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Did the COVID-19 pandemic reshape equity in healthcare use in Europe?

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ABSTRACT

Promoting equity in healthcare use requires to respect both principles of horizontal equity, that guarantees everyone the same use of healthcare for a given level of need, and vertical equity, that requires the sickest to receive more care than others, in a proportion deemed appropriate. This study explores the extent to which horizontal and vertical equity in healthcare use among individuals aged 50+ in Europe has been restructured during the COVID-19 pandemic.

Using the variance as an inequality measure, we assess horizontal equity in healthcare use based on the *fairness gap* approach and propose two new measures of vertical equity. The sample includes 24,965 respondents of the SHARE survey from 18 European countries, who participated in wave 8 just before the pandemic and the second SHARE Corona survey in 2021. These data provide information on use of physician and hospital care over the year for each period, as well as on a wide range of health and socio-economic variables.

Although pro-rich inequities in healthcare use were observed in some countries before the outbreak, our results do not reveal any significant evolution in horizontal equity during the pandemic. Conversely, vertical equity in healthcare use would have significantly declined in most countries, especially in Central or Eastern Europe. Telemedicine appears to have played a protective role against this decline in vertical equity in countries where it was heavily used during the pandemic. Our results support the case for public policies aimed at restoring access to care for individuals with the highest needs.

1. Introduction

Following on the call for health equity by the [Commission on Social Determinants of Health, 2008](#), promoting equity in healthcare is a major objective of public health policies. According to [Aday and Andersen \(1975\)](#), equity in health systems refers to healthcare use having to be mostly allocated based on health needs. From an ethical perspective, equal treatment in situations of pain or confrontation with death can be seen as a basic condition of respect for human dignity. Following [Daniels \(1982\)](#), another argument is that “*a distribution of health care services that it is not determined by the distribution of health care needs is unreasonable*” since “*the function of health care services is to prevent and cure illness, i.e. to meet health care needs*”. Finally, ensuring access to basic health care for all is an essential premise for achieving the fair equality of opportunity in health ([Daniels, 1985](#)). Two principles, rooted in the Aristotelian tradition, have been defined to assess the equity of healthcare systems ([Rochaix and Tubeuf, 2009](#); [Fleurbaey and Schokkaert, 2009](#); [Wagstaff and Van Doorslaer, 2000](#)). First, ensuring horizontal equity would imply

to guarantee the same use of the healthcare system for a given level of healthcare needs, irrespective of other individual characteristics such as the ability to pay or the level of education. Second, respecting vertical equity would require the individuals with higher needs to receive more healthcare than others, in a proportion deemed appropriate.

With the notable exception of an article by [Sutton \(2002\)](#), most existing contributions aimed at measuring equity in healthcare use focus exclusively on horizontal equity and are not concerned with the issue of vertical equity ([Fleurbaey and Schokkaert, 2011](#); [Wagstaff and Van Doorslaer, 2000](#); [Wagstaff et al., 2007](#)). Many studies have explored horizontal equity of European health systems ([Devaux, 2015](#); [OECD, 2019](#); [van Doorslaer et al., 2004](#)). They concur on pro-rich horizontal inequity in access to doctors in almost all European countries, especially for specialist consultations, dentists, and preventive care. Inequities in access to both GP and specialist consultations are higher in Eastern European countries, especially Poland and Bulgaria, as well as in Portugal ([OECD, 2019](#)). One article focused more specifically on taking account of the heterogeneity in the “use-need” relationship according to

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socio-economic status when measuring inequalities in healthcare use (Van de Poel et al., 2012). Considering such heterogeneity would result in reconsidering upwards the level of inequalities in favour of the rich, caused by the greater barriers to access to care – financial, informational, supply-related – faced by the least privileged populations.

However, the COVID-19 pandemic may have affected the level of equity in healthcare systems. Indeed, the outbreak of the COVID-19 crisis has compelled countries to undertake strong protection measures and major reorganisations of their healthcare systems. It has led to drastic healthcare rationing that has affected outpatient or primary care (Chatterji and Li, 2020; Ziedan et al., 2020), emergency departments (Hartnett et al., 2020) or elective surgeries (COVIDSurg Collaborative, 2020). This strong reduction in healthcare supply has been accompanied by the contraction of healthcare demand due to displacement restrictions and fear of contamination. Among people aged 50 or over in Europe, 5% were unable to obtain a medical appointment during the first wave of the pandemic, 12% forwent care for fear of contracting COVID-19, and 25% had at least one planned medical treatment postponed (Arnault et al., 2021).

While rationing of healthcare has certainly reduced access to healthcare in general (Pujolar et al., 2022), its overall impact on horizontal and vertical equity is not straightforward. In this context, many health systems have pursued policies of prioritising resources in favour of people with vital or urgent health care needs, irrespective of any other characteristic (Hanna et al., 2020; Rosenbaum, 2020). Thus, by early 2021, 87% of countries had implemented policies and plans to define core health services that must be maintained during the pandemic (World Health Organisation, 2021). However, the extreme emphasis on treating patients with severe forms of the Coronavirus, especially in hospitals, may certainly have rationed the demand for healthcare of some individuals with high needs and then threatened vertical equity in health systems: cancer patients, for instance, for whom the additional anxiety of being infected by COVID-19 was a source of foregoing care (Dhada et al., 2021), or patients suffering from a stroke, whose fear of going to hospital could partly explain the 21% increase in last-known-well to arrival times during the pandemic (Nawabi et al., 2022). Moreover, the poorest and those who usually struggle to access healthcare may have faced even more challenges in getting the care they need in this difficult context, potentially reducing horizontal equity. Conversely, horizontal equity may well have increased if the rationing of scheduled and specialised care has had a higher impact on the more socio-economically advantaged, who generally make more use of these types of care. Finally, we may expect discrepancies across European countries due to differences in the baseline magnitude of equity and in the policies implemented during the pandemic.

In the context of the COVID-19 pandemic, only a few studies on horizontal equity healthcare could be acknowledged, mostly dealing with reported unmet medical care needs. In the US, effects of ethnicity, low education (Czeisler et al., 2020) or job loss (Gonzalez et al., 2020) have been established. For Europe, Arnault et al. (2021) highlight the impact of economic vulnerability on unmet needs during the first months of the pandemic crisis among the 50+; they also point out that difficulties in accessing healthcare for economically vulnerable individuals were mostly experienced among the sickest groups of people, which suggests that the theoretical priority given to caring for the sickest was not entirely borne out by reality. González-Touya et al. (2021) calculate concentration indices for most European countries and fail to exhibit significant income-related inequalities in unmet medical care needs during the first epidemic wave in most European countries. In the UK, inequalities in favour of the richest in GP consultations were also observed at the peak of the first wave, but these inequities diminished as the pandemic progressed towards the summer of 2020 (Davillas and Jones, 2021).

We explore the extent to which the magnitude of inequity in healthcare use among individuals aged 50 or more across Europe has been modified during the COVID-19 pandemic, by using the wave 8 of

the SHARE survey conducted just before the pandemic and the second SHARE Corona survey conducted in the summer 2021. We propose new measures of vertical and horizontal equity based on the *fairness gap* approach, developed by Fleurbaey and Schokkaert (2009), and using variance as the measure of inequality. Our first major contribution is to investigate the normative issue of vertical equity in healthcare use, which is almost never addressed in the literature except in Sutton (2002). We extend his contribution by focusing on healthcare access (or lack of access) for the sickest people, considering a binary variable of healthcare consumption rather than a continuous measure of number of contacts. We propose two simple measures of vertical equity based on two alternative definitions of what would be a desirable increase in care as a function of an increase in need. Regarding horizontal equity, our study enriches the current literature by considering various socio-economic status variables as sources of unfairness, whereas studies relying on the concentration index approach only measure income-related inequality. We also analyse healthcare use - not unmet needs - by using data from the summer of 2021. Even though this work will not allow determine whether the changes observed with the pandemic will be temporary or permanent, our study is not limited to observing what happened immediately after the onset of COVID-19 but more than a year after, in 18 European countries that differ in their baseline levels of healthcare equity and ease of access to healthcare during the pandemic.

