COST-INDUCED UNMET NEED FOR HEALTH CARE AMONG EUROPE'S OLDER ADULTS – THE ROLE OF SPECIFIC DISEASES

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ABSTRACT

Older adults are the most vulnerable group to suffer from health care cost burdens which may result in barriers to health care consumption. Aiming to evaluate the relationship between cost-induced unmet need and specific age-related health conditions among the European 50+ population we perform age-specific regressions using data from the Survey of Health, Ageing and Retirement in Europe. The results show that unmet need is strongly associated with emotional disorders, arthritis and heart attack across all age groups. High blood pressure, high blood cholesterol, chronic lung disease, stomach ulcers, and fractures are significant correlates for specific age groups. This highlights the importance of a health condition-specific as well as age-specific approach when reducing inequalities in access to health care. Policy makers therefore should pay more attention to financial barriers accessing health care for specific groups of the older population and consider complementary protective features for people with specific health conditions.

KEY WORDS

unmet need, access to health care, health conditions, older adults, Europe

JEL CODES

I12, I18, I31, J18

1 INTRODUCTION

Although the majority of European countries have based their health care systems on universal coverage and universal access to health care, limitations to access resulting in unmet need are observed (Baeten et al., 2018; Fjær et al., 2017; Guessous et al., 2012; Litwin and Sapir, 2009; Mielck et al., 2009; Röttger et al., 2016). Unmet need is the lack or missing opportunity of any health care service while having an objective need for care. In particular treatment costs, in other words out-of-pocket (OOP) payments, are often claimed by patients

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to be one of the decisive reasons for forgoing health care (Chaupain-Guillot and Guillot, 2015; Connolly and Wren, 2017; Guessous et al., 2012; Schokkaert et al., 2017). Moreover, a positive link between unmet health care need and OOP payments has been found (Chaupain-Guillot and Guillot, 2015).

Empirical evidence suggests that older people have higher OOP payments and face a higher financial burden compared to younger, healthier and economically active individuals (Palladino et al., 2016). Thus, with respect to the fact that age is an important correlate of the need for health care and the incidence of chronic conditions and multimorbidity increases with age (Nielsen et al., 2017; Prince et al., 2015), older people might be the group most vulnerable to unmet need because of costs.

Against this background, our study aims to evaluate the relationship between unmet need due to costs and specific age-related health conditions taking into account various subgroups of the population 50+ in Europe. In the context of our analysis, unmet need is defined as a need to see any type of doctor or qualified nurse, emergency room or outpatient clinic visit, which is not met because of health care costs.

We deal with the research question: Which age-related health conditions play a role in forgoing health care for financial reasons? Additionally, we extend our analysis with the research question: Are there differences between age categories among older people?

In this study, we contribute to findings of the available empirical studies exploring unmet need among older people in Europe (Bremer, 2014; Herr et al., 2014; Litwin and Sapir, 2009; Mielck et al., 2009) providing a new insight into the issue of unmet need and its association with age-related health conditions. The main motivation for this approach is that specific health conditions are usually not considered by policy makers when implementing protective health policies. Moreover, we are not aware of any comprehensive study of both health condition-related and cost-induced unmet need for Europe.

The remainder of this paper is as follows. Section 2 continues with a brief literature review, highlighting different aspects related to unmet need. The methodological aspects of our analyses including data and variables used are described in Section 3. Results of regression models estimating correlates of unmet need for the 50+ population and specific age groups are presented in Section 4. Finally, our findings are discussed and conclusions drawn in the concluding parts Section 5 and 6 of the paper.

2 LITERATURE REVIEW

Investigating unmet need we might derive from the conceptual approach to health care utilisation presented by Andersen and Newman (2005). They distinguish three categories of individual determinants influencing health care utilisation, namely predisposing, need and enabling factors. Predisposing factors exist prior to the presence of a certain illness and include the consumer's predictable characteristics such as age, gender, marital status, previous health behaviour, race or ethnicity, family size, religion, and region of the country and residence. These factors are extended by the beliefs health care consumers have (values concerning health, knowledge about disease and treatment, and attitudes towards health care services). Need factors represent the most urgent reason to utilise health care as they relate to the onset of illness. They distinguish subjective need (self-perceived health status, symptoms of illness and disability) and objectively recognised need (physician-rated urgency of present condition, stated diagnoses, symptoms, etc.). Enabling factors ensure the possibility of access to health care. Factors such as several sources of income, education, insurance coverage, the regular source of care and the price of health services are considered.

A relationship between unmet need and socio-economic characteristics, self-perceived health status, the presence of diseases in general and specific types of health care services has

been explored in several studies (Allin et al., 2010; Chaupain-Guillot and Guillot, 2015; Connolly and Wren, 2017; Cylus and Papanicolas, 2015; Fjær et al., 2017). However, little has been written about the relationship between objectively recognised need, i.e. diagnosed health conditions, and unmet need due to costs in Europe. This is a very important aspect as some studies have found a relationship between unmet need and a decline in health outcomes (Ko, 2016) and even between unmet need and mortality (Lindström et al., 2020).

