



Access to healthcare for people aged 50+ in Europe during the COVID-19 outbreak

Šime Smolić¹ · Ivan Čipin² · Petra Međimurec²

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Abstract

This paper combines SHARE Corona Survey and SHARE Wave 7 data for 25 European countries and Israel ($N=40,919$) with institutional and epidemic-related country characteristics to investigate healthcare access for Europeans aged 50+ during the outbreak of COVID-19. We use a micro–macro approach to examine whether and to what extent barriers to accessing healthcare measured by reported unmet healthcare needs vary within and between countries. We consider various aspects of barriers and distinguish among: (1) respondents who forewent medical treatment because they were afraid of becoming infected with the Coronavirus; (2) respondents who had pre-scheduled medical appointments postponed by health providers due to the outbreak; and (3) respondents who tried to arrange a medical appointment but were denied one. Limited access to healthcare during the initial outbreak was more common for the occupationally active, women, the more educated and those living in urban areas. A bad economic situation, poor overall health and higher healthcare utilisation were robust predictors of unmet healthcare. People aged 50+ in countries of ‘Old’ Europe, countries with higher universal health coverage and stricter containment and closure policies were more likely to have medical services postponed. Policymakers should address the healthcare needs of older people with chronic health conditions and a poor socio-economic status who were made more vulnerable by this pandemic. In the aftermath of the health crisis, public health systems might experience a great revival in healthcare demand, a challenge that should be mitigated by careful planning and provision of healthcare services.

Keywords SHARE Corona Survey · Pandemic · Healthcare access · Older people · Europe

Introduction

Access to healthcare that can be easily captured by unmet healthcare need is considered as one of the most important achievements of health systems in developed countries (Allin et al. 2010; OECD 2019). It is related to gaining appropriate healthcare resources in order to preserve or improve individual health (Gulliford et al. 2002). The concept of *access to healthcare* can be described as the ‘ability to secure a specified range of services, at a specified level

of quality’ (Goddard and Smith 2001: 1151). According to the equity principle, persons in equal need of healthcare should have equal access to it (Oliver and Mossailos 2004). If access to health services is inadequate, for example, due to organisational, financial or cultural reasons, it might have detrimental social, physical or economic consequences (Neri and Kroll 2003; OECD 2019). Unmet healthcare needs might result in poorer self-reported health (Ko 2016), sustain poverty as poor people have less access to health services (Peters et al. 2008) and increase health inequalities because health declines much faster in those with unmet care (Quesnel-Vallée et al. 2016). At the beginning of 2020, the world confronted a completely different type of barrier to access and the utilisation of health services—the onset of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that was declared a global pandemic on 11 March 2020 (WHO 2020a). Healthcare capacities in many developed countries became overwhelmed by the outbreak (Kissler et al. 2020; Paterlini 2020; Tanne et al. 2020; Volpato et al. 2020).

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✉ Šime Smolić
ssmolice@efzg.hr

¹ Faculty of Economics & Business, Department of Macroeconomics and Economic Development, University of Zagreb, Zagreb, Croatia

² Faculty of Economics & Business, Department of Demography, University of Zagreb, Zagreb, Croatia

Increased burdens on health systems resulted in unprecedentedly high barriers to accessing healthcare for health conditions otherwise unrelated to COVID-19. A global survey on continuity of essential health services during the COVID-19 pandemic showed that health treatments and prevention services for noncommunicable diseases (NCDs) were significantly discontinued or reduced (WHO 2020b). Many recent studies have confirmed disruptions in the provision of different types of health services caused by epidemic control measures (Angelico et al. 2020; De Rosa et al. 2020). It is believed that in the long-run, discontinued healthcare might potentially lead to serious health consequences for some individuals (Palmer et al. 2020). In addition, this pandemic revealed that people with underlying health conditions were more likely to experience severe consequences of the infection (Clark et al. 2020); for example, people diagnosed with diabetes, cardiovascular diseases, chronic respiratory conditions and cancer have been at higher risk for severe COVID-19 and death (WHO and UNDP 2020). Moreover, Douglas et al. (2020) pointed out that the health of older people is at particular risk due to the pandemic control measures because they are at the ‘...highest direct risk of severe COVID-19, they are more likely to live alone, less likely to use online communications and at risk of social isolation’ (p. 2).

Older persons with multiple chronic diseases might be more disadvantaged when it comes to meeting their healthcare needs, especially in ageing societies (Bergman et al. 2013). A more specific study by de Meijer et al. (2013) indicated that the ‘relationship between age and the determinants of need, for instance poor health status and disability’ (p. 359) was important in explaining health spending profiles by age. This notion also arises from the fact that older persons on average have greater healthcare needs than younger age groups, resulting in health demand and health expenditure in most developed countries to steepen around the age of early to mid-60 s (Eurostat, 2016; Williams et al. 2019). For example, nearly four out of every ten EU citizens were aged 50+ in 2019 (Eurostat 2020a), but this age group in comparison with younger ages takes up the largest proportion of total healthcare expenditures (Williams et al. 2019).

Despite almost universal healthcare coverage across Europe, certain socio-demographic groups are more likely to receive inadequate health services or access to healthcare than others (Cylus and Papanicolas 2015). Studies based on data from the Survey of Health, Ageing and Retirement in Europe (SHARE) suggest that older people may have higher healthcare needs or use more medical services due to their disabilities and chronic health conditions, poor socio-economic status or social isolation (Allin et al. 2009; Cantarero-Prieto et al. 2019; Santos-Eggimann et al. 2005; Srakar et al. 2016; Terraneo 2015). Women and individuals with low education and those in disadvantaged socio-economic

conditions are more likely to report unmet needs for healthcare (Allin et al. 2009; Siciliani and Verzulli 2009). People with lower socio-economic status are also more likely to forgo medical treatments due to cost (Litwin and Sapir 2009). Not receiving needed medical treatment could potentially be life-threatening and result in death as an outcome. Studies in Spain and Sweden found a significant association between unmet healthcare needs and increased risk of mortality among older people (Alonso et al. 1997; Lindström et al. 2020).

Disparities in unmet health needs are not only reinforced by individual-level factors but can also vary between countries. Access to healthcare is related to differences in countries’ economic development and the organisation of the healthcare systems (Chaupain-Guillot and Guillot 2015). However, older people face barriers in accessing healthcare even in countries with universal healthcare coverage, especially people with poor socio-economic conditions, who are homebound or who have chronic conditions (Doetsch et al. 2017; Herr et al. 2014; Osborn et al. 2014). For instance, the EU-SILC data from 2019 show that nearly 4% of EU citizens aged 65+ reported an unmet need for healthcare, ranging from 0.4% in Spain and Germany to 19.6% in Estonia (Eurostat 2020b).

The outbreak of COVID-19 and the measures that have been implemented against it within national healthcare systems call for a better understanding of unmet healthcare needs and related determinants among older people. In doing so, this paper uses a unique SHARE Corona Survey dataset (Börsch-Supan 2020a) and combines it with available COVID-19-related and institutional macro-level data to investigate access to healthcare for Europeans aged 50+ during the outbreak of the novel Coronavirus. We consider various aspects of access to healthcare and distinguish between:

- (1) whether respondents themselves decided to forgo medical treatment because they were afraid of becoming infected with the Coronavirus;
- (2) whether health providers or medical facilities postponed respondents’ pre-scheduled medical appointments due to the pandemic; and
- (3) whether respondents tried to arrange a medical appointment but were denied one because of the pandemic.

