

DISCUSSION PAPER SERIES

IZA DP No. 13910

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Related Horizontal Equity in Access  
during the COVID-19 Pandemic**

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**Apostolos Davillas**

*University of East Anglia, IZA and RWI*

**Andrew M. Jones**

*University of York and Monash University*

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**IZA – Institute of Labor Economics**

Schaumburg-Lippe-Straße 5–9  
53113 Bonn, Germany

Phone: +49-228-3894-0  
Email: [publications@iza.org](mailto:publications@iza.org)

[www.iza.org](http://www.iza.org)

## ABSTRACT

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# Unmet Health Care Need and Income-Related Horizontal Equity in Access during the COVID-19 Pandemic\*

Using monthly data from the *Understanding Society* (UKHLS) COVID-19 Survey we analyse the evolution of unmet need and assess how the UK health care system performed against the norm of horizontal equity in health care access during the first wave of COVID-19 wave. Unmet need was most evident for hospital care, and less pronounced for primary health services (medical helplines, GP consultations, local pharmacist advice, over the counter medications and prescriptions). Despite this, there is no evidence that horizontal equity, with respect to income, was violated for NHS hospital outpatient and inpatient care during the first wave of the pandemic. There is evidence of pro-rich inequities in access to GP consultations, prescriptions and medical helplines at the peak of the first wave, but these were eliminated as the pandemic progressed. There are persistent pro-rich inequities for services that relate to individuals' ability to pay (over the counter medications and advice from the local pharmacist).

**JEL Classification:** C1, D63, I14

**Keywords:** inequity, COVID-19, unmet need, health care, UKHLS

**Corresponding author:**

Andrew M. Jones  
Department of Economics and Related Studies  
University of York  
York, YO10 5DD  
United Kingdom  
E-mail: [andrew.jones@york.ac.uk](mailto:andrew.jones@york.ac.uk)

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# 1. Introduction

Did people have access to the health care services they needed during the first wave of the COVID-19 pandemic and lockdown in the UK? Were those with higher income more able to get access to the services they needed from the health care system? The health care system in the UK is largely funded through general taxation (Cookson *et al.*, 2016). A founding principle and duty of the NHS is to ensure equal access for equal need irrespective of age, location or ability to pay, as restated in the 2012 Health and Social Care Act<sup>1</sup>. To cope with the COVID-19 pandemic, the UK reallocated resources within the health and social care systems to handle COVID-19 cases. This affected their ability to meet health care need due to other health conditions, illnesses or health emergencies. During March 2020, NHS trusts redesigned their services to release capacity for COVID-19 patients by discharging thousands to free up beds and postponing planned treatments (NHS Providers, 2020).

COVID-19 originated in the city of Wuhan, China, in December 2019 and spread rapidly to become a global pandemic. The first two confirmed cases in the UK were announced on Wednesday 29 January and, then, COVID-19 spread rapidly. The closure of pubs, restaurants, gyms and other social venues was announced on Friday, 20 March followed by the first national lockdown on the 23<sup>rd</sup> of March. It was not until the 13<sup>th</sup> of May that the first easing of lockdown was announced; two subsequent lockdown easings were made by the UK government on the 1<sup>st</sup> and 15<sup>th</sup> of June with a further easing on the 4<sup>th</sup> of July<sup>2</sup>. Health care systems in the UK experienced significant additional pressures during this period as a result of COVID-19 admissions<sup>3</sup>. As an attempt to mitigate the excess demand for health care and in response to the COVID-19 pandemic, NHS England announced the establishment of seven temporary hospitals across England, with similar initiatives undertaken in Scotland<sup>4</sup>.

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<sup>1</sup> UK Department of Health. Health and Social Care Act 2012: fact sheets. <https://www.gov.uk/government/publications/health-and-social-care-act-2012-fact-sheets>

<sup>2</sup> COVID-19 policy tracker. The Health Foundation. <https://www.health.org.uk/news-and-comment/charts-and-infographics/covid-19-policy-tracker> (accessed 21/11/2020).

<sup>3</sup> UK Government patients in hospital data. <https://coronavirus.data.gov.uk/details/healthcare> (accessed 21/November/2020).

<sup>4</sup> “NHS steps up coronavirus fight with two more Nightingale Hospitals” <https://www.england.nhs.uk/2020/04/nhs-steps-up-coronavirus-fight-with-two-more-nightingale-hospitals> (accessed 21/November/2020).