As people age some health conditions are more common than in the earlier stages of life often defined as "age-related diseases/conditions" (Chang et al., 2019). Among them the highest disease burden measured by Disability-Adjusted Life Years (DALYs) for the 50+ population is related to cancer (24.3%) and cardiovascular diseases (CVDs), including heart attack and stroke (21.6%). A high disease burden is also caused by musculoskeletal disorders[1] (9.6%), chronic obstructive pulmonary disease (4.1%), Diabetes mellitus (3.6%), Alzheimer's disease (3.4%) and falls (3.1%). Emotional disorders (1.6%), chronic kidney disease (1.2%), Parkinson's disease (0.7%), stomach/peptic ulcer disease (0.3%), and cataract (0.3%) also belong among the most common age-related health conditions but with a lower disease burden (GBD, 2020).

Evidence on unmet need shows that OOP payments can limit access to not only essential but also non-essential health care (Thomson et al., 2019). Thus, we can assume that unmet need might be perceived as for fatal as well as for less severe health conditions and therefore, the identification of particular health conditions associated with unmet need due to costs is desirable when policy makers target improvements in access to needed health care.

Older people are not a homogenous group and inequalities in health among various age groups of older population have been documented (GBD, 2020). Measured by DALYs cancer causes the highest burden in the age category 60 to 69 (28.9%) with the lowest value for the 80+ population (14.7%). Conversely, CVDs burden increases linearly with age starting at 13.7% of DALYs in the age group 50 to 59 over 25.8% among 70 to 79 years old and reaching 33.7% in the age group 80+. A noticeable inequality can be observed for musculoskeletal disorders (rheumatoid arthritis and osteoarthritis); the highest disease burden can be found in the age category 50 to 59 (13.3% of DALYs) with a decreasing trend (4.5% of DALYs) among the 80+ population. Similarly, the disease burden for emotional disorders decreases with age (2.5% of DALYs for the age group 50 to 59 and 0.8% for the 80+ group). Even if the burden of Alzheimer's disease is relatively low in younger old age (0.3% of DALYs among 50 to 59) it increases sharply in the old age and reaches 12.4% of DALYs in the age group 80+ (GBD, 2020).

3 DATA AND METHODS

3.1 Data Source

For our analysis we use the sixth wave of the Survey of Health, Ageing and Retirement in Europe (SHARE), release 6.0.0 (Börsch-Supan, 2017). SHARE is a multidisciplinary panel database containing cross-national micro data with detailed information on the European population aged 50 years and older. These data cover the key areas of life; namely health and socio-economics as well as social networks and support (Börsch-Supan et al., 2013). With the fieldwork completed in 2015, the sixth wave includes 17 European countries plus Israel. We include all European countries participating in the survey, namely Austria, Germany, Swe-

[1] Musculoskeletal disorders are not usually termed "age-related" because younger people are also affected; however, their prevalence increases with age and therefore, they are often listed as health conditions associated with older age.

den, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, the Czech Republic, Poland, Luxembourg, Portugal, Slovenia, Estonia and Croatia. Technical details such as questionnaire innovations, methodological improvements, new procedures and further important changes valid for the sixth wave are documented elsewhere (Malter and Börsch-Supan, 2017).

3.2 Unmet Need for Doctors' Visits

When investigating unmet need, the dependent variable is derived from the question "Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?" Any type of doctor or qualified nurse, emergency room or outpatient clinic visit is considered (derived from the question HC114_UnmetNeedCost). The response categories 'yes' and 'no' specify a binary indicator for cost-induced unmet need for doctors' visits (yes = 1, no = 0). Further in the text we use the term 'unmet need' for our dependent variable. The sample sizes and shares of unmet need (% of individuals claiming unmet need) are displayed in Tab. 1.

Tab. 1: Presence of unmet need in the full sample and respective subsamples

Sample	Frequency	Percent	Share of unmet need (%)
Full	64,394	100.00	4.81
50–59	15,185	23.58	6.08
60–69	23,101	35.88	4.72
70–79	16,984	26.37	4.45
80+	9,124	14.17	3.58

Note: Kruskal-Wallis test showed a statistically significant difference in unmet need between the age groups, $\chi^2(3) = 12.178$, $p = 0.0068$.

3.3 Factors Affecting Unmet Need

Our analysis is based on the demand concepts for health care and the utilisation of health care services presented by Andersen and Newman (2005) as well as on empirical findings in the literature outlined above. The final set of included predictors respects results of multicollinearity and goodness-of-fit tests. As the focus is on the need factors, we involve two types of health related variables. The most important is the set of health conditions. Health condition dummies consider the fact of being diagnosed with a specific health problem or not. These conditions are derived from the question of whether the respondent has or has ever had a specific condition diagnosed by a doctor and is either currently being treated for or bothered by this condition (question PH006_DocCond). Tab. 2 presents a more detailed description of the health conditions. Other health variables are 'limitations in basic activities of daily living' (ADL) – dressing, eating, walking, using the toilet and hygiene – and 'instrumental activities of daily living' (IADL) – shopping, housekeeping, accounting, food preparation and taking medication. Both are used as continuous variables – a number of reported limitations.