The paper employs the SHARE database by linking the available pre-pandemic characteristics of the population aged 50+ with their experiences of accessing healthcare during the initial wave of the pandemic. We aim to identify the subpopulations of older people for whom the COVID-19 crisis and subsequently congested healthcare capacities and vast disruption in healthcare utilisation made access to health services even more difficult. In addition, we examine the extent of unmet healthcare needs in the countries

of ‘New’ and ‘Old’ Europe to understand better the ability to cope with the health crisis. We use the terms ‘Old’ and ‘New’ Europe to distinguish between post-socialist EU countries and old EU member countries before 2004 plus Cyprus and Malta. Israel and Switzerland are exceptions and were classified as ‘Old’ European countries (see Table 2 for a complete list of countries). Given the fact that Europe is still far from having a common healthcare system, we also focus on identifying whether the Bismarck and the Beveridge healthcare systems differ in respect to unmet health needs resulting from the epidemic control measures.

The main objective of this article is to examine whether and to what extent barriers to accessing healthcare due to COVID-19 as measured by reported unmet healthcare needs vary within and between countries. We use a micro–macro approach to answer the following research questions:

Micro: What are the determinants of limited access to healthcare due to COVID-19 at the individual level? Which groups of people aged 50+ were more likely to report unmet healthcare needs in the course of the pandemic?

Macro: How do barriers to healthcare during the outbreak of COVID-19 differ across European countries and Israel? Does the country-specific context, both COVID-19-related and social and institutional, explain between-country differences? Can we observe typical patterns related to access to healthcare for older people in the ‘New’ Europe and in the ‘Old’ Europe?

In what follows, we primarily draw on the situation in the first wave of the pandemic when most European countries applied lockdown policies with different degrees of stringency. In this respect, our analysis will reveal if and where Corona lockdowns in the spring of 2020 made the particularly vulnerable elders even more vulnerable.

Data and methods

Our analysis focused on SHARE respondents aged 50+ who participated in the SHARE Corona Survey (Börsch-Supan 2020a) and in the regular SHARE Wave 7 (Börsch-Supan 2020b; Börsch-Supan et al. 2013). The SHARE Corona Survey asked various questions about key life domains affected by the COVID-19 outbreak, including questions about access to healthcare during the outbreak (Scherpenzeel et al. 2020). We combined data from the SHARE Corona Survey with the SHARE Wave 7 data to obtain all individual-level characteristics required for the current analysis. We removed cases with missing values on any of the measures, which left us with a sample of 40,919 respondents aged 50+ from 26 countries. This provides a good design to examine both within- and between-country differences in access to healthcare for older Europeans during the outbreak of COVID-19.

We used STATA 16 (StataCorp 2019) for data processing and statistical analysis. All STATA logs (i.e. annotated STATA outputs) are available from the authors upon request. The plots were produced using the ggplot2 package (Wickham 2016) in R (R Core Team 2020).

Micro-level explanatory variables

Because access to healthcare is a multifaceted and complex phenomenon (Andersen 1995), we considered individual-level explanatory variables from three broad groups. The first group was comprised of variables on basic socio-demographics: age (occupationally active: ages 50–64; young retirees: ages 65–79 and the older-old: age 80+), gender, education (low, medium or high, based on ISCED 2011 classification of country-specific educational categories collected by SHARE), living arrangements (does not live alone vs. lives alone) and area of residence (rural vs. urban, with rural denoting the ‘rural area or village’ category from the SHARE Wave 7 questionnaire).

The second group of explanatory variables was comprised of measures of socio-economic status, including self-reported job situation and the ability to make ends meet since the outbreak. The former was recoded to distinguish between retired, working (employed or self-employed) and other SHARE respondents (unemployed, permanently sick or disabled, homemakers and others). As for the latter, SHARE interviews persons aged 50+ and their partners (regardless of their age) within the same household and for the interview, each SHARE-participating household appoints one eligible respondent as its household respondent. This respondent answers a specific set of household-related questions—including the ability to make ends meet—on behalf of the entire household. To allow for individual-level data analysis, we copied the answers as provided by the household respondents to their partners within the same household (who participated in the survey, but did not answer this specific set of household-related questions).

The third group of explanatory variables was comprised of health-related measures. We included the following in our models: self-rated health (SRH) before the outbreak (ranging from excellent to poor), change in SRH since the outbreak (respondents answered whether their health improved/worsened or stayed about the same), dummy variables indicating whether the respondent was diagnosed with a major illness since the last interview, for example, cancer, cardiovascular disease, chronic lung disease or hip fracture (see the SHARE Corona Survey questionnaire for a full list), whether the respondent regularly takes prescription drugs (0 = No, 1 = Yes), the number of times the respondent was a hospital patient within the last 12 months as of SHARE Wave 7 (none, 1, 2 or 3+), the number of limitations on the activities of daily living (ADL) and instrumental activities of

daily living (IADL) (none vs. 1+) and the number of chronic conditions (less than 2 diseases vs. 2+ chronic conditions). Descriptive information on the micro-level variables is provided in Table 1.

Macro-level explanatory variables

To investigate whether and to what extent country-specific contexts matter in explaining how barriers to accessing healthcare during the outbreak of COVID-19 varied for older persons across European countries, we combined individual-level SHARE data with Corona-related and social and institutional country-specific characteristics. We drew data from the European Centre for Disease Prevention and Control (ECDC 2020) to measure the morbidity (the total number of cases per 100,000 population) and mortality (the total number of deaths per 100,000 population)¹ of COVID-19 until 31 May 2020. We chose this date as a cut-off because SHARE started conducting COVID-19 interviews early in June 2020 (Börsch-Supan 2020c).

In addition to COVID-19 morbidity and mortality measures, we considered the characteristics of the countries' healthcare systems. In our analysis, we distinguished between the Beveridge (national health service, mostly tax-financed) and Bismarck (social security systems funded by compulsory contributions) models of healthcare. We further considered the universal health coverage (UHC) effective coverage index (Lozano et al. 2020) in an effort to capture how effective health service is at the population level. The UHC effective coverage index is reported on a scale of 0–100, with higher scores indicating higher service coverage.

We used the Containment and Health Index (CHI)—a composite measure produced by the Oxford COVID-19 Government Response Tracker (OxCGRT)—to account for differences in the strictness of government policies related to COVID-19 (Hale et al. 2020) and to test whether and how such policies reflected on access to healthcare for older Europeans. CHI combines indicators of containment and closure policies and indicators of health system policies into a single measure ranging from 0 to 100, with higher scores indicating stricter government responses. Finally, we looked for differences in access to healthcare between 'Old' and 'New' European countries. Table 2 presents descriptive information on all macro-level variables used in our analysis.

Outcome variables and models

We examined three different outcomes to account for various aspects of limits in access to healthcare due to the Coronavirus. All three outcomes are binary and are presented, by country, in Fig. 1:

Outcome 1: *Since the outbreak of Corona, did you forgo medical treatment because you were afraid to become infected by the corona virus?* (0 = No, 1 = Yes).

Outcome 2: *Did you have a medical appointment scheduled, which the doctor or medical facility decided to postpone due to Corona?* (0 = No, 1 = Yes).

Outcome 3: *Did you ask for an appointment for a medical treatment since the outbreak of Corona and did not get one?* (0 = No, 1 = Yes).