*Understanding Society*: the UK Household Longitudinal Study (UKHLS) launched a COVID-19 survey to examine the impact of the coronavirus pandemic on UKHLS participants (Benzeval, *et al.*, 2020). We use questions on health care access, in the preceding four weeks, for each of the April, May, June and July COVID-19 survey waves. We provide evidence on the extent of income-related inequity in access to health care services and its evolution over the four months of the first wave and lockdown. Our paper contributes to the literature on socioeconomic inequity in health care access (e.g., Bago d’Uva *et al.*, 2009, Cookson *et al.*, 2016, van Doorslaer *et al.*, 2006) by providing evidence on the evolution of income-related inequities in health care use, for those in need of the specific services, during the response of the first wave of the pandemic.<sup>5</sup>

## 2. Data

We use data from *UKHLS*, a longitudinal, nationally representative study of the UK. To assess income-related horizontal equity in health care use we use long-run average household income (up to a maximum of 9 waves) collected between UKHLS waves 1 (2009-2011) and 9 (2017-2019). To facilitate comparisons over time and between households, household income is deflated using the RPI and equivalised using the modified OECD scale. Our long-run income measure may be considered as a proxy of permanent income and is less vulnerable to temporary income variations<sup>6</sup>.

Since April 2020, participants from the UKHLS main survey have been approached each month to complete a short web-survey that focuses on the impact of the COVID-19 pandemic. We focus on respondents with valid data on our long-run average income measure and for health service use at least once during the April, May, June or July COVID-19 Survey waves<sup>7</sup>.

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<sup>5</sup> A recent study found that women and those with chronic illnesses experienced more surgical or medical appointment cancellations during the first lockdown in the UK (Topriceanu *et al.*, 2020). However, cancellations capture only part of unmet need as they overlook the new health care needs. Moreover, the study does not focus on income-related inequity in access to health care for those in need or on the evolution of these income-related inequities over time (Topriceanu *et al.*, 2020).

<sup>6</sup> Given that our income data are collected before the onset of the COVID-19 pandemic in the UK, our results on income-related inequity in healthcare access will not be contaminated by any COVID-related income shocks.

<sup>7</sup> Unlike following a balanced sample of individuals over time, this design ensures that most of the available sample (subject to our selection criteria as described above) are used at each wave.

### ***Health services use for those with specific health care needs***

Questions on access to different health care services are included in the COVID-19 Survey, for those with relevant needs for the services concerned (Benzeval, *et al.*, 2020). Specifically, these are collected monthly for those respondents that reported at least one diagnosed long-lasting health condition and/or reported currently receiving or waiting for any treatment. To further ensure that our measures of utilisation are conditioned on having a current health care need, we exclude those who, when asked “have you been able to access the NHS services you need...”, reported that they “do not require” each of the health care services of interest.

Our concept of horizontal inequity is based on finding evidence of an income gradient in whether those having a need for the specific service actually received that service during the period of interest<sup>8</sup>. We use a set of binary variables that capture access to health care services, for those in need of those services, in the preceding four weeks for each of the April, May, June and July COVID-19 Survey waves. Sample sizes for all utilisation variables are shown in Table B1<sup>9</sup>.

## **3. Methods**

Our aim is to estimate and compare levels of access to health care services for those in need of the services as well as income-related inequity in use of these services. Unmet need is measured by the prevalence of actual use of services among those defined as being in need. Concentration indices (CI) are used to measure horizontal inequity in access to health care services across the distribution of long-run permanent income. The CI can be calculated as:

$$CI = \frac{2 \times cov(y_i, r_i)}{\mu} \quad (1)$$

where,  $y_i$  is healthcare utilisation for each individual,  $\mu$  represents its mean value,  $r_i$  is the individual’s fractional income rank, and  $cov(.)$  stands for the covariance.

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<sup>8</sup> We do not have a measure of the intensity of need and are not able to explore issues of vertical equity in utilization across different levels of need.

<sup>9</sup> The exact wording of the health services utilisation questionnaire is included in Appendix A.

Erreygers and Van Ourti (2011) highlight that the measurement scale and boundedness of the outcome of interest have implications for the properties of the CI. For bounded variables, Wagstaff (2005) and Erreygers (2009) have suggested two alternative normalizations of the CI. Following Erreygers and Van Ourti (2011) and given that our health care utilisation measures are binary variables, we present results based on the Erreygers' (2009) corrected concentration index (CCI). The CCI is proportional to the absolute concentration index:

$$CCI = 4 \times \mu \times CI \quad (2)$$

We also present CIs based on Wagstaff's normalisation to focus on relative inequality<sup>10</sup>. Positive (negative) values indicate the presence of pro-rich (pro-poor) inequity in the access to health services, as our utilisation measures condition on having healthcare need.