2. Methods

2.1. Measures of horizontal and vertical equity in healthcare use

2.1.1. Conceptual framework

Let us assume that healthcare utilization during a reference period – the last 12 months in our case – by an individual i at a given time t (before or after the outbreak of COVID-19) is derived from the unobservable latent individual's net utility of the individual in using care q_{it}^* , i.e. utility of using care minus utility of not using it. q_{it}^* is supposed to be additively explained by healthcare needs (N_{it}), socio-economic characteristics (S_{it}) and demographic variables (D_{it}), plus an error term assumed to be normally distributed (ε_{it}):

$$q_{it}^* = f(N_{it}, S_{it}, D_{it}) = \alpha_t N_{it} + \beta_t S_{it} + \gamma_t D_{it} + \varepsilon_{it} \quad (1)$$

The vector of needs consists in a set of variables related to health status, which are regarded as legitimate and desirable sources of differences in healthcare use under the principle of vertical equity. The vector of socio-economic characteristics may include education, income, or economic vulnerability, that are considered as sources of illegitimate differences in healthcare use under the principle of horizontal equity. The f function is assumed to be additively separable: it implies that the effect of needs on healthcare use is regarded as independent of the effect of socio-economic variables and vice-versa. Demographic variables notably include family situation, as well as age and gender, although the latter could also be considered to some extent as additional needs variables. Finally, the residual term captures individual preferences and other random factors not accounted for by the other determinants.

Empirically, q_{it}^* can refer to the latent unobserved variable associated to a binary outcome of care use q_{it} . The predicted value of this latent variable, referred to as \widehat{q}_{it} in the remainder of this work, can be estimated by a simple Probit model:

$$\widehat{q}_{it} = \widehat{\alpha}_t N_{it} + \widehat{\beta}_t S_{it} + \widehat{\gamma}_t D_{it} \quad (2)$$

2.1.2. Measure of horizontal equity

Horizontal equity is achieved if all individuals with the same needs have the same level of healthcare use, irrespective of their socio-economic status or any other illegitimate source of inequalities in healthcare use. As the effect of socio-economic status is supposed to be independent of the level of needs, this condition is satisfied if and only if

$$\widehat{\beta}_t = 0.$$

The method adopted for measuring the magnitude of horizontal inequity, known as the *fairness gap*, was introduced by Fleurbaey and Schokkaert (2009) and applied in a few empirical studies on health, healthcare use and mortality (Barbosa and Cookson, 2019; García-Gómez et al., 2015). The idea is to define a “horizontally fair” distribution of healthcare as the distribution that would be observed if all individuals could have a common socio-economic status.

For each individual i at period t , the horizontal *unfairness gap* (HUG_{it}) can be defined as the difference between his/her actual healthcare use and the “reference” healthcare use he/she could expect if the effect of illegitimate sources of inequalities were neutralized:

$$HUG_{it} = \widehat{q}_{it} - (\widehat{\alpha}_t N_{it} + \widehat{\beta}_t S_{it}^{ref} + \widehat{\gamma}_t D_{it}) \quad (3)$$

The expression $\widehat{\alpha}_t N_{it} + \widehat{\beta}_t S_{it}^{ref} + \widehat{\gamma}_t D_{it}$ is the predicted “reference” healthcare use for an individual i at period t , whose actual needs and demographic characteristics are left unchanged but who is assigned a common “reference” socio-economic status.

In a situation of complete horizontal equity, the difference between actual and “reference” predicted values of healthcare use should be equal to zero for all individuals from the population of interest. So, horizontal inequity (HI) can be assessed by aggregating all the individual values HUG_{it} through an inequality measure.

We adopt an absolute measurement approach to inequalities, by using the variance as an inequality measure. In contrast to the usual bidimensional concentration index, which is relative and only considers one source of inequality as natural ordering, the variance allows to account for many legitimate and illegitimate sources. It also satisfies translation invariance, which is a desirable property given the sharp reduction in average outcomes of healthcare utilization induced by the pandemic.

Horizontal inequity (HI) is then measured by the variance of individual horizontal *unfairness gaps* (HUG_{it}) as follows:

$$HI_t = \sigma^2(HUG_{it}) = \sigma^2(\widehat{q}_{it} - (\widehat{\alpha}_t N_{it} + \widehat{\beta}_t S_{it}^{ref} + \widehat{\gamma}_t D_{it})) \quad (4)$$

Equation (2) being additively separable, it immediately follows that:

$$HI_t = \sigma^2(\widehat{\beta}_t S_{it} - \widehat{\beta}_t S_{it}^{ref}) = \sigma^2(\widehat{\beta}_t S_{it}) \quad (5)$$

The *fairness gap* approach can be seen as a generalization of the well-known method of indirect standardization. Its main interest is that it satisfies by construction the so-called “compensation condition” which states that there should be no differences left in healthcare use due to variations in socio-economic status when the chosen measure is equal to zero:

$$HI_t = 0 \Rightarrow \sigma^2(\widehat{\beta}_t S_{it}) = 0 \Rightarrow \widehat{\beta}_t = 0 \quad (6)$$

Moreover, as equation (2) is additively separable, HI_t has two other very useful features. First, its value does not rely on S_{it}^{ref} anymore, so that choosing a reference for socio-economic status becomes unnecessary. Then, its value is never impacted by legitimate variations in healthcare use due to differences in needs or demographics. This property and the “compensation condition” both make HI_t a particularly relevant measure of horizontal inequity.

2.1.3. Measures of vertical equity

The concept of vertical equity has an even clearer normative dimension since vertical equity is achieved if care use is fairly distributed according to needs. Consequently, an agreement should be first found on what constitutes a fair distribution of use according to needs. Empirically, we aim to treat and measure horizontal and vertical equity independently of each other. To this end, we adjust by socio-economic profile when it comes to assessing vertical equity. Defining a fair distribution of use according to needs amounts to setting a reference value (α^{ref}) for the effect of needs on healthcare use.

Sutton (2002) proposes an empirical method to estimate this “ideal” relationship between needs and care use. Given that use should always be increasing with needs, he estimates their relationship and observes that this condition is not met beyond a certain level of need. He therefore deduces the ideal relationship by applying a linear projection for high needs based on the estimated relationship for moderate needs. This method, relevant with a single aggregated and continuous need variable, is difficult to replicate across multiple indicators of needs.

Our premise is rather that an egalitarian situation where all individuals would have the same use of healthcare, irrespective of their needs, is unanimously considered as vertically unfair. This amounts to a situation where there is no prioritisation of healthcare use according to need, i.e. where healthcare is randomly distributed across the population. Even in hypothetical extreme situations of care rationing (“wartime medicine”), one would “prefer” to deny care to the sickest to save the greatest number of lives rather than allocate healthcare randomly according to needs. In our first approach, we consider the egalitarian situation as the most vertically inequitable and chosen as the “reference” healthcare level in this worst-case scenario where $\alpha^{ref} = 0$.

For each individual i , at period t , the vertical *fairness gap* (VFG_{it}) can be defined as the difference between his/her actual healthcare use and the “reference” healthcare use he/she could expect if healthcare were allocated irrespective of needs, i.e. if the response to needs was the most unfair:

$$VFG_{it} = \widehat{q}_{it} - (\widehat{\beta}_t S_{it} + \widehat{\gamma}_t D_{it}) = \widehat{\alpha}_t N_{it} \quad (7)$$

We measure the magnitude of vertical equity (VE) by the variance of individual vertical *fairness gaps* (VFG_{it}):

$$VE_t = \sigma^2(VFG_{it}) = \sigma^2(\widehat{\alpha}_t N_{it}) \quad (8)$$

It immediately follows that the most vertically inequitable situation, in which healthcare use does not meet needs at all, is reached when VE_t is equal to zero:

$$VE_t = 0 \Rightarrow \sigma^2(\widehat{\alpha}_t N_{it}) = 0 \Rightarrow \widehat{\alpha}_t = 0 \quad (9)$$

Its value is never impacted by illegitimate variations in healthcare use due to differences in socio-economic characteristics, meaning that it is insensitive to potential fluctuations in horizontal equity. This measure of vertical equity is increasing with $\widehat{\alpha}_t$ when $\widehat{\alpha}_t$ is strictly positive.