Further, we control for the predisposing factors representing socio-demographic characteristics – gender and age. 'Age' is entered as a categorical variable with four groups (50 to 59, 60 to 69, 70 to 79 and 80 years or older).

The last class defines enabling factors. Income and education are observed. Further, variables reflecting health care systems settings capturing the financial burden due to OOP payments, expressed as a share of equivalised income, and supplementary health insurance are included. To account for differences in household size the variable 'income' is adjusted according to the square root equivalence scale (Organisation for Economic Cooperation and Development, 2013). For the analysis, equivalised income quartiles are constructed within each observed country in order to reflect the income distribution. 'Education' is measured according to the International Standard Classification of Education (ISCED-97) but recoded into three categories; having no or only primary education, secondary and tertiary education. The burden of OOP payments is expected to have the different magnitude of various OOP payment types. Therefore, four categories are distinguished: OOP burden for inpatient care, outpatient care, drugs and nursing care. We also include a dummy variable for supplementary health insurance which may lower OOP pay-

Tab. 2: Description of health condition variables

Health condition variable	Description
Heart attack	Heart attack including myocardial infarction or coronary thrombosis or any other heart problem including congestive heart failure
High blood pressure	High blood pressure or hypertension
High blood cholesterol	High blood cholesterol
Stroke	Stroke or cerebral vascular disease
Diabetes	Diabetes or high blood sugar
Chronic lung disease	Chronic lung disease such as chronic bronchitis or emphysema
Cancer	Cancer or malignant tumour, including leukaemia or lymphoma, but excluding minor skin cancers
Stomach ulcers	Stomach or duodenal ulcer, peptic ulcer
Parkinson	Parkinson's disease
Cataracts	Cataracts
Fractures	Hip fracture and other fractures
Alzheimer	Alzheimer's disease, dementia, organic brain syndrome, senility or any other serious memory impairment
Emotional disorders	Other affective or emotional disorders, including anxiety, nervous or psychiatric problems
Arthritis	Rheumatoid Arthritis, Osteoarthritis or other rheumatism
Kidney disease	Chronic kidney disease

Note: Descriptions are taken from the SHARE main questionnaire for the sixth wave, question PH006_DocCond.

ments and thus, improve access to health care services. Additionally, to control for various health care policy frameworks of the countries included, the OOP payment share of current national spending on health (Organisation for Economic Cooperation and Development, 2020) is used as a country-level proxy indicator for financial protection as suggested by Thomson et al. (2019). The characteristics of the sample are displayed in Tab. 3.

3.4 Analytical Framework

In this cross-sectional study, we apply binary logistic regression models to understand the determinants of unmet need. Developed in hierarchical stages the analysis starts with the need factors, is then extended by the predisposing factors and finally adding enabling factors (complete model). Running the analysis in the hierarchical stages also serves as a robustness check of our model (see supplementary file in the Annex). In the main analysis, we run the complete model for the full sample. As a next step, we perform age-specific regressions for four age categories with the complete model specification in order to check the model's applicability in different stages of the ageing process and to account for possible differences between these stages. The 'age' variable is included here as a continuous variable to control for age differences within a specific age group.

Model diagnostics, including checking for influential outliers and multicollinearity, link testing and goodness of fit testing indicate that the model is properly fitted. Regression results are displayed as average marginal effects (AMEs) as they allow comparison between the models. AMEs first calculate the marginal effect in every individual observation of the respective independent variable and then calculate the average. This is particularly useful as it produces a single quantity measure that reflects the full distribution of the respective variable.

Tab. 3: Sample characteristics (percentage shares)

