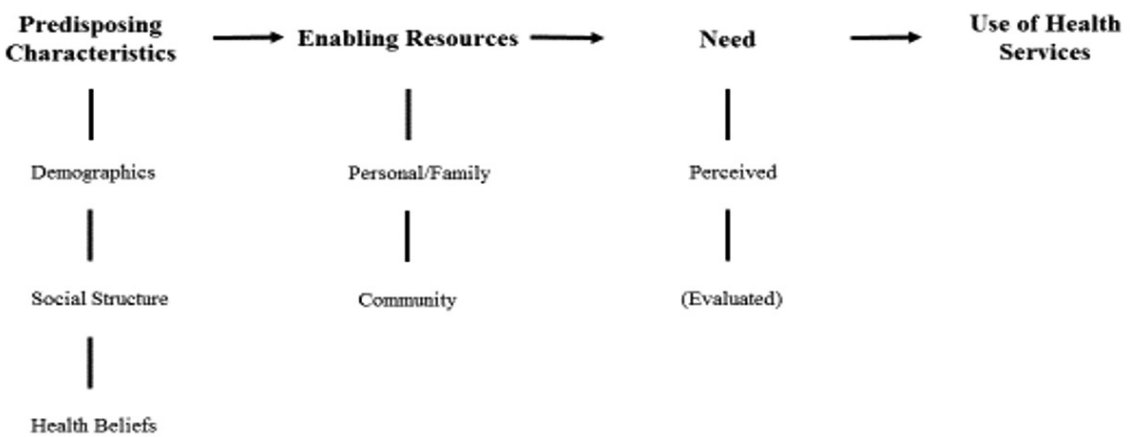

Figure 1: The structure of the Andersen's "initial" behavioral model. Based on: Andersen (1995).

[1] This paper uses data from SHARE Wave 5 (DOI: 10.6103/SHARE.w5.100), see Börsch-Supan et al. (2013) for methodological details. The SHARE data collection has been primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812) and FP7 (SHARE-PREP: N°211909, SHARE-LEAP: N°227822, SHARE M4: N°261982). Additional funding from the German Ministry of Education and Research, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064) and from various national funding sources is gratefully acknowledged (see www.share-project.org).

advancement in studying relationship between long-term care of elderly and health care utilization from an economical perspective, studying whether these two important variables complement or substitute each other.

2. Methods

Bivariate and regression analyses are applied to cross-sectional database of Wave 5 of the Survey of Health, Ageing and Retirement in Europe (SHARE) (see Börsch-Supan 2015). We limit the respondents to only those aged 65 years or more[2] (for more details, see Börsch-Supan et al. 2015; Malter and Börsch-Supan 2015; Börsch-Supan et al. 2013). Bivariate tests use t and F statistic to test the statistically significant difference between individual covariates, influencing health care utilization of the older people. The regression methods we use are Poisson for the dependent variables of count nature (nr. of medical visits, nr. of taken medications, nr. of hospitalizations) and probit for the dependent variable of binary nature (probability of hospitalization). We test the models for goodness of fit (deviance and Pearson statistic for Poisson; Hosmer-Lemeshow test for probit) as well as classification and sensitivity (only for probit).

The variables used in the study are summarized in Tables 1 through 3: Table 1 delineates dependent variables and Table 2 independent variables, while Table 3 shows their descriptive statistics. As indicated in Table 3, the average number of medical visits, average number of taken medications, and average number of hospitalizations is 7.75, 2.22 and 2.32, respectively; the average number of years of education is 10.35. There are more females (55%) than males in the study group, more than two thirds live in the urban environment, and about one fourth is living alone in the household. About 60% of the study group has one or more chronic diseases, about a quarter has depression, and one fifth has severe limitations in their daily activities. The highest proportion of persons is coming from the continental welfare regime (42%) according to the Esping-Andersen classification, followed by the Eastern European (23%) and Mediterranean (18%) welfare regimes.

3. Results and Discussion

Results of bivariate analysis are shown in Table 4. It is notable that female gender is significantly correlated with more medical visits and medications taken, but fewer hospitalizations. As expected, older people have significantly more medical visits, taken medications and hospitalizations. Higher level, i.e., more years of education are on the other hand significantly correlated with fewer medical visits, medications taken and hospitalizations as is the income.