Several objections can be raised at this stage: firstly, our measure of vertical equity also increases when $\widehat{\alpha}_t$ is strictly negative, although it could correspond to situations at least as undesirable as our situation of reference. In our empirical analyses, we ensure that such situations where the total (combined) effect of needs on healthcare use is negative apply to very few observations, and we normalize the measure of vertical equity to 0 for all individuals concerned. Secondly, while this measure of vertical equity allows us to capture differences in healthcare access between individuals with and without needs, it is not sensitive to increases in healthcare use according to the intensity of needs. Thus, it does not necessarily consider a situation where individuals with high needs have greater use than those with moderate needs as more equitable than a situation where it is the opposite. This debatable assumption would nonetheless seem more problematic to us if we were modelling a continuous variable of number of visits or healthcare expenses rather than a binary indicator of healthcare access, which is desirable by all individuals with needs. Finally, according to this measure, vertical equity is maximized when $\widehat{\alpha}_t$ tends towards infinity. It raises questions for very high values of $\widehat{\alpha}_t$ as an excess healthcare use from high-need individuals is not desirable beyond a certain threshold and could be source of inefficiency.

An alternative approach consists in choosing the fairest response to needs as the “reference” situation, considering that an additional increase in the use of high-need individuals relatively to low-need individuals would reduce vertical equity. We construct a synthetic and virtual reference value α^{ref} that considers, for each need variable, the

highest estimated value of $\hat{\alpha}$ before the pandemic, i.e. the largest gap in the net utility of care use between low-need and high-need individuals.

For each individual i , at period t , the vertical *unfairness gap* (VUG_{it}) can be defined as the difference between his/her actual healthcare use and the “reference” healthcare use he/she could expect if the response to needs for all individuals was the fairest:

$$VUG_{it} = \hat{q}_{it} - (\alpha^{ref} N_{it} + \hat{\beta}_t S_{it} + \hat{\gamma}_t D_{it}) = (\hat{\alpha}_t - \alpha^{ref}) N_{it} \quad (10)$$

The magnitude of vertical inequity (VI) can be measured by the variance of individual vertical *unfairness gap* (VUG_{it}):

$$VI_t = \sigma^2(VUG_{it}) = \sigma^2((\hat{\alpha}_t - \alpha^{ref}) N_{it}) \quad (11)$$

It immediately follows that there is no difference left in healthcare use due to variations from the fair response to needs when VI_t is equal to zero:

$$VI_t = 0 \Rightarrow \sigma^2((\hat{\alpha}_t - \alpha^{ref}) N_{it}) = 0 \Rightarrow \hat{\alpha}_t = \alpha^{ref} \quad (12)$$

Its value is never impacted by illegitimate variations in healthcare use due to differences in socio-economic characteristics, meaning that it is insensitive to potential fluctuations in horizontal equity.

2.1.4. Estimation strategy

We use Probit models to produce estimates of the healthcare outcome (\hat{q}_{it}) for both periods, before and after the outbreak of COVID-19. In a first step, for each period, we estimate a pooled model on the whole SHARE sample adjusted for country-fixed effects to obtain global values of horizontal and vertical equity “all countries together”. In a second step, for each period, the same model is estimated separately for each country to compare horizontal and vertical equities between countries.

Separately for both periods, for the whole sample and for each country, we calculate a set of measures of horizontal inequity and two sets of measures of vertical equity ($\alpha_{ref} = 0$) and vertical inequity ($\alpha^{ref} = \hat{\alpha}_{max}$). Confidence intervals of (in)equity measures are obtained by bootstrap with 1000 replications. Finally, the evolutions of magnitude in horizontal and vertical (in)equity across countries and periods are illustrated graphically.

2.2. Data and sample

This research is based on SHARE panel data (Börsch-Supan et al., 2013). SHARE is a European multi-disciplinary survey which includes persons aged 50 or more and their partner, living in 27 European countries or Israel. The population to be analysed consists of a subsample of longitudinal SHARE respondents who have taken part in two separate SHARE collection operations: the eighth wave of the regular face-to-face SHARE survey (October 2019–March 2020) and the second wave of the SHARE Corona survey (SHARE Corona 2), conducted in June and July 2021 (Scherpenzeel et al., 2020). The scope is first restricted to participants aged 50 or over and living in private households from 18 SHARE countries: Austria (AT), Germany (DE), Sweden (SE), Spain (ES), Italy (IT), France (FR), Denmark (DK), Greece (GR), Switzerland (CH), Belgium (BE), Czech Republic (CZ), Poland (PL), Slovenia (SI), Estonia (EE), Croatia (HR), Lithuania (LT), Finland (FI) and Romania (RO). Eight countries with less than 750 observations were dropped from the sample due to problems of convergence or accuracy of the estimations arising from insufficient sample size: Bulgaria, Cyprus, Hungary, Israël, Latvia, Luxemburg, Malta and The Netherlands. The original sample of respondents to wave 8 ($N = 37,452$) is subject to two additional steps of selection. We construct a balanced sample, retaining only SHARE participants who answered both wave 8 and SHARE Corona 2. This choice is driven by the conditional design of the two consecutive waves, associated with a significant attrition (29% reduction of the total wave 8 sample), which leads us to base the analysis on a consistent population, i.e. identical at both points of measurement. Second, we

exclude from the sample respondents with missing values for most of the variables used to build the outcome or as covariates in the models, leading to a further cut of 6%. The final sample includes 24,965 respondents. Sample selection is summarized in a flowchart and analysed in terms of composition bias in Online appendix (Fig. A1 and Table A1).

2.3. Outcomes of healthcare use

Before the pandemic, in SHARE wave 8, the respondents were asked about the number of times they have seen or talked with doctors or qualified/registered nurses (including emergency rooms and outpatient visits at hospital) and the number of hospital stays they had during the previous twelve months (questions Q1a and Q1b in Online Appendix A1). In SHARE Corona 2, the questions regarding physician utilization and hospital care (Q2a and Q2b in Online Appendix A1) cover approximately the same time span of 12 months but their scope slightly differ in several ways. Contrary to questions from wave 8, questions Q2a and Q2b are devised as simple “yes/no” measures. Question Q2a refers to visits to a doctor’s office or medical facility but does not explicitly account for remote contacts by phone or video, or contacts with qualified nurses. Question Q2b concerns treatment in a hospital but does not distinguish between hospital stays and outpatient consultations or emergency room visits. To make the measure of healthcare use as comparable as possible between the two waves, we build a binary indicator measuring whether the respondent has had at least one contact with a physician or an hospital. We are using another question from SHARE Corona 2 to capture telemedicine use (Q2c), although the time frame of this question is slightly different, covering the last fifteen or sixteen months rather than the past year.

The broad scope of this outcome aligns with our ambition of assessing equity in terms of access to care. It facilitates comparisons between countries, by smoothing out differences related to national healthcare systems, and is in line with the ethical vision of equity in access to “a reasonable or decent basic minimum of health-care services” advocated by Daniels (1985). Furthermore, it also contributes to the setting aside of theoretical questions pertaining to moral hazard or efficiency, to respect of preferences, and to the “expensive tastes” responsibility: it can be stated that, in an ideal world with no rationing of care or barriers to access, everyone aged 50 or over should have at least one contact per year with a doctor, especially those with poor health status. Therefore, access to one medical visit per year could be considered as a merit good that must be guaranteed to all. Conversely, lack of access to care would be particularly unfair for individuals with health needs or those who are less privileged, regardless of any consideration of moral hazard or preferences.

2.4. Potential sources of inequalities

We consider a broad set of variables in measuring healthcare needs. Self-reported health, grouped into three categories (“Excellent or very good”, “Good”, “Fair or poor”) aims to proxy the global health status of individuals before and during the pandemic. Four other binary variables of health symptoms or situations potentially experienced in the last 6 months before each of the two interviews are also used to create a single time-varying binary indicator of frailty: “Has fallen down”, “Was afraid of falling down”, “Has experienced dizziness, faints or blackouts”, “Has experienced fatigue”. We also consider the number of chronic diseases diagnosed, grouped into four categories: “0”, “1”, “2”, “3 or more”, based on a list of 18 chronic conditions, information available only in wave 8. The Global Activity Limitation Indicator (GALI), measured in wave 8, is also introduced into the analysis: “For the past 6 months at least, to what extent have you been limited because of a health problem in activities people usually do? Severely limited/Limited, but not severely/Not limited”.