Variable	Full sample	Subsamples 50–59	60–69	70–79	80+
Predisposing					
Gender					
– male	44.13	40.53	45.87	45.98	42.25
– female	55.87	59.47	54.13	54.02	57.75
Age	67.74 (9.924)	55.47 (2.547)	64.50 (2.861)	74.14 (2.831)	84.49 (3.860)
Age groups					
– 50–59	23.58				
– 60–69	35.87				
– 70–79	26.38				
– 80+	14.17				
Need					
Heart attack	11.31	4.38	8.52	15.42	22.26
High blood pressure	41.50	26.15	39.77	51.42	52.96
High blood cholesterol	24.48	16.91	25.23	29.25	26.30
Stroke	3.66	1.53	2.71	4.92	7.24
Diabetes	13.42	6.72	12.84	17.82	17.88
Lung disease	6.36	4.60	5.84	7.49	8.55
Cancer	4.61	3.04	4.25	6.06	5.46
Stomach ulcers	4.12	3.91	3.85	4.47	4.53
Parkinson	0.85	0.15	0.43	1.37	2.12
Cataracts	8.06	1.42	4.64	12.60	19.27
Fractures	5.78	4.60	4.72	6.29	9.49
Alzheimer	2.01	0.41	0.67	2.08	7.98
Emotional disorders	6.75	7.25	6.14	6.59	7.72
Arthritis	24.90	16.79	22.93	29.16	35.44
Kidney disease	1.96	1.20	1.53	2.44	3.39
ADL*	0.251 (0.874)	0.11 (0.527)	0.14 (0.619)	0.27 (0.891)	0.73 (1.479)
IADL*	0.51 (1.493)	0.16 (0.698)	0.24 (0.925)	0.54 (1.477)	1.74 (2.605)
Enabling					
Education					
– none/primary	40.89	28.02	36.23	47.03	62.71
– secondary	37.07	44.25	40.25	33.34	23.98
– tertiary	22.04	27.72	23.52	19.63	13.31
Income					
– 1st quartile	25.52	25.33	25.68	25.42	25.64
– 2nd quartile	25.20	25.16	24.82	26.04	24.67
– 3rd quartile	24.81	24.81	25.03	24.13	25.48
– 4th quartile	24.47	24.70	24.47	24.41	24.21
OOP burden*					
– inpatient	0.100 (1.204)	0.068 (1.109)	0.069 (0.808)	0.134 (1.423)	0.171 (1.656)
– outpatient	1.262 (3.701)	1.254 (3.828)	1.262 (3.556)	1.355 (3.887)	1.107 (3.478)
– drugs	1.272 (2.929)	0.888 (2.344)	1.121 (2.673)	1.538 (3.248)	1.801 (3.598)
– nursing	0.559 (5.584)	0.120 (1.685)	0.199 (2.450)	0.474 (3.843)	2.359 (12.992)
Supp. HI	36.68	42.54	37.94	32.98	30.60
Country OOP share of total health expenditure*	19.27 (7.271)	19.02 (7.473)	19.14 (7.292)	19.38 (7.082)	19.81 (7.199)

Note: * OOP burden, ADL, IADL and country OOP share of total health expenditure – continuous variables – mean and standard deviation (in parentheses).

Tab. 4: Logit regression results for unmet need (average marginal effects)

Variable	Complete model	Age-specific models 50–59	60–69	70–79	80+
Predisposing					
Gender[a]	−0.0125*** (0.0017)	−0.0214*** (0.0040)	−0.0140*** (0.0028)	−0.0109*** (0.0033)	−0.0019 (0.0040)
Age group[b]					
– 60–69	−0.0243*** (0.0027)				
– 70–79	−0.0371*** (0.0028)				
– 80+	−0.0520*** (0.0029)				
Age		−0.0038*** (0.0007)	−0.0026*** (0.0005)	−0.0012* (0.0005)	−0.0030*** (0.0006)
Need					
Heart attack	0.0146*** (0.0023)	0.0179* (0.0075)	0.0186*** (0.0040)	0.0126*** (0.0037)	0.0087* (0.0042)
High blood pressure	0.0066*** (0.0017)	0.0132** (0.0042)	0.0050 (0.0028)	0.0066* (0.0032)	0.0029 (0.0040)
High blood cholesterol	0.0073*** (0.0018)	0.0061 (0.0047)	0.0075** (0.0029)	0.0074* (0.0032)	0.0052 (0.0039)
Stroke	0.0097* (0.0038)	0.0004 (0.0132)	0.0057 (0.0069)	0.0104 (0.0060)	0.0068 (0.0065)
Diabetes	0.0021 (0.0022)	−0.0001 (0.0066)	0.0031 (0.0037)	0.0037 (0.0037)	−0.0028 (0.0045)
Lung disease	0.0133*** (0.0028)	0.0183** (0.0070)	0.0058 (0.0049)	0.0163*** (0.0047)	0.0081 (0.0056)
Cancer	0.0018 (0.0038)	−0.0117 (0.0107)	0.0045 (0.0063)	0.0027 (0.0064)	0.0017 (0.0082)
Stomach ulcers	0.0150*** (0.0030)	0.0188** (0.0071)	0.0118* (0.0052)	0.0084 (0.0055)	0.0179** (0.0061)
Parkinson	−0.0101 (0.0085)	0.0165 (0.0392)	−0.0347 (0.0232)	−0.0140 (0.0110)	−0.0147 (0.0125)
Cataracts	0.0039 (0.0028)	0.0068 (0.0127)	0.0016 (0.0055)	0.0088* (0.0041)	0.0031 (0.0044)
Fractures	0.0090** (0.0031)	0.0217** (0.0076)	0.0103* (0.0053)	0.0034 (0.0056)	0.0016 (0.0059)
Alzheimer	−0.0114* (0.0058)	−0.0313 (0.0255)	0.0050 (0.0121)	−0.0087 (0.0093)	−0.0070 (0.0076)
Emotional disorders	0.0212*** (0.0024)	0.0284*** (0.0055)	0.0167*** (0.0042)	0.0158*** (0.0046)	0.0156** (0.0054)
Arthritis	0.0208*** (0.0018)	0.0230*** (0.0045)	0.0229*** (0.0030)	0.0202*** (0.0032)	0.0133*** (0.0039)
Kidney disease	−0.0019 (0.0050)	−0.0013 (0.0133)	−0.0121 (0.0095)	−0.0063 (0.0092)	0.0137 (0.0078)
ADL	0.0018 (0.0011)	−0.0023 (0.0035)	0.0009 (0.0022)	−0.0005 (0.0019)	0.0053** (0.0017)
IADL	0.0021** (0.0007)	0.0086*** (0.0025)	0.0055*** (0.0014)	0.00440*** (0.0012)	−0.0019 (0.0011)
Enabling					
Education[c]					
– secondary	−0.0147*** (0.0019)	−0.0114** (0.0044)	−0.0180*** (0.0031)	−0.0177*** (0.0035)	−0.0117** (0.0045)
– tertiary	−0.0223*** (0.0022)	−0.0220*** (0.0050)	−0.0277*** (0.0035)	−0.0192*** (0.0044)	−0.0087 (0.0064)
Income[d]					
– 2nd quartile	−0.0178*** (0.0023)	−0.0322*** (0.0056)	−0.0181*** (0.0038)	−0.0095* (0.0044)	−0.0049 (0.0052)
– 3rd quartile	−0.0298*** (0.0023)	−0.0513*** (0.0055)	−0.0299*** (0.0038)	−0.0197*** (0.0044)	−0.0098 (0.0052)
– 4th quartile	−0.0295*** (0.0025)	−0.0520*** (0.0057)	−0.0245*** (0.0041)	−0.0274*** (0.0044)	−0.0066 (0.0058)
OOP burden					
– inpatient	−0.0011 (0.0007)	−0.0007 (0.0018)	−0.0024 (0.0018)	−0.0026 (0.0018)	0.0001 (0.0008)
– outpatient	0.0009*** (0.0001)	0.0014*** (0.0003)	0.0009*** (0.0002)	0.0005 (0.0003)	0.0007* (0.0003)
– drugs	0.0017*** (0.0002)	0.0027*** (0.0005)	0.0018*** (0.0003)	0.0011*** (0.0003)	0.0015*** (0.0003)
– nursing	−0.0004* (0.0002)	−0.0037 (0.0019)	−0.0002 (0.0004)	−0.0007 (0.0005)	−0.0000 (0.0002)
Supp. HI	−0.0133*** (0.0022)	−0.0174*** (0.0047)	−0.0151*** (0.0036)	−0.0093* (0.0043)	−0.0076 (0.0058)
OOP share of total health expenditure	0.0046*** (0.0001)	0.0050*** (0.0003)	0.0043*** (0.0002)	0.0047*** (0.0002)	0.0046*** (0.0003)