Our analysis proceeded in several steps. We first estimated a series of pooled logistic regression models with country controls. We then used multilevel techniques to estimate multilevel logistic regression models in which individuals are nested in countries. We allowed the intercepts to vary across countries. We compared the pooled regression results to multilevel results (see Table 3 in the Results section). This step of the analysis allowed us to address the determinants of limited access to healthcare due to COVID-19 at the individual level and to identify the groups of people aged 50+ that were more likely to report unmet healthcare needs in the course of the pandemic. In the next step, we used multilevel models to study the effects of variables at the country level on the odds of forgoing a medical treatment (outcome 1), having a medical appointment postponed (outcome 2) or being denied a medical appointment (outcome 3) due to the Coronavirus. Because of the correlations between the macro-level explanatory variables (results available from the authors upon request), we added the macro-variables to each model one by one. This step of the analysis allowed us to consider the role of country-specific context, both COVID-19-related and social and institutional, in explaining between-country differences in access to healthcare—while taking account of individual background characteristics.

One should note that we were unable to differentiate between respondents with no need for healthcare and respondents with a met need for healthcare. Our estimates of difficulties in accessing healthcare during the pandemic might therefore be biased downwards, because the denominator includes respondents who had no need for healthcare in the first place. However, we believe that this survey design limitation affects descriptive statistics more than it affects our multivariate findings, which, we believe, will still be very useful in revealing within- and between-country variations in access to healthcare during the COVID-19 pandemic.

¹ We used 2019 population estimates.

Table 1 Description of the micro-level SHARE study variables

	Frequency	Per cent
<i>Age</i>		
50–64	11,460	28.01
65–79	21,964	53.68
80+	7495	18.32
<i>Gender</i>		
Male	17,090	41.77
Female	23,829	58.23
<i>Education (SHARE w7)</i>		
Low	13,947	34.08
Medium	17,619	43.06
High	9353	22.86
<i>Living arrangements (SHARE w7)</i>		
Does not live alone	32,141	78.55
Lives alone	8778	21.45
<i>Area of residence (SHARE w7)</i>		
Rural	15,519	37.93
Urban	25,400	62.07
<i>Job situation (SHARE w7)</i>		
Retired	24,884	60.81
Working	9867	24.11
Other	6168	15.07
<i>Ability to make ends meet since outbreak</i>		
With great difficulty	3747	9.16
With some difficulty	10,635	25.99
Fairly easily	14,549	35.56
Easily	11,988	29.30
<i>Self-rated health (SRH) before the outbreak</i>		
Excellent	2684	6.56
Very good	6489	15.86
Good	18,080	44.18
Fair	10,811	26.42
Poor	2855	6.98
<i>Change in SRH since Corona</i>		
About the same	36,029	88.05
Improved	1177	2.88
Worsened	3713	9.07
<i>Diagnosed with a major illness since last interview</i>		
Yes	4420	10.80
No	36,499	89.20
<i>Regularly takes prescription drugs</i>		
Yes	31,819	77.76
No	9100	22.24
<i>Times a hospital patient within last 12 months (SHARE w7)</i>		
None	35,420	86.56
1	3817	9.33
2	945	2.31
3+	737	1.80
<i>ADL limitations</i>		
No ADL limitations	37,067	90.59
1+ ADL limitations	3852	9.41

Table 1 (continued)

	Frequency	Per cent
<i>IADL limitations</i>		
No IADL limitations	34,698	84.80
1 + IADL limitations	6221	15.20
<i>Chronic conditions</i>		
Less than 2 diseases	19,839	48.48
2 + chronic diseases	21,080	51.52

Unweighted values based on combined data from SHARE Wave 7 Release 7.1.1, SHARE Corona Survey Release 0.0.1 beta

Table 2 Description of the macro-level variables: COVID-19-related and institutional country characteristics, by country

	Sample size ^a	COVID-19 morbidity ^b	COVID-19 mortality ^b	Healthcare system	UHC index	CHI ^c	'Old' versus 'New' Europe
Belgium	3192	514.58	81.66	Bismarck	87	62.46	'Old' Europe
Bulgaria	756	35.90	2.00	Bismarck	63	54.04	'New' Europe
Croatia	1700	55.10	2.53	Bismarck	79	68.72	'New' Europe
Cyprus	556	107.66	1.94	Beveridge	80	69.76	'Old' Europe
Czech Republic	2138	86.67	3.00	Bismarck	82	62.69	'New' Europe
Denmark	1788	200.36	9.83	Beveridge	84	55.08	'Old' Europe
Estonia	3352	140.77	4.76	Bismarck	82	49.52	'New' Europe
Finland	1158	123.71	5.73	Beveridge	91	47.74	'Old' Europe
France	1685	226.07	42.93	Bismarck	91	67.24	'Old' Europe
Germany	2370	218.60	10.24	Bismarck	86	58.34	'Old' Europe
Greece	2280	27.18	1.63	Bismarck	80	57.43	'Old' Europe
Hungary	660	39.57	5.36	Bismarck	72	60.43	'New' Europe
Israel	963	199.69	3.33	Bismarck	81	70.52	'Old' Europe
Italy	2878	385.46	55.24	Beveridge	89	74.25	'Old' Europe
Latvia	849	55.47	1.25	Beveridge	70	52.07	'New' Europe
Lithuania	1093	59.77	2.51	Bismarck	70	62.77	'New' Europe
Luxembourg	667	654.18	17.92	Bismarck	91	62.07	'Old' Europe
Malta	702	125.01	1.82	Beveridge	83	72.50	'Old' Europe
Poland	2628	62.07	2.79	Bismarck	73	60.90	'New' Europe
Portugal	815	313.36	13.58	Beveridge	84	63.78	'Old' Europe
Romania	1259	98.55	6.45	Bismarck	70	61.47	'New' Europe
Slovakia	743	27.91	0.51	Bismarck	78	64.00	'New' Europe
Slovenia	2545	70.79	5.19	Bismarck	90	64.80	'New' Europe
Spain	1509	510.11	57.79	Beveridge	90	63.40	'Old' Europe
Sweden	1075	375.27	44.96	Beveridge	90	47.72	'Old' Europe
Switzerland	1558	360.02	19.38	Bismarck	93	54.65	'Old' Europe

See text for data sources. ^aUnweighted values. ^bRefers to time period until 31 May 2020. ^cAverage for time period from 12 March 2020 until 31 May 2020

In what follows, we present and interpret our findings focusing on two statistics. We begin with odds ratios, the exponentiations of logit coefficients. A positive logit coefficient corresponds to an odds ratio (OR) greater than 1, while a negative logit coefficient corresponds to an OR less than 1. In our case, the ORs show how the odds of forgoing a medical treatment (outcome 1) or having a medical

treatment postponed (outcome 2) or being denied a medical treatment (outcome 3) due to the Coronavirus change with a one-unit increase in the explanatory variable (holding all other explanatory variables constant). To facilitate interpretation, we supplemented the OR estimates with predictive margins, to show how outcome probabilities are