More medications are taken – with high statistical significance – by those individuals who live in the urban area. Other strong statistical significances are observed for people living alone and having more medical visits and more hospitalizations and medications. All three health variables (limitations, chronic diseases, depression) are statistically significantly related to more medical visits and hospitalizations and a larger number of taken medications.

Comparison among various welfare regimes reveals that medical visits are the most frequent in mixed regime (Israel), followed by continental and Mediterranean regimes; Eastern European and, in particular, the social-democratic regimes have the fewest visits. For the num-

Table 1: Dependent variables used in the study

Dependent variable	Description
Nr. of medical visits	Number of visits to a medical doctor or qualified nurse about respondents health (excluding dentist visits and hospital stays, but including emergency room or outpatient clinic visits)
Nr. of taken medications	Number of taken medications as a sum of answers to the following question: »Do you currently take drugs at least once a week for problems mentioned*?«
Nr. of hospitalisations	Number of hospitalisations in a hospital overnight during the last twelve months
Probability of hospitalisation	Response to the following question: »During the last twelve months, have you been in a hospital overnight? Please consider stays in medical, surgical, psychiatric or in any other specialised wards.«

* The drugs include the following: 1. Drugs for high blood cholesterol; 2. Drugs for high blood pressure; 3. Drugs for coronary or cerebrovascular diseases; 4. Drugs for other heart diseases; 6. Drugs for diabetes; 7. Drugs for joint pain or for joint inflammation; 8. Drugs for other pain (e.g. headache, back pain, etc.); 9. Drugs for sleep problems; 10. Drugs for anxiety or depression; 11. Drugs for osteoporosis; 13. Drugs for stomach burns; 14. Drugs for chronic bronchitis; 15. Drugs for suppressing inflammation (only glucocorticoids or steroids); 97. Other drugs, not yet mentioned.

[2] Older people are usually defined as people aged 65 years or older. For the definition see e.g. OECD (2010).

Table 2: Independent variables used in the study

Independent variable	Description
Gender	Male or female
Age	Four groups – 65-69 years; 70-74 years; 75-79 years; 80 and more years
EduYears	Years of education
Income	Total household income, classified into tertiles (low, middle, high) by individual country
Settlement	Living in an urban (encompassing: 1. A big city; 2. The suburbs or outskirts of a big city; 3. A large town; 4. A small town) or in a rural (A rural area or village) environment
LivingAlone	Binary variable, having the value of 1 if the respondent lives alone in a household and 0 otherwise
ChildDist	Binary variable, having the value of 1 if the respondent has a child living in the area of 25 km and 0 otherwise
Limited	Binary variable, having the value of 1 if the respondent is severely limited because of a health problem in activities people usually do and 0 otherwise
ChronDis	Binary variable, having the value of 1 if the respondent has 2 or more chronic diseases*; and 0 otherwise
Depression	Binary variable, having the value of 1 if the respondent has a score of 4 or more on the Euro-Depression scale and 0 otherwise
Welfare Regime	Individual countries grouped in the welfare regimes, following Esping-Andersen (1990) and related literature, as 1 – continental (Austria, Germany, Netherlands, France, Switzerland, Belgium, Luxembourg); 2 – social democratic (Sweden, Denmark); 3 – Mediterranean (Spain, Italy); 4 – eastern European (Czech Republic, Slovenia, Estonia); 5 – mixed (Israel)

*The chronic disease include the following: 1. A heart attack including myocardial infarction or coronary thrombosis or any other heart problem including congestive heart failure; 2. High blood pressure or hypertension; 3. High blood cholesterol; 4. A stroke or cerebral vascular disease; 5. Diabetes or high blood sugar; 6. Chronic lung disease such as chronic bronchitis or emphysema; 10. Cancer or malignant tumour, including leukaemia or lymphoma, but excluding minor skin cancers; 11. Stomach or duodenal ulcer, peptic ulcer; 12. Parkinson disease; 13. Cataracts; 14. Hip fracture; 15. Other fractures; 16. Alzheimer's disease, dementia, organic brain syndrome, senility or any other serious memory impairment; 18. Other affective or emotional disorders, including anxiety, nervous or psychiatric problems; 19. Rheumatoid Arthritis; 20. Osteoarthritis, or other rheumatism; 97. Other conditions, not yet mentioned