To assess socio-economic status, we first consider education, which is measured on three aggregate levels of the International Standard Classification of Education (ISCED-1997) before the pandemic: “Lower

secondary or under”, “Upper secondary”, “Post-secondary education”. The income variable considered here is the annual total net household income per consumption unit, using the modified OECD equivalence scale. Respondents are classified into their income quintile based on the income distribution of their country of residence. Economic vulnerability of the respondents is also assessed based on the self-reported difficulty of “making ends meet”, which is collected through the following question: “Thinking of your household’s total monthly income, would you say that your household is able to make ends meet ... ? With great difficulty/With some difficulty/Fairly easily/Easily”. The first (“With great difficulty” and “With some difficulty”) and the last two categories (“Fairly easily” and “Easily”) are grouped together to end up with a binary variable. This synthetic and subjective indicator of living conditions should measure the respondent’s real budgetary constraint—i.e. the difference between the ability to pay and expenses—and his/her ability to withstand unexpected financial shock. Income and the economic vulnerability are considered as time-varying since they are measured in both periods.

Age and gender, as biological determinants of health, are first treated as demographic controls since they could have an influence of their own on the demand for healthcare or on healthcare system response, different from a mere effect of needs. We test the effect of this choice by treating them alternatively as variables of needs in a sensitivity analysis (see section 4). We also include an indicator of “couple life” as a pure control variable, without any associated normative hypothesis.

3. Results

Before the pandemic, 91% of the respondents have had at least one contact with the healthcare system during the previous 12 months (Table 1). Access to healthcare was initially very comparable in almost all countries involved, the probability of use of care ranging from 87% in Finland and Sweden to 97% in Austria, except for Romania (76%). By contrast, only 78% of the respondents have had at least one contact between June–July 2020 and June–July 2021, with marked differences across countries. If access to care seemed remarkably reduced or inhibited during the pandemic in Romania (54%) and in Greece (64%), the probability of contact remained over 80% in most countries.

Table 1 also provides a detailed description of the health, socio-economic and demographic characteristics of respondents for each of the two periods, for the sample as a whole and separately for each country.

Table 2 provides the estimated coefficients of Probit model explaining healthcare use before and after the outbreak of COVID-19 on the overall sample. Similar results of Probit models estimated separately for each country can be found in Online appendix (Tables A2 and A3). Before the pandemic occurred, the propensity of using care was strongly and positively correlated with needs in all countries, and especially with the number of chronic diseases, consistent with the principle of vertical equity. For a given level of needs, the net utility of healthcare use was also significantly higher among the most educated (coefficient of +0.184 compared to low-educated people) and in the highest income quintiles (coefficients from +0.164 to +0.250 compared to the lowest quintile). This points to the existence of pro-rich horizontal inequities in healthcare utilization among people aged 50 and over in Europe before the pandemic.

The consequences of the pandemic on the association between needs and the propensity to use care are mixed. The gap in net utility of healthcare use between the individuals reporting three chronic conditions or more and those reporting none seems to have largely reduced. Similarly, the effect of age was reversed: whereas the net utility of healthcare utilization was significantly increasing with age before, it became significantly decreasing with age during the pandemic. It may suggest that the oldest and/or chronically ill people have particularly complied with policy recommendations to stay at home or have more forgone care due to the fear of being infected. The effect of being severely limited, as measured by the GALL, on the propensity to use care

has decreased and even become significantly negative. However, this negative effect should be interpreted with caution, insofar as being severely limited is positively correlated with other need variables, such as being frail or self-reporting poor health, for which the relative differences in use tended to rise with the pandemic. This growing gaps in net utility of healthcare use between frail and non-frail individuals or between people in poor health and others may reflect a certain priority in delivering care to those whose health has deteriorated to the point where they require it at that time.

Regarding the socio-economic effects, only a narrowing of the gap between those with low and average levels of education was observed during the pandemic; in contrast, the gap between those with high and low levels of education remained unchanged. A similar pattern can be discerned in terms of income, suggesting that the most privileged individuals have had greater access to care than others in this context of rationing (private sector consultations, telemedicine, etc.).

The measures of horizontal and vertical (in)equity at each period and in each country as well as their bootstrapped standard errors (based on 1000 replications) are reported in Table 3. The “All countries” estimates arise from a pooled model with country-fixed effects, while country-specific measures arise from models estimated separately for each country. These measures are depicted in Figs. 1–3, where countries are ranked according to their level of equity before COVID-19, from most equitable to least equitable.

Before the outbreak, horizontal inequity measure is significantly positive on average in Europe (Table 3, column 2), but only in three specific countries taken separately: France, Greece, and Estonia. It suggests that there was horizontal inequity in healthcare utilization, at least in these countries, before the pandemic. After the outbreak, horizontal equity remains significantly different from zero on average (0.0133) but there is no evidence that its level has significantly evolved during the pandemic (Table 3, column 6), except for a decrease in France and an increase in Slovenia (Fig. 1). In France, the correlation between access to healthcare and both income and self-reported ability to make ends meet was much smaller during the pandemic than before. The opposite is observed in Slovenia (Online appendix, Tables A2 and A3).

We examine vertical equity by first considering as worst-case reference the egalitarian situation where all individuals would have the same use of healthcare regardless of their needs. The cases of negative (total) contributions of needs on healthcare use concern less than 1% of observations in all countries except Denmark (4%), Belgium (4%) and the Czech Republic (11%); these contributions are brought down to 0 before measuring vertical equity. In all countries, vertical equity measures were significantly different from zero before the pandemic and remained so afterwards (Table 3, columns 7 and 9). This implies that, throughout Europe, people with any kind or level of needs do have a higher propensity of using healthcare than those with no need at all, both before and since COVID-19.

Nonetheless, the measure of vertical equity declined significantly after the pandemic compared with before on average in Europe (from 0.295 to 0.127). This drop observed in all countries except Spain and Lithuania is particularly sharp in the countries that were initially the most equitable, like Germany, Denmark, Poland or the Czech Republic (Fig. 2). This suggests that the pandemic has narrowed the gap in use of the healthcare system between those with needs and those without, irrespective of the underlying cause.

Alternatively, we now assess vertical inequity as the gap between the real situation in a country and a best-case scenario of “optimal” distribution of use according to needs, which is proxied by the maximum effects of each need variable before the pandemic. All countries together, vertical inequity has increased significantly after the outbreak of COVID-19 (from 0.268 to 0.553). A similar trend is observed in all European countries and the gap is significant in most of them (Table 3, columns 12 to 16, and Fig. 3).

These results suggest that we have deviated further from the most vertically equitable situation during the pandemic than before in most

Table 1
– Main characteristics of the respondents at each period by country.