## 4. Results

Table 1 shows that the levels of unmet need shortly after the introduction of the first lockdown (on 23<sup>rd</sup> March) were largest for inpatient and outpatient care, while much lower levels of unmet need are evident for medical helplines, GP consultations, local pharmacist advice, purchase of over the counter medications and use of prescription medicines. These results show a more pronounced impact on secondary care versus primary care services during the peak of the first wave. For example, in the April wave (late March-April reference period), only 30% of those who needed inpatient care managed to access those services; however, 98% of respondents reported that they had access to prescription medicines. Unmet need became less evident during the May, June and July waves. For example, outpatient consultations increased from 46% in April to 63% in the June UKHLS wave, following the easing of the lockdown. About 70% of those who needed outpatient care had access to it in the July wave, after the complete easing of the first lockdown on 4<sup>th</sup> July.

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<sup>10</sup> Our outcome measure focuses on the headcount of those who receive health services and a relative index is invariant to the headcount being measured in numbers of cases, hundreds of case, thousands of cases or other multiples.

**Table 1. Mean health services utilisation, conditional on need, over the first COVID-19 wave in the UK.**

Reference period	April wave	May wave	June wave	July wave
	Late March-April	Late April-3 June	June-1 July	Late June -July
GP	0.733	0.795	0.842	0.860
Outpatient	0.457	0.541	0.629	0.703
Inpatient	0.309	0.334	0.414	0.509
Prescription medicine	0.977	0.982	0.984	0.986
Medical helpline	0.652	0.667	0.728	0.786
Local pharmacist advice	0.757	0.781	0.813	0.856
Over the counter medication	0.920	0.947	0.959	0.971

Table 2 reveals that, despite the high levels of unmet need for these services, the CCI indices for inpatient and outpatient hospital care are not statistically different from zero throughout the period from April to July. This implies that the impact of the pandemic did not lead to a breakdown of the NHS's performance with respect to the norm of horizontal equity. For primary care, Table 2 does show systematic pro-rich inequity in GP consultations in April. But it is notable that these inequities diminished as the response to the pandemic progressed. Similar results are also observed for prescription medicines and for the use of medical helpline services (i.e., NHS 111 or NHS 24 in Scotland). On the other hand, pro-rich inequity in accessing advice from local pharmacists and for over the counter medications persists over time, although with variations in levels across waves<sup>11</sup>.

**Table 2. CCI measure of income-related inequity**

	April wave	May wave	June wave	July wave
GP	0.046** (0.016)	0.020 (0.016)	0.029** (0.015)	0.009 (0.015)
Outpatient	-0.015 (0.022)	0.034 (0.024)	-0.011 (0.024)	-0.003 (0.024)
Inpatient	0.048 (0.034)	0.019 (0.036)	0.010 (0.038)	-0.015 (0.041)
Prescription medicine	0.017*** (0.004)	0.012*** (0.004)	0.005 (0.004)	0.005 (0.004)
Medical helpline	0.098*** (0.034)	0.071* (0.039)	0.012 (0.040)	-0.018 (0.038)
Local pharmacist for advice	0.039* (0.023)	0.051** (0.025)	0.026 (0.025)	0.066*** (0.023)
Over the counter medication	0.066*** (0.011)	0.061*** (0.010)	0.042*** (0.010)	0.058*** (0.008)

Note: Standard errors are in parenthesis.

\*p<0.10;\*\*p<0.05;\*\*\*p<0.01.

<sup>11</sup> Results based on Wagstaff's normalisation of the CI show comparable patterns for all the utilisation variables and across waves (Table B2, Appendix)



## 5. Conclusions

Using data from the UKHLS COVID-19 Survey we explore the evolution of unmet health care need during the first wave of the COVID-19 pandemic. Levels of unmet need were most pronounced for inpatient and outpatient hospital care but less evident for the other health care services examined. This confirms that the impact of COVID-19 wave was more pronounced for hospital care than for primary care services. Our evidence reflects administrative data releases showing a reduction in emergency and non-COVID related admissions during this period, while online GP consultation initiatives seem to have met demand more effectively (NHS Providers, 2020; Thorlby *et al.*, 2020). Unmet need peaked at the peak of the pandemic in April and then declined as the impact of the pandemic became less severe and lockdown measures were eased.