ber of taken medications the ranking is as follows: mixed, Mediterranean, Eastern, continental, and socialdemocratic regime. Eastern European regime witnesses most hospitalizations, and is followed by the continental, mixed, Mediterranean, and socialdemocratic regimes. For each of the three dependent variables, highly statistically significant differences among the welfare regimes are observed.

Table 5 shows the results of initial regression models, including all covariates, except the long-term care variables. For the number of medical visits, gender has a positive and strong influence (women tend to use medical visits more frequently than men). As for age, the 70-74 and 75-79 groups have more frequent visiting than 65-69 group, while 80+ group uses medical visits less often as compared to 65-69 group, although the relationship is insignificant (this phenomenon has already been observed and partly explained in Hren, Prevolnik Rupel and Srakar (2015). Education is not significantly related to the number of medical visits. When considering income, the highest tertile group tends to have significantly less visits, the relationship is strong in significance. Urban residents tend to have more visits which can be an indication of better access to health care in cities. Those having a child in the proximity of 25 km tend to have significantly more visits (having a child living close could be a reason for being able to visit a doctor more often with help of a child). As for the need (health) variables, the pattern is clear: the worse health, the more visits – all relationships are very strong, which holds for all dependent variables. As for the differences in welfare regimes, compared to Eastern European (reference category), social democratic countries tend to have less visits (which could be an indication of better health among older people in those countries in general, see e.g. Srakar 2015), while other three regimes tend

Table 3: Descriptive statistics of main variables used in the study

	Average	Median
Nr. of medical visits	7.75	5.00
Nr. of taken medications	2.22	2.00
Nr. of hospitalisations	2.32	0.00
EduYears	10.35	10.40
		Percent
Gender	Male	45%
	Female	55%
Age	65-69	31%
	70-74	25%
	75-79	20%
	80+	23%
Settlement	Rural	30%
	Urban	70%
LivingAlone	No	72%
	Yes	28%
ChildDist	No	26%
	Yes	74%
Limited	No	80%
	Yes	20%
ChronDis	No	41%
	Yes	59%
Depression	No	71%
	Yes	29%
Welfare Regime	SocialDem	14%
	Continent	42%
	Mediterr	18%
	Eastern	23%
	Mixed	4%

to have more visits.

For the number of taken medications, gender has again a positive but strong influence, namely women tend to take much more medications than men. As for age, all of the older groups have significantly more frequent taking of medications than the reference, 65-69 group. More educated tend to take fewer medications, as already observed in Table 4. Groups with higher income clearly tend to take fewer medications. Urban residents tend to take slightly more medications, which could again be a sign of better access to health care in cities in general. In the model we do not include the variables of living alone and child distance and we expect they do not have and logical interrelationship to the taking of medications. Again, the health variables have a strong relationship to the dependent variable following the rule: "the worse health, the more medications". As compared to Eastern European (reference category), social democratic countries tend to have less taken medications, while other three regimes tend to have more taken medications, which is fully in line with the model for previous dependent variable.

As for probability of hospitalization, the gender has a *negative* and strong influence: women tend to have lower probability of hospitalization than men. All of the older

Table 4: Results of bivariate tests. The number of asterisks denote the level of significance (*** - 1%; ** - 5%; * - 10%). For abbreviations, see Tables 1 and 2.