Note: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference categories: [a]female, [b]50–59, [c]none/primary, [d]1st quartile.

4 RESULTS

Estimations for determinants of cost-induced unmet need to see a doctor are presented in Tab. 4. First, we interpret the results of the complete model for the 50+ population, then the results of the age-specific models. We focus on the interpretation of estimates related to health and health care factors especially.

4.1 Results of the Complete Model for the 50+ Population

Starting with the factors of main importance, the need factors, a significant association of unmet need with several health conditions is found among 50+ population. Emotional disorders (AME = 0.0212, $p < 0.001$) and arthritis (AME = 0.0208, $p < 0.001$) are strong correlates which most increase the probability of facing unmet need. Important correlates are stomach ulcers (AME = 0.0150, $p < 0.001$), heart attack (AME = 0.0146, $p < 0.001$) and chronic lung disease (AME = 0.0133, $p < 0.001$). A significant and positive association is also found for high blood pressure, high blood cholesterol, stroke, and fractures even if average marginal effects are rather small. Only Alzheimer's disease (AME = −0.0114, $p < 0.05$) shows a negative association with unmet need but at a lower significance level with no significant results for the age categories. While the number of limitations in IADL increases the probability of unmet need (but with a relatively low marginal effect), the number of limitations in ADL is not significant.

Regarding other health care variables, the OOP payments burden provides significant results for outpatient care (AME = 0.0009, $p < 0.001$) and drugs (AME = 0.0017, $p < 0.001$) even if average marginal effects are rather low. Nursing care showed a negative association; however, average marginal effects are negligible. The presence of supplementary health insurance is a strong and preventive correlate of unmet need (AME = 0.013, $p < 0.001$).

Age plays a significant role and is a strong correlate for unmet need. The results for age categories suggest that the likelihood of forgoing health care sharply decreases with age (AME = −0.052, $p < 0.001$, for 80+ age group). In other words, the younger older adults have a higher probability of experiencing an unmet need.

Briefly commenting on other control variables, women have a higher probability to face unmet need. Higher education leads to lower probability of unmet need, while the probability is lowest for those with tertiary education. Belonging to a higher income group, especially to the third and fourth income quartile, is associated with a lower probability of forgoing care. Thus, the greater the financial security the less likely is an unmet need for health care due to costs. The country-level indicator showed that an increasing share of OOP payments on national health spending is likely to increase the probability of unmet need.