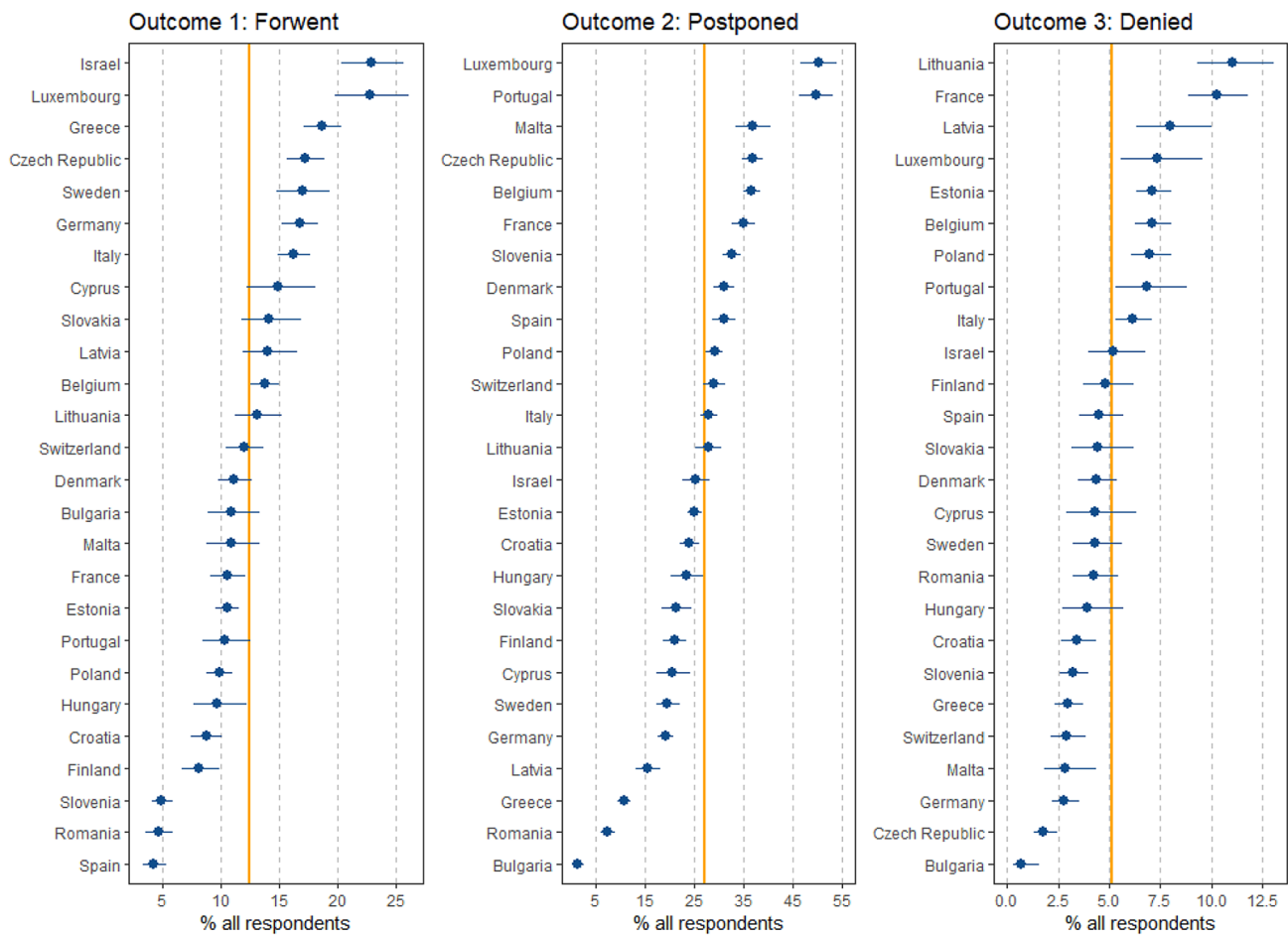


Fig. 1 Outcomes by country. *Notes:* Own calculations based on combined data from SHARE Wave 7 Release 7.1.1, SHARE Corona Survey Release 0.0.1 beta ($N=40,919$). Error bars represent 95% confidence intervals; the solid vertical line represents the sample average

expected to change with each (at least partially) significant macro-level explanatory variable from our models.

Results

Overall, 12.4% of the respondents reported having had forgone healthcare, 27% had pre-scheduled health services postponed and 5.2% were denied healthcare services after the outbreak. The unweighted proportions of unmet healthcare needs for outcomes in our analysis varied from 4.2% in Spain to 22.9% in Israel (for forgoing medical treatment), from 1.5% in Bulgaria to 50.4% in Luxemburg (for postponed scheduled medical appointments) and from 0.7% in Bulgaria to 11.1% in Lithuania (for denied medical appointments). There was less between-country variation in unmet healthcare needs due to denied medical appointments than due to postponed or forwent medical treatments (see Fig. 1).

Table 3 presents estimated odds ratios for all factors associated with the three outcome variables of unmet

healthcare that were controlled for in this analysis. First, we find that the older-old were least likely to experience barriers in accessing healthcare measured by each of the three outcomes. Precisely, the odds of having healthcare postponed were 36% lower for the older-old compared with individuals in the reference age group. This finding for postponed healthcare for the older-old is consistent with the results of a simpler model in which we considered age and country effects only (separate analysis not presented here). Being a female proved to be a robust predictor of forgoing and postponement of health services in the outbreak. The effects of education in every single outcome are evident—the higher the person’s educational attainment, the greater the odds of reporting forwent, postponed and denied healthcare. People aged 50+ in urban areas were more likely to forgo or to find themselves faced with postponement of scheduled medical treatments. In general, some degree of limited healthcare access during the outbreak of the Coronavirus in Europe was more common among the occupationally active, women, people with

Table 3 Determinants of limited access to healthcare for older Europeans due to the outbreak of COVID-19

	Outcome 1: Forwent		Outcome 2: Postponed		Outcome 3: Denied	
	Pooled	Multilevel	Pooled	Multilevel	Pooled	Multilevel
<i>Age</i>						
50–64	Ref	Ref	Ref	Ref	Ref	Ref
65–79	0.909**	0.912*	0.900***	0.900***	0.881*	0.879*
80+	0.786***	0.789***	0.643***	0.643***	0.640***	0.638***
<i>Gender</i>						
Male	Ref	Ref	Ref	Ref	Ref	Ref
Female	1.543***	1.541***	1.201***	1.201***	1.102**	1.102**
<i>Education (SHARE w7)</i>						
Low	0.826***	0.825***	0.822***	0.823***	0.877**	0.879**
Medium	Ref	Ref	Ref	Ref	Ref	Ref
High	1.301***	1.302***	1.156***	1.156***	1.232***	1.239***
<i>Living arrangements (SHARE w7)</i>						
Does not live alone	Ref	Ref	Ref	Ref	Ref	Ref
Lives alone	0.983	0.984	0.967	0.967	0.999	1.003
<i>Area of residence (SHARE w7)</i>						
Rural	0.944*	0.942*	0.954*	0.954*	0.885**	0.885**
Urban	Ref	Ref	Ref	Ref	Ref	Ref
<i>Job situation (SHARE w7)</i>						
Retired	1.112**	1.109**	1.053	1.053	0.961	0.959
Working	Ref	Ref	Ref	Ref	Ref	Ref
Other	0.991	0.990	0.969	0.970	1.051	1.052
<i>Ability to make ends meet since outbreak</i>						
With great difficulty	1.415***	1.404***	0.984	0.977	1.406***	1.384***
With some difficulty	1.160***	1.152***	0.897***	0.894***	1.087	1.082
Fairly easily	0.998	0.993	0.930**	0.930**	1.010	1.013
Easily	Ref	Ref	Ref	Ref	Ref	Ref
<i>Self-rated health (SRH) before Corona</i>						
Excellent	Ref	Ref	Ref	Ref	Ref	Ref
Very good	1.329***	1.328***	1.094	1.094	1.396**	1.397**
Good	1.503***	1.498***	1.290***	1.289***	1.630***	1.631***
Fair	1.936***	1.927***	1.608***	1.607***	2.153***	2.161***
Poor	2.019***	2.006***	1.581***	1.580***	2.580***	2.598***
<i>Change in SRH since Corona</i>						
About the same	Ref	Ref	Ref	Ref	Ref	Ref
Improved	1.300***	1.302***	1.293***	1.293***	1.131	1.131
Worsened	1.512***	1.514***	1.238***	1.239***	1.913***	1.919***
<i>Diagnosed with a major illness since last interview</i>						
Yes	1.115**	1.115**	1.422***	1.421***	1.479***	1.476***
No	Ref	Ref	Ref	Ref	Ref	Ref
<i>Regularly takes prescription drugs</i>						
Yes	1.495***	1.496***	1.876***	1.876***	1.270***	1.266***
No	Ref	Ref	Ref	Ref	Ref	Ref
<i>Times a hospital patient within last 12 months (SHARE w7)</i>						
None	Ref	Ref	Ref	Ref	Ref	Ref
1	0.978	0.979	1.173***	1.174***	1.140*	1.141*
2	1.028	1.029	1.321***	1.320***	1.387**	1.384**
3+	1.183	1.184	1.111	1.111	1.207	1.208
<i>ADL limitations</i>						
No ADL limitations	Ref	Ref	Ref	Ref	Ref	Ref