		Nr. of medical visits		Nr. of taken medications		Nr. of hospitalisations	
		Average	t/F (Sign.)	Average	t/F (Sign.)	Average	t/F (Sign.)
Gender	Male	7.4896	-4.2***	2.0433	-31.8***	2.4464	2.02**
	Female	7.9562		2.3603		2.2224	
Age	65-69	6.6848	72***	1.8088	435.5***	1.5755	43.99***
	70-74	7.6545		2.1351		2.1751	
	75-79	8.3812		2.4607		2.6158	
	80+	8.7554		2.6503		3.2449	
EduYears	below 11	7.9452	3.95***	2.3636	16.16***	2.4322	2.56***
	11+	7.5205		2.0722		2.1642	
Income	Low	8.1938	16.6***	2.4662	131.2***	2.4182	6.93***
	Middle	7.5556		2.1439		2.0452	
	High	7.1352		1.9698		1.8187	
Settlement	Rural	7.7951	0.58	2.1657	-3.67***	2.4777	1.90**
	Urban	7.7239		2.2392		2.2582	
LivingAlone	No	7.5376	-5.9***	2.1462	-12.1***	2.1186	-5.51***
	Yes	8.2932		2.4038		2.8593	
ChildDist	No	7.6067	-3.0***	2.1004	-7.41***	2.3828	-0.21
	Yes	8.0246		2.2688		2.4098	
Limited	No	6.4687	-34***	1.9398	-54.6***	1.2956	-22.7***
	Yes	13.0527		3.3350		6.4753	
ChronDis	No	5.0998	-44***	1.0810	-130***	1.2165	-18.0***
	Yes	9.6110		3.0128		3.0997	
Depression	No	6.4456	-29***	1.8534	-53.2***	1.4929	-16.6***
	Yes	10.5655		3.0345		4.0071	
Welfare Regime	SocDem	4.9304	136***	1.8979	129.8***	1.3321	21.43***
	Continent	8.4823		2.1277		2.6166	
	Mediterr	8.2869		2.4361		1.8281	
	Eastern	7.2382		2.2871		2.7586	
	Mixed	10.4938		2.9162		2.3555	

age groups have higher probability of hospitalization than 65-69 group, which is fully in accordance with expectations and shows a slight difference between the probability and frequency of hospitalizations and frequency of visiting the doctor where an inverse U-shaped relationship has been observed as explained before. There is no influence of either education, income and/or settlement, while those living alone tend to have a higher probability of hospitalization. Again, the relationship of health variables is positive and very strong. There is no relationship of socialdemocratic regime as compared to Eastern European (reference category), while continental countries tend to have higher and Mediterranean and mixed regime countries a lower probability of hospitalization.

Similar relationships can be observed for the number of hospitalizations: gender has a negative influence, namely

Table 5: Results of regression models (Poisson, probit). The number of asterisks denote the level of significance (*** - 1%; ** - 5%; * - 10%). For abbreviations, see Tables 1 and 2.

	Nr. of medical visits			Nr. of taken medications			Probab. of hospitalisation			Nr. of hospitalisations		
	Coef.	z	P>z	Coef.	z	P>z	Coef.	z	P>z	Coef.	z	P>z
Constant	1.3324	81.13	***	-0.0540	-2.08	**	-1.4286	-21.14	***	-0.3668	-11.43	***
Gender	-0.0284	-4.47	***	0.0560	5.24	***	-0.1402	-5.28	***	-0.2859	-23.78	***
Age70-74	0.0673	8.30	***	0.0722	5.14	***	0.0733	2.16	**	0.2455	14.82	***
Age75-79	0.0785	9.25	***	0.1275	8.77	***	0.0888	2.48	**	0.1558	8.98	***
Age80+	-0.0018	-0.21		0.1112	7.79	***	0.1183	3.37	***	0.2685	16.53	***
EduYears	0.0002	0.28		-0.0035	-2.47	**	-0.0016	-0.46		-0.0054	-3.39	***
IncomeMid	-0.0078	-1.06		-0.0281	-2.45	**	0.0181	0.58		0.0216	1.54	
IncomeHigh	-0.0453	-5.36	***	-0.0573	-4.14	***	0.0202	0.57		-0.0716	-4.34	***
Settlement	0.0223	3.44	***	0.0202	1.82	*	0.0016	0.06		-0.0433	-3.61	***
LivingAlone	0.0055	0.80					0.0638	2.19	**	0.0915	6.93	***
ChildDist	0.0267	4.06	***				0.0263	0.96		0.0628	5.02	***
Limited	0.4515	65.56	***	0.2469	20.78	***	0.5250	17.52	***	1.2190	99.75	***
ChronDis	0.5053	74.27	***	0.8897	70.57	***	0.3738	13.86	***	0.6555	45.29	***
Depression	0.2020	31.08	***	0.2157	19.65	***	0.2066	7.45	***	0.4257	35.20	***
Welfare Regime												
SocialDem	-0.1837	-15.33	***	-0.0401	-2.34	**	0.0325	0.74		-0.1255	-5.62	***
Continent	0.2765	36.15	***	0.0464	3.69	***	0.1520	4.84	***	0.2432	17.83	***
Mediterr	0.2683	27.96	***	0.0941	5.98	***	-0.0854	-2.04	**	-0.1062	-5.48	***
Mixed	0.3008	17.15	***	0.2691	9.73	***	-0.1468	-1.78	*	-0.1512	-4.10	***
Observations	15309			18567			15430			15419		
LR Chi2	20263.4	***		9883.8	***		965.9	***		24158.4	***	
Log Likelihood	-79468			-30018			-6838			-71097		
Pseudo R2	0.1131			0.1414			0.0660			0.1452		