4.2 Results of the Age-Specific Models

The results for the pre-retirement population (age category 50–59) showed that the probability of unmet need increases with an increasing number of limitations in IADL and average marginal effects are larger compared to the full sample. Seven health conditions are found to be associated with unmet need. The strongest effect relates to emotional disorders (AME = 0.0284, $p < 0.001$), arthritis (AME = 0.0230, $p < 0.001$) and fractures (AME = 0.0217, $p < 0.01$). A weaker but significant association is found for those who reported stomach ulcers, chronic lung disease, heart attack and high blood pressure (listed according to the magnitude). The OOP burden for outpatient care and especially for drugs is related to unmet need and is a much stronger correlate compared to the full sample. Supplementary health insurance is again identified as a preventive factor. Importantly, belonging to the lowest income quartile significantly increases the probability of facing unmet need.

Individuals close to retirement or shortly after retirement (age category 60–69) are likely

to forgo care due to arthritis (AME = 0.0229, $p < 0.001$), heart attack (AME = 0.0186, $p < 0.001$) and emotional disorders (AME = 0.0167, $p < 0.001$). Stomach ulcers, fractures and high blood cholesterol also show a positive association but with lower marginal effects. As the previous age group, limitations in IADL increase the probability of unmet need. The magnitude of OOP burden for drugs and outpatient care corresponds to the effects for the 50+ population. As with the previous age category, supplementary health insurance decreases the probability of unmet need significantly as well as belonging to the lowest income quartile continues to put individuals at a higher risk of forgoing care.

Individuals in the post-retirement phase (age category 70–79) with limitations in IADL experience a higher probability of unmet need. Unmet need is significantly and still with relatively high magnitude related to arthritis (AME = 0.0202, $p < 0.001$). Chronic lung disease (AME = 0.0163, $p < 0.001$), emotional disorders (AME = 0.0158, $p < 0.001$) and heart attack (AME = 0.0126, $p < 0.001$) are important correlates of unmet need. A low but significant probability of facing unmet is also found for cataracts, high blood pressure and high blood cholesterol. From the OOP payment burden point of view only payments for drugs are a significant but a weak correlate for unmet need. Supplementary health insurance is negatively correlated with unmet need with a low marginal effect. Higher income has a significantly preventive character as for the previous age groups

Among the oldest old (age category 80+) four health conditions were shown to increase the probability of facing an unmet need with the highest magnitude of stomach ulcers (AME = 0.0179, $p < 0.01$), emotional disorders (AME = 0.0156, $p < 0.01$), arthritis (AME = 0.0133, $p < 0.001$) and with the lowest marginal effect for heart attack (AME = 0.0087, $p < 0.05$). By contrast to the previous age groups the number of limitations in IADL is not significant but limitations in ADL show a positive even if a low association with unmet need. The OOP burden from drugs and to a lesser extent from outpatient care persists as the risk factor for unmet need. Income situation and supplementary health insurance are no longer significant.

5 DISCUSSION

It seems to be desirable to extend investigations of unmet need due to costs by addressing specific health conditions. We found a positive association between cost-induced unmet need and certain age-related health conditions. Additionally, we discovered differences in the effects of health conditions on unmet need for specific age groups.

Several health conditions were shown as a risk factor for unmet need among the population 50+ at large; however, across the age groups only arthritis, emotional disorders and to a lesser extent heart attack are associated with unmet need. Based on official statistics CVDs and musculoskeletal disorders are frequent health conditions in older age and highly contribute to the disease burden (GBD, 2020). Thus, greater health care needs can be associated with OOP payments for these health conditions leading to a strong association with unmet need due to costs. On the other hand, emotional disorders cause a low disease burden compared to CVDs and musculoskeletal disorders with a decreasing trend in age (GBD, 2020) but based on our findings they are one of the most important correlates for unmet need regardless of age group. An association of emotional disorders or depressive symptoms with unmet need among older adults has been shown in other studies (Bremer, 2014; Callander et al., 2017; Litwin and Sapir, 2009; Ronksley et al., 2012).

Discussing age differences, a more intensive perception of unmet need in relation to arthritis and emotional disorders for younger age groups corresponds to a higher disease burden for these groups. On the contrary, the disease burden for heart attack linearly increases with age and

is highest for the oldest old but as shown the probability of facing unmet need is the lowest for age group 80+. In addition, an interesting result is found for fractures. This disorder is strongly associated with unmet need for the age group 50–59 but it is not associated with age groups 70+ at all even if the prevalence of fractures increases with age. This might imply that physical limitations probably resulting in economic limitations play an important role.

Our findings suggest that the association of specific health conditions and unmet need does not have to be necessarily related to the prevalence of health conditions or their burden. Moreover, it is worth highlighting that several health conditions exhibited a strong associative power with unmet need for the pre-retirement population (50–59). These findings have important implications for health care policies because the majority of protective measures are usually targeted at the population in the retirement age (mostly 65+) and age is the only one criterion.