Table 3 (continued)

	Outcome 1: Forwent		Outcome 2: Postponed		Outcome 3: Denied	
	Pooled	Multilevel	Pooled	Multilevel	Pooled	Multilevel
1 + ADL limitations	0.913	0.911	1.004	1.004	1.040	1.042
<i>IADL limitations</i>						
No IADL limitations	Ref	Ref	Ref	Ref	Ref	Ref
1 + IADL limitations	1.003	1.004	0.923**	0.923**	0.829**	0.828**
<i>Chronic conditions</i>						
Less than 2 diseases	Ref	Ref	Ref	Ref	Ref	Ref
2 + chronic diseases	1.270***	1.270***	1.258***	1.259***	1.332***	1.333***
Observations	40,919	40,919	40,919	40,919	40,919	40,919
Country controls	Yes	No	Yes	No	Yes	No
Multilevel ICC (from the null model)	–	0.063	–	0.155	–	0.077

Odds ratio estimates based on combined data from SHARE Wave 7 Release 7.1.1, SHARE Corona Survey Release 0.0.1 beta ($N=40,919$); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

higher educational attainment and those living in urban areas.

We observed a statistically significant socio-economic gradient for outcomes 1 and 3. Europeans aged 50+ who reported a bad economic situation, that is, who have experienced difficulties in making ends meet, were more likely to report forgoing medical services due to fear of Coronavirus infection or to have an appointment for a medical treatment denied.

Our set of health-related variables exhibits the expected patterns, with SRH assessed before and perceived change in SRH after the outbreak as the most compelling determinants of barriers in access to healthcare in our sample of Europeans aged 50+. We found that persons aged 50+ who reported poorer SRH or worsening SRH in the outbreak were significantly more likely to refrain from getting health services due to fear of infection with the Coronavirus, more likely to have a scheduled medical appointment postponed and an appointment for a medical treatment denied. Next, we identified several characteristics of people aged 50+ who were more vulnerable to this health crisis and had greater likelihood to experience issues in access to healthcare. These include individuals who were diagnosed with a serious illness since the last SHARE interview, those who regularly take prescription drugs and who suffer from two or more chronic conditions. Previous experience of older persons with hospitalisation(s) increases the likelihood of having scheduled medical appointment postponed or having medical treatment denied.

In the null models in our multilevel analysis, the between-country variances in access to healthcare are estimated at 6.3, 15.5 and 7.7% (outcome 1, outcome 2 and outcome 3, respectively), as can be observed in the last row from Table 3. This is a measure of how much variation in accessing healthcare during the outbreak of COVID-19

is at the country level. We considered macro-variables to gain additional insight, see Fig. 2 and Table 4.

With Fig. 2, we began our examination of whether the differences in accessing healthcare between countries are associated with contextual variables. We plotted the country-specific proportions of each outcome (y-axis) against the macro-variables (x-axis).

We then proceeded to estimate a series of multilevel random intercept models, with macro-level variables added one by one. The findings are presented in Table 4. The higher the number of COVID-19 cases per 100,000 inhabitants until 31 May 2020, the higher the likelihood of having a previously scheduled medical appointment postponed or requested medical treatment denied; similarly, the higher the total number of COVID-19 deaths per 100,000, the higher the likelihood of having an appointment for medical treatment denied. Persons aged 50+ in countries with higher values of the UHC index were more likely to have their scheduled medical treatments postponed due to COVID-19. Furthermore, respondents from ‘New’ European countries (as compared to respondents from ‘Old’ European countries) were less likely to forgo medical treatments and to have medical appointment postponed. We also found a significant effect of the CHI, suggesting that more stringent governmental measures against COVID-19 might be associated with a greater chance of healthcare systems pursuing postponements of previously scheduled medical treatments.

To facilitate interpretation and to get a more practical feel for the impact of contextual variables on access to healthcare in logistic regression models, in addition to odds ratio estimates, we considered all significant country-level effects in terms of predicted outcome probabilities at specified values of macro-covariates. In Figs. 3, 4 and 5, we show predicted outcome probabilities with 95% confidence intervals