women tend to have less hospitalizations than men. As for age, all of the older groups have more hospitalizations than the reference, 65-69 group. More educated and/or richer people tend to have fewer hospitalizations, while, interestingly, rural areas tend to have more hospitalizations (in line with results from Table 4), which could be explained as a consequence of worse health in those areas. Those living alone and those having a child in proximity of 25 km tend to have more hospitalizations, while the relationships of health variables are again guided by the rule: "the worse health, the more hospitalizations". As compared to Eastern European (reference category), continental countries tend to have more hospitalizations, while other three regimes tend to have less hospitalizations.

One of the main interesting results is shown in Table 6, where we also include the long-term care provision as covariates. Informal care (which is a binary variable, taking the value of 1 for those respondents receiving either informal care within or outside household, and 0 otherwise) and formal care (a binary variable, having value of 1 of the respondent receives any type of formal care, and 0 otherwise) have a positive influence on all dependent variables: people receiving such care tend to have both a higher number of medical visits, number of taken medications, higher probability of hospitalization and higher number of hospitalizations. This shows the complementary relationship

Table 6: Results of regression models, including receiving of formal and/or informal care as predictor. The number of asterisks denote the level of significance (*** - 1%; ** - 5%; * - 10%). For abbreviations, see Tables 1 and 2.

	Nr. of medical visits			Nr. of taken medications			Probab. of hospitalisation			Nr. of hospitalisations		
	Coef.	z	P>z	Coef.	z	P>z	Coef.	z	P>z	Coef.	z	P>z
Constant	1.3230	80.16	***	-0.0505	-1.93	*	-1.4264	-20.85	***	-0.3214	-10.03	***
Gender	-0.0442	-6.96	***	0.0451	4.20	***	-0.1631	-6.09	***	-0.3446	-28.73	***
Age70-74	0.0562	6.93	***	0.0664	4.73	***	0.0579	1.69	*	0.1955	11.78	***
Age75-79	0.0478	5.60	***	0.1114	7.62	***	0.0470	1.30		0.0304	1.74	*
Age80+	-0.0784	-8.98	***	0.0722	4.91	***	0.0108	0.30		0.0035	0.21	
EduYears	-0.0005	-0.64		-0.0038	-2.64	***	-0.0028	-0.80		-0.0080	-5.02	***
IncomeMid	-0.0096	-1.31		-0.0228	-1.98	**	0.0130	0.42		0.0105	0.75	
IncomeHigh	-0.0468	-5.52	***	-0.0531	-3.83	***	0.0168	0.47		-0.0785	-4.74	***
Settlement	0.0269	4.16	***	0.0191	1.72	*	0.0085	0.31		-0.0369	-3.06	***
LivingAlone	-0.0259	-3.73	***				0.0149	0.51		-0.0230	-1.73	*
ChildDist	0.0148	2.25	**				0.0167	0.60		0.0376	3.00	***
Limited	0.3664	51.02	***	0.2080	16.81	***	0.4135	13.24	***	0.9412	73.48	***
ChronDis	0.4784	69.94	***	0.8786	69.44	***	0.3404	12.50	***	0.5597	38.39	***
Depression	0.1694	25.89	***	0.2030	18.38	***	0.1666	5.93	***	0.3332	27.44	***
InfCare	0.2690	40.47	***	0.0794	6.94	***	0.2992	10.59	***	0.6169	49.58	***
FormCare	0.1232	15.56	***	0.1033	7.56	***	0.2503	7.32	***	0.5893	44.60	***
Welfare Regime												
SocialDem	-0.1775	-14.77	***	-0.0432	-2.51	**	0.0290	0.65		-0.1624	-7.24	***
Continent	0.2946	37.78	***	0.0393	3.06	***	0.1601	4.97	***	0.2209	15.86	***
Mediterr	0.2912	30.20	***	0.0969	6.14	***	-0.0670	-1.59		-0.0636	-3.26	***
Mixed	0.3166	18.00	***	0.2645	9.54	***	-0.1539	-1.84	*	-0.1929	-5.21	***
Observations	15309			18567			15430			15419		
LR Chi2	22442.1	***		10015.7	***		1167.5	***		29851.0	***	
Log Likelihood	-78378			-29952			-6738			-68250		
Pseudo R2	0.1252			0.1432			0.0797			0.1794		