Country	All	AT	DE	SE	ES	IT	FR	DK	GR	CH	BE	CZ	PL	SI	EE	HR	LT	FI	RO
N =	24,965	1124	1700	770	840	1574	1490	1143	2324	1482	1469	1550	1452	1850	2296	971	1016	865	1049
Wave 8 – before outbreak (Oct.19 – Mar. 20)																			
HC use last 12 months (%)	91	97	96	87	95	92	94	90	88	89	96	97	90	91	91	88	90	87	76
Age (mean)	69.6	71.8	68.8	71.9	73.0	69.8	70.0	68.8	69.1	70.9	69.3	71.0	66.9	70.2	71.0	67.6	68.0	67.8	66.4
Gender: <i>Woman</i> (%)	58	61	54	55	59	57	59	56	57	55	55	63	56	59	64	56	63	55	57
In couple (%)	71	63	75	73	75	80	65	74	75	70	66	65	76	73	59	78	62	75	73
Education: <i>Primary/low sec.</i> (ISCED = 0–2) (%)	32	20	8	27	78	68	32	12	49	17	35	33	25	27	20	56	17	27	47
Education: <i>Upper sec.</i> (ISCED = 3) (%)	38	47	53	24	10	21	38	38	27	45	28	49	56	51	37	28	35	29	41
Education: <i>Post sec.</i> (ISCED = 4–6) (%)	30	33	39	49	12	11	30	50	24	38	37	19	19	22	44	17	48	45	12
Ability to make ends meet: <i>(Fairly) Easily</i> (%)	62	88	91	87	66	44	78	94	13	87	77	83	48	51	56	37	53	79	29
Equivalized income (mean, K€/year)	22	28	25	26	14	15	25	48	16	80	23	9	7	17	9	8	9	47	4
Self-assessed health: <i>Excellent, very good</i> (%)	22	30	20	41	16	20	23	55	31	40	28	19	8	22	5	18	6	20	13
Self-Assessed health: <i>Good</i> (%)	40	38	43	36	36	38	46	26	39	43	44	58	45	45	25	36	38	42	44
Self-Assessed health: <i>Fair, poor</i> (%)	37	32	37	24	48	42	32	19	30	18	28	23	47	33	69	46	56	38	44
GALI: <i>Not limited</i> (%)	53	48	46	57	55	56	56	62	74	64	52	49	46	49	38	50	50	54	51
GALI: <i>Limited</i> (%)	33	35	38	32	34	30	30	31	20	28	33	37	36	34	36	34	35	34	38
GALI: <i>Severely limited</i> (%)	14	17	17	11	11	14	14	7	6	7	14	14	17	18	26	16	15	12	11
# chronic diseases: 0 (%)	19	19	16	25	14	26	18	25	19	31	17	14	14	19	18	16	15	16	25
# chronic diseases: 1 (%)	27	28	26	29	26	30	29	29	26	30	26	23	23	27	29	26	26	25	31
# chronic diseases: 2 (%)	23	24	22	22	22	21	24	23	24	20	26	26	22	23	23	24	23	25	23
# chronic diseases: 3+ (%)	31	29	36	25	38	23	29	24	31	19	31	38	42	31	31	35	35	35	21
Frailty: 1+ symptom (%)	38	41	33	30	43	27	49	34	35	27	48	43	39	22	49	45	40	34	55
Corona 2 – after outbreak (June–July 2021)																			
HC use last 12 months (w. telemedicine) (%)	78	86	90	85	87	75	85	82	64	73	87	85	83	76	70	77	84	80	58
HC use last 12 months (wo. telemedicine) (%)	64	85	90	79	65	41	85	77	44	72	85	80	60	52	42	44	50	74	54
Ability to make ends meet: <i>(Fairly) Easily</i> (%)	69	94	93	93	78	54	83	96	10	91	85	93	61	63	74	44	62	86	29
Lowest equivalized income (mean, K€/year)	14	21	21	22	10	14	21	29	7	39	20	6	5	5	7	5	5	21	3
Self-assessed health: <i>Excellent, very good</i> (%)	21	32	20	37	11	14	21	55	25	38	28	15	7	19	6	25	5	20	13
Self-Assessed health: <i>Good</i> (%)	41	37	42	37	40	39	46	24	40	44	45	50	49	46	26	37	37	46	47
Self-Assessed health: <i>Fair, poor</i> (%)	39	32	39	26	49	47	34	22	35	19	27	35	45	35	69	39	58	34	40
Frailty: 1+ symptom (%)	47	45	42	40	43	32	61	42	51	31	56	57	43	34	58	55	50	45	59

Sample: N = 24,965 respondents to SHARE Wave 8 and to SHARE Corona 2 questionnaires, 18 countries.

Notes: unweighted frequencies. Average ages and incomes are presented, but these variables are introduced categorically in our models.

Table 2

– Estimated coefficients of Probit models on healthcare use before and after the outbreak, all countries together.

	Before outbreak	After outbreak
N	24,965	24,965
Age: 50–64	–	–
Age: 65–69	0.023	–0.023
Age: 70–74	0.072*	0.003
Age: 75–79	0.180***	–0.041
Age: 80+	0.025	–0.121***
Gender: Woman	0.147***	0.061***
In couple: Yes	0.084***	0.043**
Education: Primary or low sec. (ref)	–	–
Education: Upper sec.	0.106***	0.058**
Education: Post sec.	0.184***	0.185***
Make ends meet: With some/great difficulty (ref)	–	–
Make ends meet: (Fairly) Easily	0.025	0.013
Annual income: < Q1 (ref)	–	–
Annual income: [Q1; Q2]	0.069	–0.020
Annual income: [Q2; Q3]	0.168***	0.018
Annual income: [Q3; Q4]	0.250***	–0.008
Annual income: ≥ Q4	0.164***	0.174***
Annual income: Missing	0.098**	–0.038
SAH: Excellent (ref)	–	–
SAH: Good	0.145***	0.140***
SAH: Fair or poor	0.223***	0.326***
GALI: Not limited (ref)	–	–
GALI: Limited	0.114***	0.045*
GALI: Severely limited	0.184***	–0.052
Chronic diseases: None (ref)	–	–
Chronic diseases: 1	0.636***	0.352***
Chronic diseases: 2	0.936***	0.477***
Chronic diseases: 3+	1.258***	0.602***
Frailty: Yes	0.085**	0.256***
Country fixed effects	Yes	Yes
Intercept	0.614***	0.327***
Pseudo R2	0.181	0.094

Sample: N = 24,965 respondents to SHARE regular Wave 8 and to SHARE Corona 2 questionnaires, 18 countries.

Notes: (unweighted) models; coefficients are displayed, not marginal effects; * p-value <0.1 ** p-value <0.05 *** p-value <0.01.

European countries, indicating that the progressivity of healthcare utilization according to need has declined substantially with the pandemic. The analysis of coefficients by country highlights the influence of chronic diseases on these results, with a reduced gap in the utilization of healthcare services between the sickest and the others (Online Appendix, Tables A2 and A3).

Given that the two approaches of vertical equity do not rely on the same assumptions, it is not unexpected that they do not result in an identical ranking of countries prior to the pandemic, nor that they reveal the same exact trends in all countries (Fig. 2 vs. Fig. 3). However, they both lead to classify Germany (respectively Italy) as the most (resp. the least) vertically equitable country before the pandemic. And although they differ in terms of significance or magnitude of the before/after changes for some countries, Denmark and Belgium in particular, they yield fairly consistent trends for most countries.

4. Sensitivity analyses

We first test the sensitivity of the results by adjusting the model post-pandemic by COVID-19 infection and COVID-19 vaccination (see Online appendix; Tables A4 and A5, Figures A2, A3 and A4) insofar as they partly drive healthcare utilization and could, in turn, affect equity measures. However, in practice, the results are virtually unaffected by these two additional features.

Our main outcome of healthcare use also includes remote medical consultations. However, the time frame of the telemedicine question after the outbreak is slightly different from before, covering the last fifteen or sixteen months rather than the past year. We test the

Table 3 – Estimated values of horizontal and vertical (in)equity in healthcare use across waves and countries.

Country	Horizontal inequity				Vertical equity (1) ($\alpha_{ref} = 0$; no prioritisation according to needs)				Vertical inequity (2) ($\alpha_{ref} = \hat{\alpha}_{max}$)				
	Before outbreak	SE	After outbreak	SE	Before outbreak	SE	After outbreak	SE	Before outbreak	SE	After outbreak	SE	Significance of the gap
All ctr.	0.0157***	0.0035	0.0133***	0.00239	0.295***	0.017	0.127***	0.00756	0.268***	0.0159	0.553***	0.0147	***
AT	0.0547	0.0707	0.0412	0.0273	0.288**	0.118	0.173***	0.059	0.378	0.29	0.589***	0.0818	
DE	0.121	0.168	0.0445**	0.0211	0.727***	0.271	0.0907***	0.0329	0.0967	0.404	0.567***	0.0633	***
SE	0.0535	0.0429	0.0316	0.0273	0.251**	0.109	0.133**	0.0625	0.327***	0.0801	0.629***	0.0938	***
ES	0.109	0.119	0.0322	0.0314	0.169*	0.0993	0.187***	0.0702	0.386***	0.115	0.522***	0.0855	***
IT	0.028	0.0202	0.0334**	0.015	0.149**	0.062	0.0725**	0.0233	0.508***	0.0858	0.801***	0.0694	***
FR	0.137**	0.0637	0.014	0.013	0.323***	0.119	0.107***	0.0333	0.223*	0.114	0.656***	0.0705	***
DK	0.054	0.0364	0.0790**	0.031	0.514***	0.15	0.188***	0.0538	0.265	0.275	0.455***	0.0642	***
GR	0.0285*	0.0157	0.0121*	0.00701	0.355***	0.0643	0.203***	0.0337	0.338***	0.0545	0.579***	0.0477	***
CH	0.028	0.0213	0.0214*	0.0127	0.372***	0.104	0.133***	0.0336	0.241***	0.0662	0.564***	0.0576	***
BE	0.0478	0.0478	0.0107	0.0139	0.436***	0.14	0.153***	0.0412	0.238	0.331	0.450***	0.0593	
CZ	0.0608	0.133	0.0202	0.0156	0.468***	0.17	0.0563**	0.0236	0.202	0.514	0.594***	0.0686	
PL	0.0334	0.0262	0.0367*	0.02	0.470***	0.0978	0.220***	0.0425	0.112***	0.043	0.391***	0.0516	***
SI	0.007	0.0128	0.0549***	0.0194	0.334***	0.0729	0.160***	0.0315	0.282***	0.0575	0.453***	0.0505	***
EE	0.0528**	0.0238	0.0203**	0.0093	0.304***	0.0587	0.0470***	0.0149	0.258***	0.0452	0.660***	0.0518	***
HR	0.0165	0.029	0.0237	0.02	0.356***	0.112	0.228***	0.0544	0.260***	0.067	0.523***	0.0688	***
LT	0.0411	0.0359	0.0443	0.0278	0.278***	0.0927	0.300***	0.0754	0.220***	0.0649	0.254***	0.0594	***
FI	0.0616	0.0408	0.0356	0.0245	0.242**	0.107	0.0589*	0.0309	0.298***	0.0691	0.593***	0.0851	***
RO	0.0255	0.0206	0.0469**	0.0233	0.508***	0.097	0.375***	0.0635	0.236***	0.0495	0.559***	0.0692	***