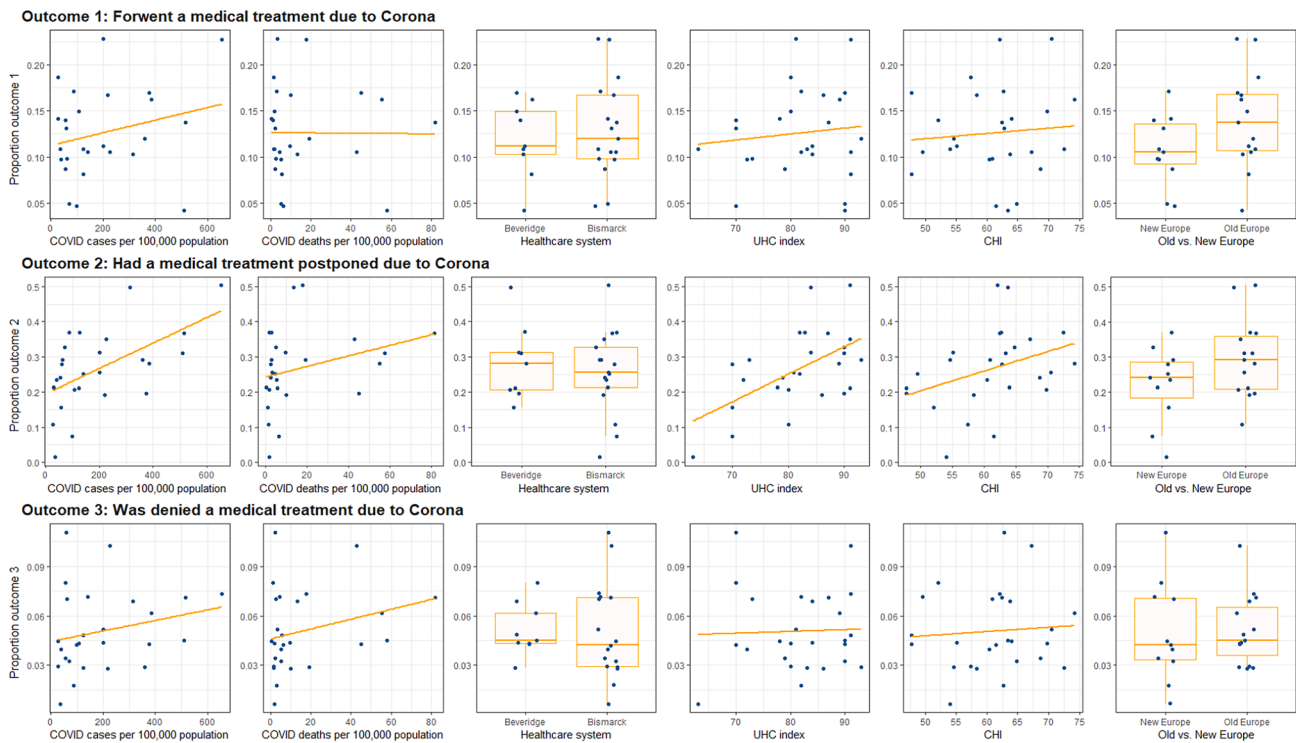


Fig. 2 Association between macro-variables and outcomes. *Note:* own calculations based on SHARE data and various sources of country-level data (see the Data and methods section).

Table 4 Country-context effects (estimates from multilevel random intercept models)

	Outcome 1: Forwent	Outcome 2: Postponed	Outcome 3: Denied
Cases per 100,000	1.001	1.002***	1.001**
Deaths per 100,000	1.001	1.011 ^a	1.009**
UHC index	1.013	1.068***	1.019
<i>Healthcare system</i>			
Bismarck	Ref	Ref	Ref
Beveridge	0.952	1.318	1.153
CHI	1.005	1.043**	1.007
<i>'Old' versus 'New' Europe</i>			
'Old' Europe	Ref	Ref	Ref
'New' Europe	0.654**	0.552**	0.815
Observations	40,919	40,919	40,919
Individual-level controls	Yes	Yes	Yes

Odds ratio estimates based on combined data from SHARE Wave 7 Release 7.1.1, SHARE Corona Survey Release 0.0.1 beta ($N=40,919$) and macro-level data from various sources (see text); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; ^a $p = 0.103$

for different values of each explanatory macro-level variable that was found to be (at least marginally) significant in Table 4.

Discussion

To the extent of our knowledge, this is the first study that has examined the effects of the epidemic control measures in the outbreak of the COVID-19 pandemic on multiple dimensions of healthcare access for people aged 50+ in 25 European countries and Israel. Furthermore, it is a first multinational, harmonised study about the effects of the COVID-19 pandemic on different dimensions of life among people aged 50+ in Europe. Our goal in this paper was to explore within- and between-country variations in barriers to accessing healthcare resulting from measures to contain the spread of COVID-19. We studied these barriers using three self-reported measures of forgoing, postponing and being denied healthcare services, while accounting for cross-national differences, features of a country's health system and containment indicators of the pandemic. We used data from the SHARE study and its unique *micro*-dataset from the SHARE Corona Survey and supplemented these with macro-data—the prevalence of the COVID-19 cases and deaths and health system features. We argued that specific

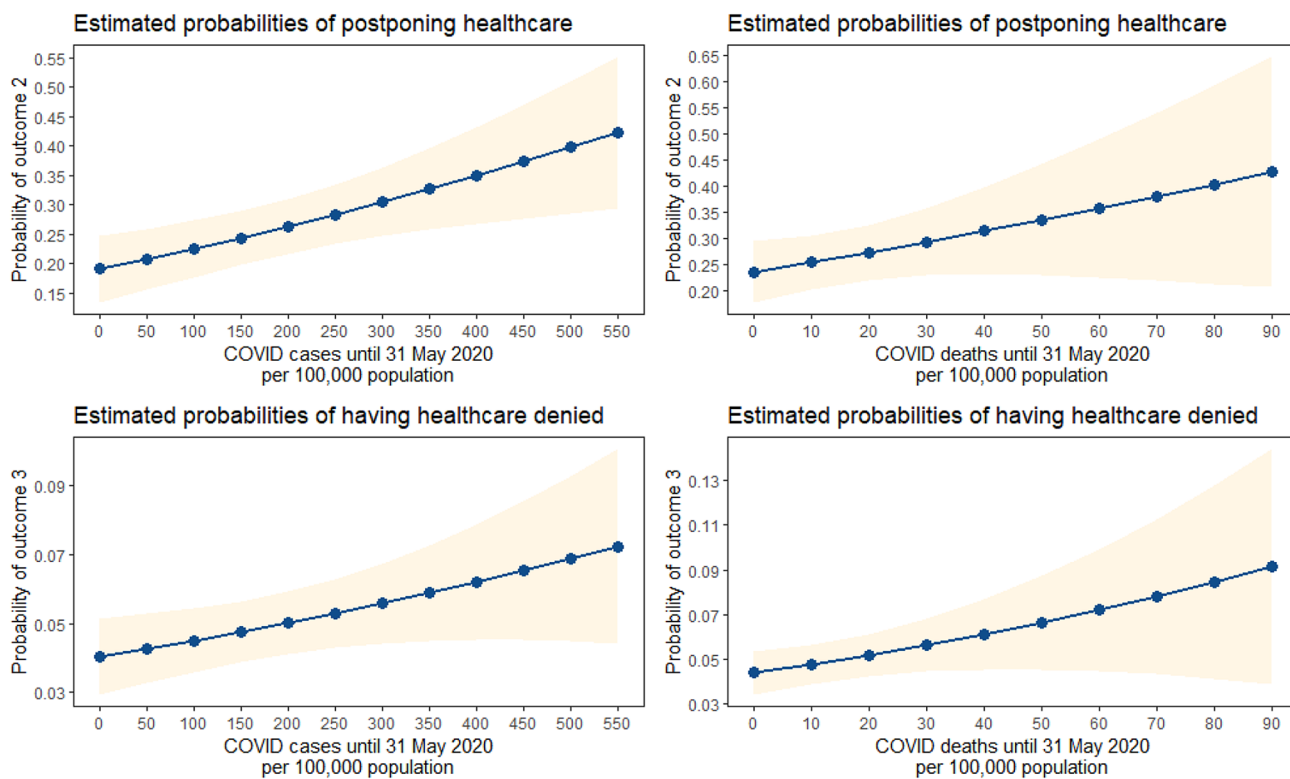


Fig. 3 Predictive margins at specified values of COVID-19 morbidity and mortality macro-variables. *Note:* own calculations based on SHARE data and various sources of country-level data (see the Data and methods section)