The effect of specific health conditions on unmet need might be further accelerated with a presence of limitations in IADL for younger age groups, especially for the age group 50–59. These limitations quite often go hand in hand with long-term care dependency and increased non-health care costs (Schokkaert et al., 2017) and therefore may put individuals at serious risk.

Discussing only the effect of age it is obvious that policy makers should pay more attention to older adults of a younger age. This conclusion is also supported by findings of other study about unmet need based on the first wave of SHARE (Litwin and Sapir, 2009). One might argue that studies focusing on OOP payments have shown that especially the oldest-old are the group most vulnerable to the OOP burden and thus, higher probability of unmet need would be expected; however, even if the younger older adults have a lower OOP burden they might feel themselves to be much more threatened by unmet need due to the fact that they are still obliged to support other family members financially or because of possible instability/insecurity of their earnings compared to people drawing regularly an old age pension. For that matter, it was found that a pension entitlement is associated with a decline in unmet need (Reeves et al., 2017). Moreover, as already suggested above the majority of protective features from high OOP payments are mostly targeted at the oldest generations, and therefore the younger older adults whose health capacity is in the phase of deterioration might urgently feel the need to have access to desirable care. From a different point of view, it might be explained by the theory of demand for health care. The consumption of health care services is taken not only as a consumer good but also an investment commodity (Grossman, 1972). Investing in a good health might produce time for other activities (market and nonmarket), thus the younger older adults might be more sensitive to cost induced unmet need than older people who are less motivated to invest in their mostly already very low health capacity. This could support our findings for the youngest age group. In any case, it seems that statements about the effect of age on unmet healthcare need to be made with more caution and an age-specific approach to investigating unmet need is thus justified.

Additional important findings have to be highlighted. Income is a powerful correlate of unmet need with the highest risk for the youngest old. This effect is supported by other studies concluding that OOP payment-induced unmet need is a problem among low-income individuals (Bremer, 2014; Herr et al., 2014; Kim et al., 2017; Mielck et al., 2009; Schokkaert et al., 2017). Thus, it seems to be highly relevant to improve access to health care for the 50+ population with low income. Furthermore, even if the associative power of OOP payments and unmet need is rather low and depends on the type of health care it is worth paying attention to OOP payments for drugs especially because they cause the highest burden of household budgets (Baeten et al., 2018). In relation to cost, or respectively the price of health care services, the importance of supplementary health insurance as a preventive factor can be highlighted. These findings suggest that cost plays an important role and additional coverage is desirable because

it prevents unmet need for the youngest-old especially.

Interpreting our findings, several aspects have to be taken into account. A pan-European approach is applied in our analysis bearing in mind that observed health care systems differ. On the other hand, we can find some commonalities in these health care systems which, to a particular extent, narrow differences among vulnerable groups. In essence, all health care systems apply some OOP payments (in particular for medication and outpatient care), claim to secure universal access to health care and protect the most vulnerable including some forms of protection from high OOP payments for chronically ill and older people (Baeten et al., 2018). Furthermore, cultural differences, values and beliefs of a society should be kept in mind as well. Thus, even if we control for cost sharing policy settings, one of the limitations of our study is a missing view on national health care policies which influence people's health care utilisation. Case studies of particular countries are a desirable step for future research. Another limitation is the cross-sectional design of our study. Extending it to a longitudinal analysis could allow tracing the effects of changes in correlates on changes in unmet need and might further increase the resonance of the findings.

Although SHARE is a unique data set to explore the older population and their behavioural patterns, several limitations emerge from the survey. Non-response and attrition may lead to sample selection bias, limitation of the data representativeness and the generalisation of the results. More on this issue can be found in Börsch-Supan et al. (2013). Basically, SHARE's limitations come from its strengths, the complexity and interdisciplinarity. In terms of that, a combination with more detailed and objectively recognised information about health conditions and treatment would be desirable for future research on unmet need related to specific health conditions. Finally, we acknowledge that unmet need due to financial reasons is only one of the aspects of forgoing health care considered in this paper.

6 CONCLUSION

Unmet need to see any type of doctor or qualified nurse, emergency room or outpatient clinic visit due to cost is a phenomenon which is present among older European adults. Our study contributes to the discussion on unmet need and extends it by highlighting the importance of a health condition and age-specific approach. If the objective of national health policies is to improve access to health care and to reduce perceived unmet need for the European 50+ population at large, the management of diseases such as emotional disorders, including anxiety, nervous and psychiatric problems as well as rheumatoid arthritis, osteoarthritis or other rheumatism should be a priority. The impact of cardiovascular diseases, chronic lung diseases and stomach ulcers nevertheless should be monitored as well. We conclude that policy makers should pay more attention to financial barriers within the health care sector taking into account also younger groups of the older population and to specific health conditions and their association with forgoing health care. Thus, complementing current general protective social policies with detailed health-related measures targeted at vulnerable groups could be a serious option. In the short run, implementing and/or extending safety nets and capping OOP payments with respect to income could improve access to health care. Another important alternative, although mainly in the long run, is implementing a comprehensive disease prevention strategy. Accompanied with promoting supplementary health insurance could also help to reduce the share of people with cost-related unmet need.