Sample: N = 24,965 respondents to SHARE regular Wave 8 and to SHARE Corona 2 questionnaires, 18 countries. Notes: inequality measures derived from (unweighted) models in Tables 2, A2 and A3; SE refers to “standard errors”; * p-value <0.1 ** p-value <0.05 *** p-value <0.01; SE and p-values are calculated by bootstrap (N = 1000 replicates).

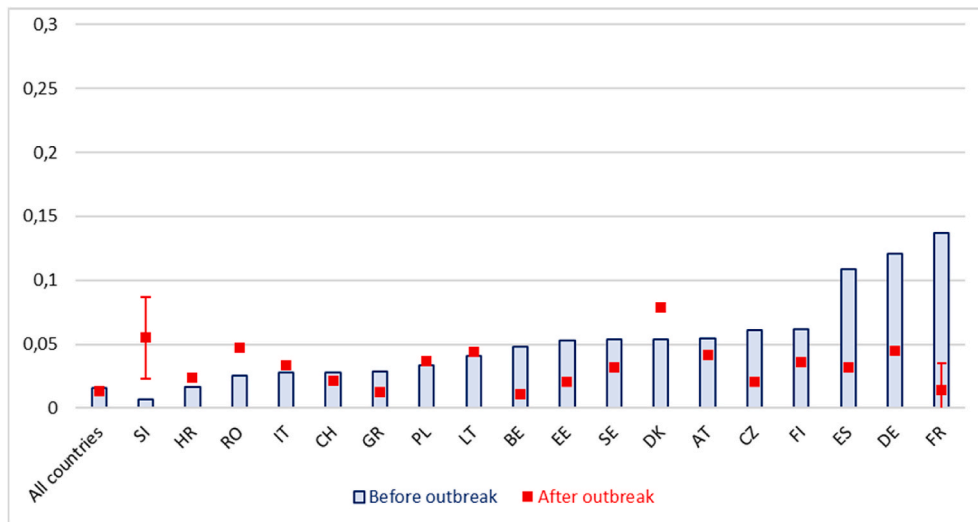


Fig. 1. – Horizontal inequity in healthcare use before and after the outbreak, by country
 Sample: N = 24,965 respondents to SHARE regular Wave 8 and to SHARE Corona 2 questionnaires, 18 countries.
 Notes: inequality measures derived from (unweighted) models in [Tables 2, A2 and A3](#); vertical error bars represent 90% confidence intervals after the outbreak calculated by bootstrap (N = 1000 replicates), only for countries with significant differences between before and after the outbreak.

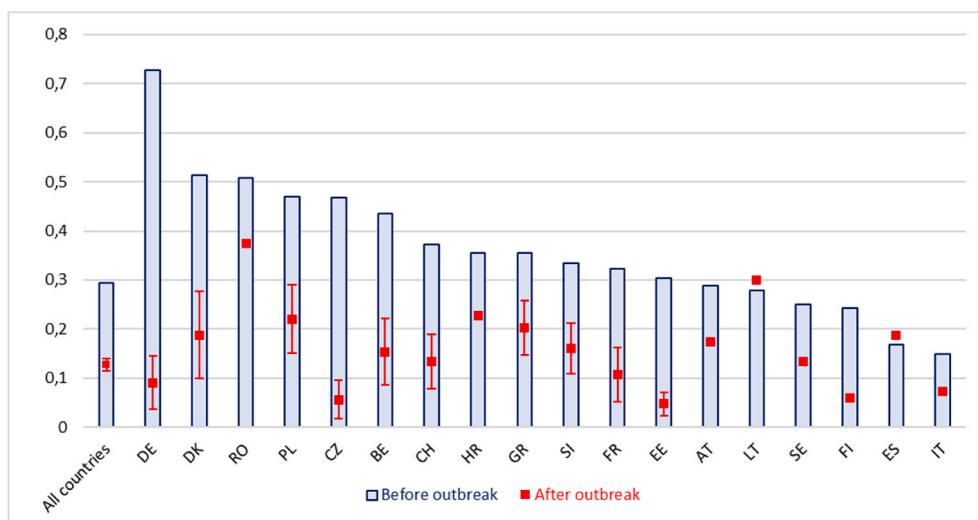


Fig. 2. – Vertical equity in healthcare use before and after the outbreak, by country, taking the egalitarian situation as the undesirable “reference”
 Sample: N = 24,965 respondents to SHARE regular Wave 8 and to SHARE Corona 2 questionnaires, 18 countries.
 Notes: inequality measures derived from (unweighted) models in [Tables 2, A2 and A3](#); vertical error bars represent 90% confidence intervals after the outbreak calculated by bootstrap (N = 1000 replicates), only for countries with significant differences between before and after the outbreak; the reference used to measure vertical equity is the undesirable egalitarian situation without any prioritisation according to need ($\alpha_{ref} = 0$).

sensitivity of our results to the exclusion of telemedicine consultations from our outcome in SHARE Corona 2: see Online appendix ([Tables A6 and A7](#), [Figures A5, A6 and A7](#)). The results on horizontal inequity are very similar to those observed in our primary analysis as they do not show significant evolution with the pandemic. However, the overall increase in vertical inequity induced by the pandemic is even higher when telemedicine is not accounted for: all countries together, VI increases from 0.268 to 0.611, while it only reaches 0.553 when telemedicine is included. It suggests that telemedicine has played a protective role against the decrease in vertical equity during the pandemic, by providing individuals in need of care the opportunity to have contact with professionals. This result is especially striking in most of the countries where telemedicine has been heavily used, such as in Croatia, Estonia, Poland, Slovenia or Lithuania, with Italy being the exception.

As a third sensitivity analysis, the vertical (in)equity measures are estimated after incorporating gender and age in the basket of needs: see Online appendix ([Table A8](#), [Figs. A8 and A9](#)). All countries together, similar trends are observed, the decrease in vertical equity being even slightly higher. The evolutions in vertical (in)equity observed at the country level are also quite similar.