between long-term care and health care utilizations of the older people – long-term care serves as an addition (and not replacement) for formal hospital facilities. Although this relationship would need more econometric testing, as the variables of long-term care and hospital care are surely in an endogenous, reverse causal relationship and there are many possible confounders, this could be an important information for future measures in both areas, which are particularly adjourn and actual in Slovenia with reforms being under construction.

We can also see that for the control variables there are no notable changes in sign and significance of the coefficients.

In the analysis above we presented an econometric analysis of determinants of health care utilization in older Europeans, using SHARE dataset. Our main findings on the basis of above elaboration can be grouped as follows:

- Among the determinants, gender has a different effect

for visiting doctors and taking medications vs. hospitalization. Women tend to have more visits to doctors and medications while men tend to be hospitalized more. This could be a consequence of women being more frail and prone to milder forms of health care while men using the health facilities mainly when their health situation is more severe.
- Age has an expected effect for most of the variables: older people tend to use health facilities more often, with an exception of visiting doctors where the oldest group tends to visit the doctors less frequently. Perhaps this could be explained by survival effects – the ones who are the oldest had a largest probability of survival and are therefore more resistant to at least the milder forms of health problems.
- Education and income have mainly expected effects: those with higher education and income tend to use health facilities less often.
- Those, living in urban areas tend to have more visits to doctors and taken medications, which could be a consequence of better access to healthcare as compared to rural areas. Interestingly, those living in urban areas tend to have more hospitalizations which we explain as a sign of their worse health as compared to urban areas.
- »Need«, i.e. health variables has an expected, positive effect to utilization of health care services: those in more need use health care facilities significantly more often.
- There are significant differences between welfare regimes: those in social-democratic countries tend to use health facilities less often (as compared to the reference, Eastern European regime), which is probably a consequence of their better health in general[2]. Interestingly, those in continental regime tend to use facilities significantly more often (both the number of hospitalizations, number of taken medications as well as medical visits), compared to Eastern European regime, while Mediterranean and mixed regime tend to have more visits to doctors and taken medications, while having significantly less hospitalizations.
- Informal and formal long-term care contributes positively and significantly to the usage of health care facilities, which we interpreted as sign of complementarity between long-term care and health care utilization. Again, we warn that causal structure of the model (including the modelling of an apparent reverse causal relationship between long-term care and health utilization) could be oversimplified and would have to be modelled more accurately in future studies.

The main drawback to the study, therefore, lies in an over-simplified causal structure of our models. For the future work, models of causal inference (instrumental variables, counterfactuals, longitudinal modelling, etc.) should be used, taking into account several recursive, i.e. reverse-causal relationships in the model, as observed already by Andersen (1995). Furthermore, these techniques would allow us to estimate marginal effects of individual variables and by that the size of their effects on health care utilization. We, nevertheless, hope that the findings of our study will provide important information in both scientific sense as well as a foundation for the future policy measures in the field.

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