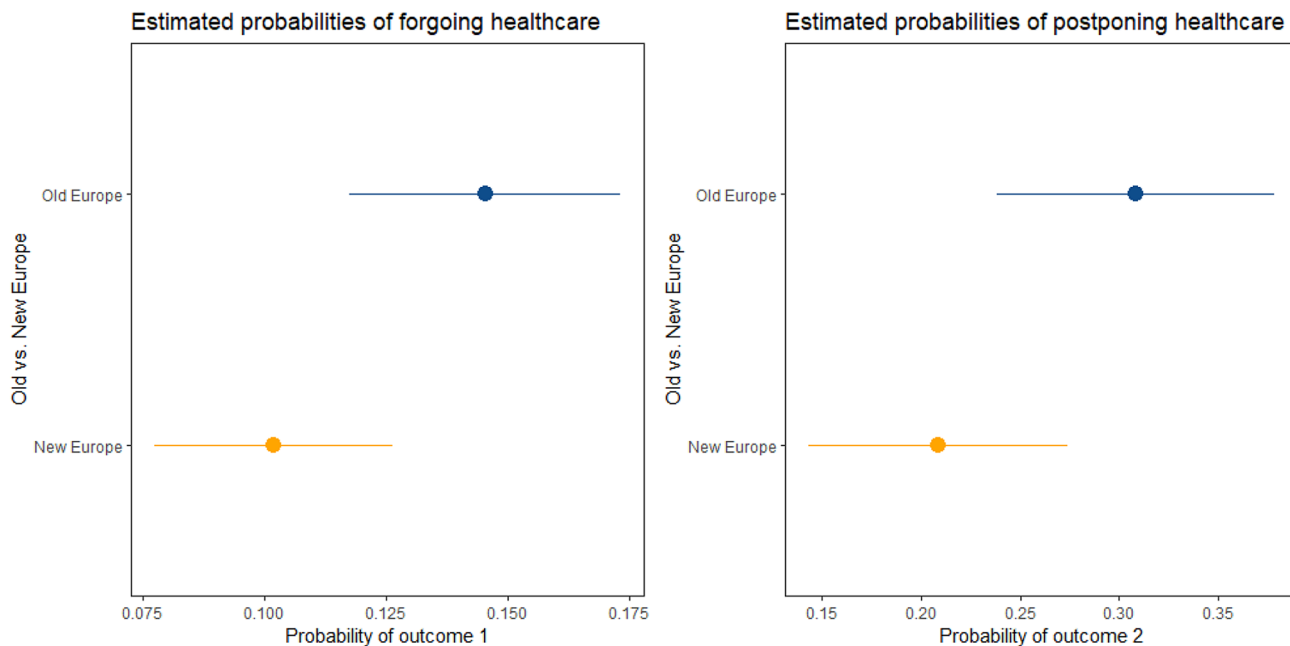


Fig. 4 Predictive margins for ‘Old’ versus ‘New’ European countries

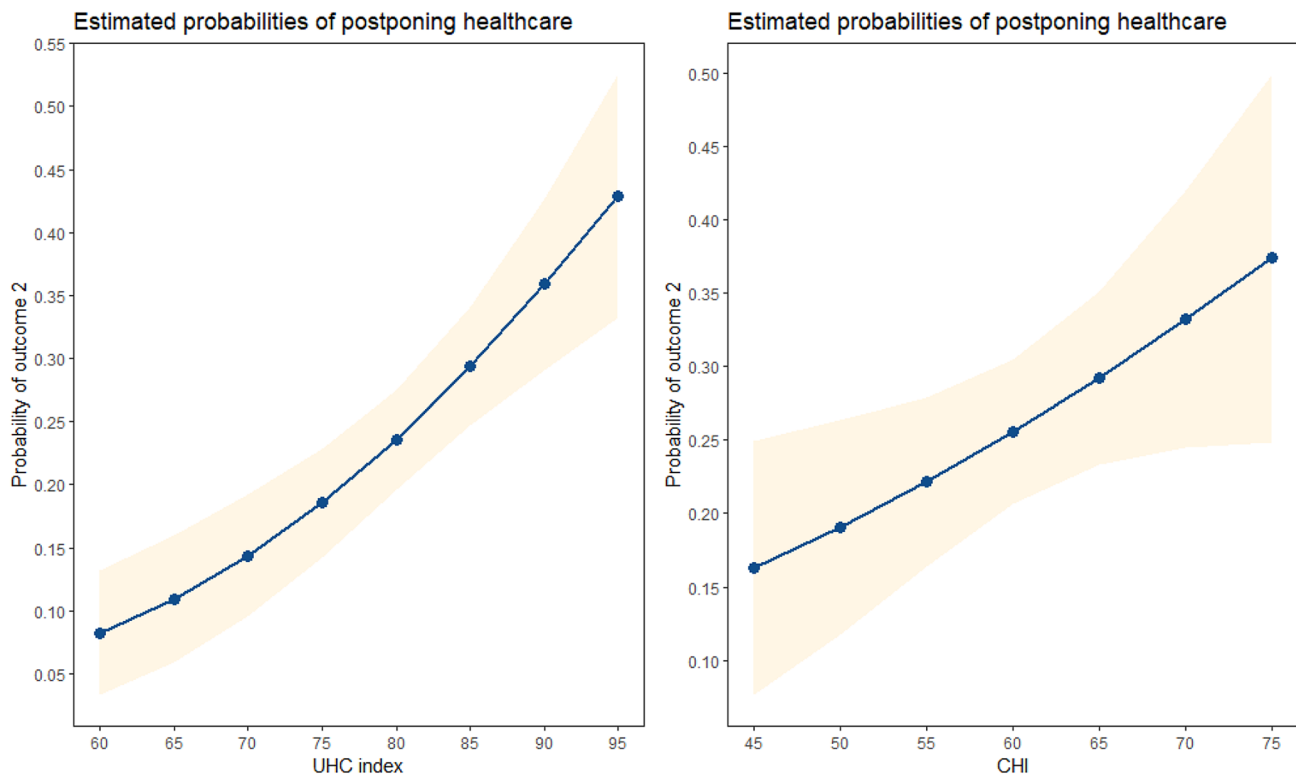


Fig. 5 Predictive margins at specified values of UHC index and CHI

groups of people 50+ were at higher risk of experiencing barriers to accessing healthcare due to the epidemic control decisions. Furthermore, we highlighted the importance of the *macro*-factors that could be associated with the unmet needs among a population group that is already burdened by the NCDs and is at high-risk of COVID-19 infection. The implications of these findings are discussed separately in the context of the micro- and macro-levels of the analysis.

Micro-determinants

Demographic characteristics

Our first research question addressed the determinants of limited access to healthcare due to COVID-19 at the individual level. Our goal was to uncover which groups of people aged 50+ were more likely to report barriers to healthcare in the pandemic. Holding all other variables constant, we found that occupationally active (50–64), sometimes denoted as young-old, were more likely to report forwent, postponed and denied healthcare. Similar findings, but for healthcare forgone due to costs, were reported by Litwin and Sapir (2009). On the other hand, if we consider models with age as the only independent variable, the age effect is much weaker (less negative) or even positive in the case

of forwent healthcare for young retirees (65–74) and the older-old (80+) while care is postponed for young retirees. However, including other variables in the models changes the age effect to being negative. Even though the older age is an important predictor of healthcare utilisation (Beard and Bloom 2015; Cantarero-Prieto et al. 2019; Midão et al. 2018), healthcare demand and health spending (Meijer et al. 2013; Reinhardt 2000), it seems to have had a protective effect against forwent, postponed or denied healthcare during the outbreak. It could be that older adults (65+) continued to receive adequate support from others and were not so reluctant in seeking medical care in spite of social distancing and epidemic control measures. The observed gender differences in the likelihood of reporting forgone and postponed healthcare in the outbreak have been validated in many previous studies that employed SHARE data (see, for example, Abuladze et al. 2017; Pirani and Salvini 2012; Santos-Eggimann et al. 2005).