Fourth, we test if our results are sensitive to the restriction of the sample to only individuals suffering from at least one chronic disease (N = 20,194), for whom it is even more obvious that they should have received healthcare within the year: see Online appendix ([Tables A9, A10 and A11](#), [Figures A10, A11 and A12](#)). Main results for horizontal equity are unchanged. Regarding vertical (in)equity, the magnitude of the evolutions observed is a little weaker and the sample restriction induces loss of precision in the estimates. Nevertheless, the decrease in vertical equity remains significant for all countries combined and

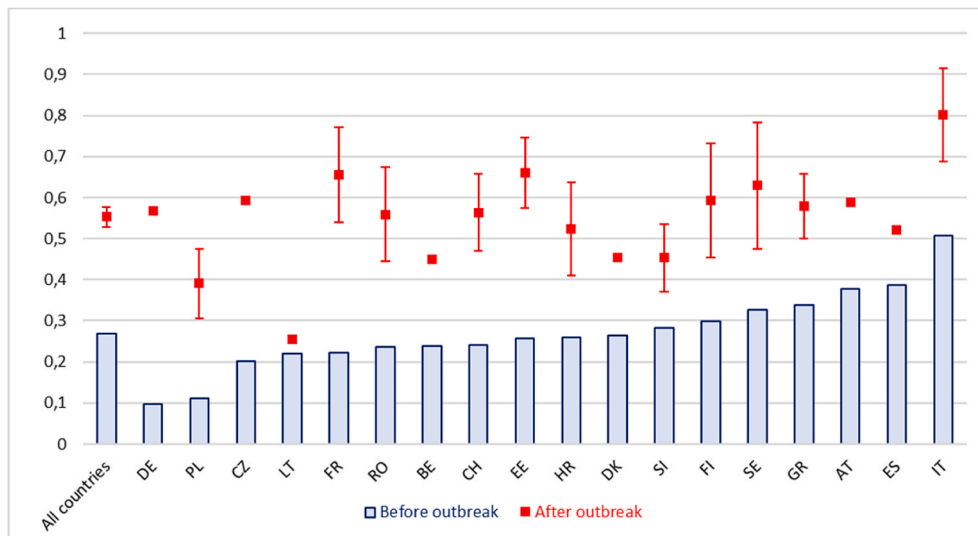


Fig. 3. – Vertical inequity in healthcare use before and after the outbreak, by country, taking the highest average effect per need variable before the pandemic as a desirable “reference”

Sample: $N = 24,965$ respondents to SHARE regular Wave 8 and to SHARE Corona 2 questionnaires, 18 countries.

Notes: inequality measures derived from (unweighted) models in Tables 2, A2 and A3; vertical error bars represent 90% confidence intervals after the outbreak calculated by bootstrap ($N = 1000$ replicates), only for countries with significant differences between before and after the outbreak; the reference used to measure vertical inequity is the highest average effect per need variable estimated before the outbreak ($\alpha_{ref} = \hat{\alpha}_{max}$).

perceptible in most of them.

Finally, we are testing an alternative hypothesis regarding the choice of the “optimal” distribution of use according to needs for measuring vertical inequity. In our main analysis, we chose a virtual reference corresponding to the combination of the highest coefficients for each need variable observed before the pandemic, regardless of the country where they were observed. As a sensitivity analysis, we consider the alternative hypothesis of a “real” reference situation, corresponding to the coefficients observed in the country where the sum of the effects of the need variables on the latent utilization variable was the highest before the pandemic (Germany): see Online appendix (Table A12, Fig. A13). Empirically, although the values taken by the inequity measures change mechanically with this alternative reference, the evolutions in vertical inequity observed at the country level are fairly similar to those observed in the main analysis.

5. Discussion

Our study identifies pro-rich horizontal inequities in healthcare use in 2019 in Europe but the evidence does not suggest that the level of horizontal equity evolved significantly during the pandemic, except for a slight increase in Denmark, Italy, Poland and Slovenia and a decrease in France. From this perspective, it appears that the various restrictions brought about by the pandemic have not served as a “great equalizer” and that the readjustment in the equity of healthcare provision in favour of the poorest did not occur on its own.

We have devised two alternative approaches for vertical equity, one measuring it in comparison with a purely egalitarian situation, envisaged as the worst possible situation from a theoretical point of view, and the other measuring the reduction in equity relative to a reference situation considered to be the closest empirically to the best possible relationship between care needs and access to care. Both measures suggest that vertical equity has significantly decreased in almost all European countries. This means that individuals with high needs suffered proportionally more than the others from a reduction in their access to care due to “stay-at-home” policies, postponement of scheduled treatments and procedures, reduced availability of care, and foregoing care for fear of contamination. Even if the two approaches of vertical

equity do not rely on the same assumptions, they highlight similar trends for most countries. We also observe that telemedicine has played a “protective” role against this decline in vertical equity in healthcare utilization, especially in countries where it was used extensively during the pandemic. It suggests that individuals with the highest needs also used this alternative of telemedicine and that the detrimental effect of the pandemic on vertical equity might have been even larger without it.

The empirical strategy on SHARE data compels us to select a balanced sample on the one hand, and to carry out “complete case” analysis on the other by excluding instances of partial non-response to the core SHARE questions used in the analysis. The decision to work on a balanced panel is highly constrained by the conditional design of the SHARE Corona survey relative to the regular SHARE wave 8. This is not standard in studies about equity, where it is customary to compare different cross-sectional points of measurement and work on unbalanced panels. However, this would have required us to work on two samples overly different in terms of structure, due to the high level of attrition between the two waves, specific to the pandemic period and to the telephone design of the SHARE Corona surveys and subject to selection bias regarding health and socio-economic status. Given that these selection biases could not be appropriately corrected with suitable weighting sets, our strategy was to define a population identical at both points and to focus on the individual effects of their characteristics on equity levels of equity before and during the pandemic.

Our research is also conducted on a binary “all-encompassing” outcome of healthcare use. While this choice is largely motivated by considerations of data comparability between SHARE wave 8 and SHARE Corona 2, we believe that such a global outcome helps to simplify the normative framework of the analysis and to circumvent certain restrictive hypotheses that would otherwise be required regarding the optimal relation between the level of needs and the volume or type of care provided. The use of two distinct methods to assess vertical equity, along with this binary outcome, provides a better understanding of the underlying normative assumptions. In this context, our focus is on ensuring fair access to the most basic forms of care, with particular attention to the risk of “non-access” for people with at least some need for care, regardless of the intensity of that need. This allows us to think in terms of healthcare which, in the absence of rationing or

barriers to access, ought to be universally distributed to people aged 50 and over which precludes the risk of moral hazard and the issue of the efficiency of the care provided. Our approach implies reasoning in terms of relative inequalities based on an outcome relating to basic routine care: from a public health perspective, the most pressing concern is to prevent the sickest from being the most affected by non-use, even if the extent of this non-use phenomenon is limited. In contrast, it is true that this outcome does not permit a clear understanding of the equity in the volume of healthcare use according to the level of needs, and therefore does not lend itself to interpretation in terms of over-use or under-use. Another restriction is that of our method relies on the complete separability of the effects of needs and socio-economic factors on use in the models, which means that we can only assess vertical equity for otherwise equal socio-economic profiles. Future research could employ an approach that allows the “use-need” relationship to vary according to socio-economic groups. Such an approach would enable to gain greater insight into the role of potential social inequalities in access to healthcare, including limitations in supply, information asymmetry and discrimination in the delivery of care, as well as demand-side factors such as a lower preference for care. Moreover, as we are primarily interested in equity of access to healthcare for health needs prior to the specific context of COVID-19, we have chosen not to account for specific COVID-related factors of healthcare use in our main analysis. COVID-19 infection and vaccination may have created avenues for new contacts with the healthcare system, but not as a rule. People suffering from mild COVID were advised to stay at home, and to consult a doctor only if symptoms had not disappeared after several days. Also, screening and vaccinations campaigns were not necessarily conducted by doctors or at doctors’ office, but also by other professionals like pharmacists. Additionally, individuals with comorbidities were more likely to experience severe symptoms in case of infection, and thus more inclined to seek medical attention and to get vaccinated. In practice, the inclusion of such control variables does not modify the results.

Despite these limitations, our work makes major contributions to the literature on equity of healthcare use, particularly by looking at it from a perspective of vertical equity, for which the literature is sparse. We posit that the utilization of two alternative approaches to vertical equity yields insights on their relative merits and drawbacks in relation with the underlying normative assumptions. Our results on horizontal and vertical equity may already give rise to concerns about the long-term adverse health effects of healthcare rationing for high-need individuals – and incidentally also for less privileged people insofar as their needs are higher on average – thereby increasing their risks of morbidity and mortality. They also call for further studies based on more recent data to determine whether these changes were only temporary or if the pandemic has permanently deteriorated vertical equity. Anyway, they point to the necessity of implementing public policies to restore and foster access to doctors, particularly through telemedicine, for those with the greatest needs and/or the lowest socio-economic status, since the pandemic has not levelled out the slight pre-existing social inequity and has even worsened equity of access to care between those with no need of care and the others in most countries. This is a particularly challenging concern in the countries of Central and Eastern Europe, where public health spending and health professionals’ resources are scarce.