In order to make specific policy recommendations, results have to be interpreted against the background of national health care systems and regulations which is a step for future research. It would also be relevant to investigate unmet need across time to discover more about the

persistence of unmet need and the implications of changes in correlates and outcomes. Further, it might be important to look closer at certain population subgroups with a higher prevalence of unmet need (as from health condition perspective as well as from socio-demographic and economic perspective) to narrow down potential influences.

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9 ANNEX

Tab. 5: Logit regression results for unmet need (average marginal effects) – model developed in hierarchical stages.

Variable	Need	+Predisp	+Enabl	+OOP share
Need				
Heart attack	0.0094*** (0.0024)	0.0163*** (0.0024)	0.0115*** (0.0024)	0.0146*** (0.0023)
High blood pressure	0.0069*** (0.0018)	0.0105*** (0.0018)	0.0037* (0.0018)	0.0066*** (0.0017)
High blood cholesterol	0.0148*** (0.0019)	0.0146*** (0.0019)	0.0123*** (0.0019)	0.0073*** (0.0018)
Stroke	0.0037 (0.0039)	0.0060 (0.0039)	0.0053 (0.0039)	0.0097* (0.0038)
Diabetes	0.0049* (0.0023)	0.0070** (0.0023)	0.0001 (0.0023)	0.0021 (0.0022)
Lung disease	0.0137*** (0.0029)	0.0142*** (0.0029)	0.0097*** (0.0028)	0.0133*** (0.0028)
Cancer	−0.0056 (0.0040)	−0.0047 (0.0040)	−0.0032 (0.0039)	0.0018 (0.0038)
Stomach ulcers	0.0271*** (0.0031)	0.0253*** (0.0031)	0.0212*** (0.0031)	0.0150*** (0.0030)
Parkinson	−0.0087 (0.0088)	−0.0040 (0.0088)	−0.0051 (0.0086)	−0.0101 (0.0085)
Cataracts	−0.0032 (0.0029)	0.0037 (0.0030)	0.0035 (0.0029)	0.0039 (0.0028)
Fractures	0.0051 (0.0032)	0.0057 (0.0032)	0.0077* (0.0031)	0.0090** (0.0031)
Alzheimer	−0.0205*** (0.0061)	−0.0151* (0.0061)	−0.0123* (0.0060)	−0.0114* (0.0058)
Emotional disorders	0.0334*** (0.0025)	0.0273*** (0.0025)	0.0211*** (0.0025)	0.0212*** (0.0024)
Arthritis	0.0173*** (0.0018)	0.0167*** (0.0019)	0.0157*** (0.0018)	0.0208*** (0.0018)
Kidney disease	−0.0022 (0.0052)	−0.0031 (0.0052)	−0.0084 (0.0052)	−0.0019 (0.0050)
ADL	0.0011 (0.0012)	−0.0003 (0.0012)	−0.0002 (0.0011)	0.0018 (0.0011)
IADL	0.0023** (0.0007)	0.0045*** (0.0008)	0.0025*** (0.0008)	0.0021** (0.0007)
Predisposing				
Gender[a]		−0.0181*** (0.0018)	−0.0126*** (0.0018)	−0.0125*** (0.0017)
Age[b]				
– 60–69		−0.0212*** (0.0027)	−0.0259*** (0.0028)	−0.0243*** (0.0027)
– 70–79		−0.0312*** (0.0028)	−0.0394*** (0.0029)	−0.0371*** (0.0028)
– 80+		−0.0457*** (0.0030)	−0.0531*** (0.0030)	−0.0520*** (0.0029)
Enabling				
Education[c]				
– secondary			−0.0250*** (0.0019)	−0.0147*** (0.0019)
– tertiary			−0.0307*** (0.0022)	−0.0223*** (0.0022)
Income[d]				
– 2nd quartile			−0.0124*** (0.0023)	−0.0178*** (0.0023)
– 3rd quartile			−0.0223*** (0.0023)	−0.0298*** (0.0023)
– 4th quartile			−0.0204*** (0.0025)	−0.0295*** (0.0025)
OOP burden				
– inpatient			−0.0010 (0.0007)	−0.0011 (0.0007)
– outpatient			0.0014*** (0.0001)	0.0009*** (0.0001)
– drugs			0.0029*** (0.0002)	0.0017*** (0.0002)
– nursing			−0.0003 (0.0002)	−0.0004* (0.0002)
Supp. HI			−0.0432*** (0.0023)	−0.0133*** (0.0022)
OOP share of total health expenditure				0.0046*** (0.0001)

Note: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference categories: [a]female, [b]50–59, [c]none/primary, [d]1st quartile.

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