Socio-economic characteristics

Studies exploring the association of a predisposing factor—educational attainment—and perceived barriers to accessing healthcare services show mixed results. The conclusion of this study, that individuals with higher levels of education were more likely to perceive barriers to accessing healthcare

due to epidemic control decisions, can be linked with findings of earlier research about the association between education level and unmet healthcare needs in the general population (Allan and Ammi 2020; Allin et al. 2010; Sibley and Glazier 2009). Furthermore, studies confirm that more schooling tends to increase the use of the screening services (Kenkel 1994) and that better educated individuals are more likely to visit doctors (Jürges 2007), to get vaccinated (Schmitz and Wübker 2011) or to engage in more preventive and risk control behaviours (Cutler and Lleras-Muney 2010). Another argument is that better educated older people have higher health literacy (see, for example, Chesser et al. 2016) and thus are more informed about the importance of regular health treatments and generally tend to care more for their health and claim their right to healthcare services. A plausible explanation could be that the sudden outbreak and rapid epidemic control measures have probably disproportionately crowded out this group from their routine use of healthcare. On the other hand, the better educated could have a better understanding of the demands for acute healthcare during a pandemic and therefore do not insist on their regular appointments.

Additionally, we identify a significant negative association between perceived economic status and reported barriers to healthcare access. Economic deprivation turns out to be a strong predictor for reporting forwent or denied healthcare among persons aged 50+ in this health crisis. Poor economic situation was already found elsewhere to be a strong predictor of unmet healthcare needs among older Europeans (Herr et al. 2014; Mielck et al. 2009; Otero et al. 2003) as well as in the general population (Kasman and Badley 2004; Shi and Stevens 2005; Zavras et al. 2016). Our analysis revealed that people aged 50+ residing in urban areas were more likely to forgo and to have medical treatment postponed during the COVID-19 outbreak. Although it has been investigated in a limited number of studies on unmet healthcare needs (see, for example, Chen and Hou 2002; Pappa et al. 2013; Zavras et al. 2016), urbanity might be especially interesting in the context of this pandemic. Before the outbreak, urbanity might have been considered as an access facilitator because the density of primary, specialist or hospital healthcare is higher in urban areas (Cyr et al. 2019; Henning-Smith 2020); this could have reversed after huge numbers of infected patients started to overwhelm health capacities, particularly in the hospitals. In addition, the urban–rural divide in Europe is complex, and some regions in Europe face so-called rural isolation while others experience high levels of wellbeing due to proximity to urban areas. This might have implications for policymakers who should aim to prevent overcrowding of healthcare systems and secure undisturbed access to healthcare for patients with other NCDs. This could be done by facilitating access to primary and preventive healthcare services in rural

areas, for example, by using more telemedicine or delivering healthcare via mobile medical teams, which could curtail the pressure to provide hospital healthcare.

Individual health-related characteristics

We showed that poorer health status described by individual's SRH, chronic conditions or healthcare utilisation (drugs and hospital services) was a significant predictor of perceived barriers in accessing healthcare among people 50+. This finding has been confirmed in earlier published studies either for samples of older people (Kim et al. 2018; Otero et al. 2003; Thorpe et al. 2011) or in the general population (Kasman and Badley 2004). Going beyond previous studies, we found that individuals whose health worsened after the outbreak had a higher likelihood of reporting barriers to accessing care as measured by all the outcomes. This finding is of special interest as this group would require more attention in the future when it comes to healthcare prioritisation. For these already vulnerable groups, access to healthcare during the outbreak actually got worse. Failing to meet adequate healthcare needs of older people might have two far-reaching consequences: greater health vulnerability for those who did not receive healthcare for other conditions and substantial negative health consequences. Our interpretation is supported by several studies that have found that delayed referrals due to the COVID-19 pandemic increased mortality for patients with chronic conditions (see, for example, Maringe et al. 2020; Sud et al. 2020; Weinberger et al. 2020). Obviously, in the aftermath of this health crisis triggered by the SARS-CoV-2 outbreak, public healthcare systems might experience a great rebound in demand for their resources. To get ready for this spike or 'demand wave', careful planning of health resources, whether of medical staff, medical equipment or medical facility working regimes, is crucial. This strategy could prevent a further increase in health inequalities and improve overall health outcomes.

Macro-determinants

This study tested whether exogenous factors, for example, the number of COVID-19 deaths and cases, healthcare system features (Bismarck vs. Beveridge), the UHC index, strictness of government policies related to COVID-19 and geographical clustering ('Old' vs. 'New' Europe), were associated with access barriers to healthcare services. We have seen that healthcare systems that had a better UHC effective score in 2019 have been perceived as less successful in controlling the initial spread of the Coronavirus (e.g. Luxembourg, Spain, Belgium, Italy and France). Another interesting finding is the difference between perceived barriers in access to healthcare in countries sometimes described

as the ‘Old’ and the ‘New’ Europe (see, for example, Cri-stea et al. 2021; Iacovou and Skew 2011; Mälksoo 2009). There is a statistically significant difference in proportions of persons aged 50+ who have forgone or have had medical treatment postponed in countries of ‘Old’ and ‘New’ Europe. It has been documented that countries of ‘New’ Europe, mainly post-socialist countries, were more successful in their response to the COVID-19 crisis in its initial wave. For example, the Czech ‘blanket’ quarantine and the adoption of strict epidemic control measures in the early stage of the pandemic have been recognised as a ‘success’ (Kouřil and Ferenčuhová 2020), in contrast to developments in some of the most affected countries of ‘Old’ Europe, like France, Italy and Spain (Ceylan 2020; Saglietto et al. 2020). Obviously, policies intended to contain the epidemic in ‘New’ Europe did not result in higher likelihoods of forgoing medical treatment due to fear of infection or postponement of scheduled medical appointments by healthcare providers. It could be that more eager epidemic control measures in the post-socialist countries have had positive effects on their more fragile healthcare systems.

Study limitations

We are aware that this paper has several limitations. To begin with, unlike previous empirical studies, our investigation used a non-standard set of outcome variables to assess the unmet healthcare needs of people aged 50+; that is, the variables were all related to epidemic control decisions. Thus, comparisons with earlier studies could be misleading but should improve when the data from the follow-up research, the second round of the SHARE Corona Survey planned for 2021, becomes available. Another limitation of our study is the inability to differentiate between respondents with no need for healthcare and respondents whose needs for healthcare were met. The calculated estimates of difficulties in access to healthcare might be biased downwards because the survey population at risk in the denominator also included respondents who answered ‘no’ to the questions on our three outcome variables but in reality had no need for healthcare. Our study is not the first to encounter such a survey design issue (OECD 2019), but we attenuate it using a rich set of health-related controls from SHARE Wave 7. While aware of this limitation, we believe that our findings are still useful in revealing within- and between-country variations in access to healthcare during the SARS-CoV-2 outbreak. Last but not least, it is worthwhile to mention that the second wave of the SHARE Corona Survey will allow future studies to explore the longitudinal dimension of the data and upgrade this study and our understanding of health-related and socio-economic impacts of the crisis.

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Availability of data and material Publically available.

Code availability Available on request from the authors.

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