Ethics

The SHARE data collection procedures are subject to continuous ethics review. SHARE-ERIC’s activities related to human subjects research are guided by international research ethics principles such as the [Respect Code of Practice for Socio-Economic Research](#) (PDF) (professional and ethical guidelines for the conduct of socio-economic research) and the [‘Declaration of Helsinki’](#) (PDF) (a set of ethical principles regarding human experimentation developed for the medical community by the World Medical Association, last revised at the 64th

WMA Meeting held in Fortaleza/Brazil in October 2013).

As SHARE users, we are familiar with the fundamental principles of research ethics and to take them into account in an appropriate manner when conducting research using SHARE data.

In addition, our research involves pseudonymised records and data sets: it is not possible for us to identify any individual from the information provided.

Therefore, we believe our research study does not require any further ethics approval.

CRediT authorship contribution statement

Louis Arnault: Writing – review & editing, Writing – original draft, Validation, Resources, Methodology, Formal analysis, Data curation, Conceptualization. **Florence Jusot:** Writing – review & editing, Writing – original draft, Validation, Supervision, Formal analysis, Conceptualization. **Thomas Renaud:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation.

Data availability

OUR CODE WILL BE MADE AVAILABLE ON REQUEST

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2024.117194>.

References

- Aday, L.A., Andersen, R., 1975. A framework for the study of access to medical care. *Health Serv. Res.* 9 (3), 208–220.
- Arnault, L., Jusot, F., Renaud, T., 2021. Economic vulnerability and unmet healthcare needs among the population aged 50 + years during the COVID-19 pandemic in Europe. *Eur. J. Ageing* 5, 1–15.
- Barbosa, E.C., Cookson, R., 2019. Multiple inequity in health care: an example from Brazil. *Social science & medicine* 228, 1–8.
- Borsch-Supan, A., Brandt, M., Hunkler, C., Kneip, T., Korbacher, J., Malter, F., Schaaf, B., Stuck, S., Zuber, S., 2013. Data resource profile the survey of health, ageing and retirement in Europe (SHARE). *Int. J. Epidemiol.*
- Borsch-Supan, A., et al., 2022a. Survey of health, ageing and retirement in Europe (SHARE) wave 8. Release version: 8.0.0. SHARE-ERIC. Data set.
- Borsch-Supan, A., et al., 2022b. Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 9. COVID-19 Survey 2. Release Version: 8.0.0. SHARE-ERIC. Data set.

- Chatterji, P., Li, Y., 2020. Effects of the Covid-19 Pandemic on Outpatient Providers in the US. National Bureau of Economic Research (NBER), Working Paper Series. No. 27173.
- Commission on Social Determinants of Health, 2008. Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health. World Health Organization, Geneva.
- COVIDSurg Collaborative, 2020. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. *Br. J. Surg.* 107 (11), 1440–1449.
- Czeisler, M.E., Marynak, K., Clarke, K.E.N., Salah, Z., Shakya, I., Thierry, J.M., et al., 2020. Delay or avoidance of medical care because of COVID-19-related concerns. *US Department of Health and Human Services/Centers for Disease Control and Prevention, MMWR (Morbidity and Mortality Weekly Report)* 69 (36).
- Daniels, N., 1982. Equity of access to health care: some conceptual and ethical issues, the milbank memorial fund quarterly. *Health and Society* 60 (1), 51–81. Winter, 1982.
- Daniels, N., 1985. *Just Health Care*. Cambridge University, New York.
- Davillas, A., Jones, A.M., 2021. Unmet health care need and income-related horizontal equity in use of health care during the COVID-19 pandemic. *Health Econ.*
- Devaux, M., 2015. Income-related inequalities and inequities in health care services utilisation in 18 selected OECD countries. *Eur. J. Health Econ.* 16 (1), 21–33.
- Dhada, S., Stewart, D., Cheema, E., Hadi, M.A., Paudyal, V., 2021. Cancer services during the COVID-19 pandemic: systematic review of patient's and caregiver's experiences. *Cancer Manag. Res.* 13, 5875–5887.
- Fleurbaey, M., Schokkaert, E., 2009. Unfair inequalities in health and health care. *J. Health Econ.* 28 (1), 73–90.
- Fleurbaey, M., Schokkaert, E., 2011. Equity in health and health care. In: Pauly, M., McGuire, T., Pita-Barros, P. (Eds.), *Handbook of Health Economics*, vol. 2. North-Holland.
- García-Gómez, P., Schokkaert, E., Van Ourti, T., Bago d'Uva, T., 2015. Inequity in the face of death. *Health Econ.* 24 (10), 1348–1367.
- Gonzalez, D., Zuckerman, S., Kenney, G.M., Karpman, M., 2020. Almost Half of Adults in Families Losing Work during the Pandemic Avoided Healthcare Because of Costs or COVID-19 Concerns. Urban Institute, Policy brief.
- González-Touya, M., Stoyanova, A., Urbanos-Garrido, R.M., 2021. COVID-19 and unmet healthcare needs of older people: did inequity arise in Europe? *Int. J. Environ. Res. Publ. Health* 18 (17), 9177.
- Hanna, T.P., Evans, G.A., Booth, C.M., 2020. Cancer, COVID-19 and the precautionary principle: prioritizing treatment during a global pandemic. *Nat. Rev. Clin. Oncol.* 17 (5), 268–270.
- Hartnett, K.P., Kite-Powell, A., DeVies, J., Coletta, M.A., Boehmer, T.K., Adjemian, J., Gundlapalli, A.V., 2020. Impact of the COVID-19 pandemic on emergency department visits — United States, January 1, 2019 – May 30, 2020. *Centers for disease control and prevention (CDC). Morb. Mortal. Wkly. Rep.* 69 (23), 699–704.
- Nawabi, N.L.A., Duey, A.H., Kilgallon, J.L., Jessurun, C., Doucette, J., Mekary, R.A., Aziz-Sultan, M.A., 2022. Effects of the COVID-19 pandemic on stroke response times: a systematic review and meta-analysis. *J. Neurointerventional Surg.* 14 (7), 642–649.
- Organisation for Economic Cooperation and Development (OECD), 2019. *Health for everyone? Social inequalities in health and health systems*. OECD Health Policy Studies.
- Pujolar, G., Oliver-Anglès, A., Vargas, I., Vázquez, M.L., 2022. Changes in access to health services during the COVID-19 pandemic: a scoping review. *Int. J. Environ. Res. Publ. Health* 19 (3), 1749.
- Rochaix, L., Tubeuf, S., 2009. Equity measurement in health. *Rev. Econ. Paris* 60 (2), 325–344.
- Rosenbaum, L., 2020. Facing Covid-19 in Italy—ethics, logistics, and therapeutics on the epidemic's front line. *N. Engl. J. Med.* 382 (20), 1873–1875.
- Scherpenzeel, A., Axt, K., Bergmann, M., Douhou, S., Oepen, A., Sand, G., Schuller, K., Stuck, S., Wagner, M., Börsch-Supan, A., 2020. Collecting survey data among the 50+ population during the COVID-19 outbreak: the survey of health, ageing and retirement in Europe (SHARE). *Surv Res Methods* 14 (2), 217–221.
- Sutton, M., 2002. Vertical and horizontal aspects of socio-economic inequity in general practitioner contacts in Scotland. *Health Econ.* 11 (6), 537–549.
- Van de Poel, E., Van Doorslaer, E., O'Donnell, O., 2012. Measurement of inequity in health care with heterogeneous response of use to need. *J. Health Econ.* 31 (4), 676–689.
- van Doorslaer, E., Koolman, X., Jones, A.M., 2004. Explaining income related inequalities in doctor utilisation in Europe. *Health Econ.* 13 (7), 629–647.
- Wagstaff, A., Van Doorslaer, E., 2000. Equity in health care finance and delivery. In: *Handbook of Health Economics*, vol. 1. Elsevier, pp. 1803–1862.
- Wagstaff, A., O'Donnell, O., Van Doorslaer, E., Lindelow, M., 2007. *Analyzing Health Equity Using Household Survey Data: a Guide to Techniques and Their Implementation*. World Bank Publications.
- World Health Organisation (WHO), 2021. *Second Round of the National Pulse Survey on Continuity of Essential Health Services during the COVID-19 Pandemic: January-March 2021. Interim Report*. World Health Organization, 22 April 2021.
- Ziedan, E., Simon, K.I., Wing, C., 2020. Effects of State COVID-19 Closure Policy on NON-COVID-19 Healthcare Utilization. National Bureau of Economic Research (NBER). Working Paper Series, No. 27621.