For secondary care (hospital outpatient and inpatient care) there is no evidence of the principle of horizontal equity, with respect to income, being violated throughout the first wave of COVID-19. This is despite the level of unmet need and the overall COVID-19-related pressures on the hospital system. There is some evidence of systematic pro-rich inequity in access to GP consultations, prescriptions, medical helplines, local pharmacist advice and over the counter medications. However, for GP visits, prescriptions and medical helpline services these inequities diminished as the pandemic progressed towards July 2020. In a publicly funded health care system, one of the sources of pro-rich inequity in access to health care may be that low-income individuals are heavily time-constrained, due to harsher employment (and living) arrangements, and may be more constrained in seeking health care (Cookson *et al.*, 2016). Lockdown, the furlough scheme and the large media focus on health-related issues may have mitigated the time constraints and encouraged more active seeking for care, potentially explaining our results on reduced inequities as the UK response to the pandemic progressed. On the other hand, the presence of persistent pro-rich inequities for those services where access may be linked to individuals' ability to pay (over the counter medications and getting advice from the local pharmacist) is to be expected.

## References

- Bago d'Uva, T. B., Jones, A. M., Van Doorslaer, E. (2009). Measurement of horizontal inequity in health care utilisation using European panel data. *Journal of Health Economics*, 28(2), 280-289.
- Benzeval, M., Booker, C., Burton, J., Crossley, T.F., Jäckle, A., Kumari, M., Read B. (2020) Understanding Society COVID-19 Survey April Briefing Note: Health and Caring, ISER, University of Essex.
- Cookson, R., Propper, C., Asaria, M., Raine, R. (2016). Socio-economic inequalities in health care in England. *Fiscal Studies*, 37(3-4), 371-403.
- Erreygers, G. (2009). Correcting the concentration index. *Journal of Health Economics*, 28(2), 504-515.
- Erreygers, G., Van Ourti, T. (2011). Measuring socioeconomic inequality in health, health care and health financing by means of rank-dependent indices: a recipe for good practice. *Journal of Health Economics*, 30(4), 685-694.
- NHS Providers (2020). Confronting coronavirus in the NHS: the story so far. NHS Providers, April 2020. <https://nhsproviders.org/media/689450/confronting-coronavirus-in-the-nhs.pdf>
- Thorlby, R., Tinson, A., Kraindler, J. (2020). COVID-19: Five dimensions of impact. The Health Foundation, London. <https://www.health.org.uk/news-and-comment/blogs/covid-19-five-dimensions-of-impact>
- Topriceanu, C. C., Wong, A., Moon, J. C., Hughes, A., ...&, Captur, G. (2020). Inequality in access to health and care services during lockdown. Findings from the COVID-19 survey in five UK national longitudinal studies. medRxiv. <https://doi.org/10.1101/2020.09.12.20191973>
- Van Doorslaer, E., Masseria, C., Koolman, X. (2006). Inequalities in access to medical care by income in developed countries. *Cmaj*, 174(2), 177-183.
- Wagstaff, A. (2005). The bounds of the concentration index when the variable of interest is binary, with an application to immunization inequality. *Health Economics*, 14(4), 429-432.

## Appendix A

### UKHLS COVID-19 survey questionnaire for the variables used in our analysis.

#### **nhsnowgp [Use of NHS now for condition – GP]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Thinking about your situation now, have you been able to access the NHS services you need to help manage your condition(s) over the last 4 weeks?

GP or primary care practice staff?

1. Yes, in person
2. Yes, online or by phone only
3. No, not able to access
4. No, decided not to seek help at this time
5. Not required

#### **nhsnowpm [Use of NHS for condition – prescription meds]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Still thinking about your situation now, have you been able to access the NHS services you need...

Prescription medicine?

1. Yes
2. No
3. Not required

#### **nhsnowop [Use of NHS for condition – outpatients]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Have you been able to access the NHS services you need...

Hospital or clinic outpatient?

1. Yes, in person
2. Yes, online or by phone only
3. No, postponed or cancelled by NHS
4. No, I postponed or cancelled
5. No, different treatment provided
6. Not required

#### **nhsnowip [Use of NHS for condition – inpatients]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Still thinking about your situation now, have you been able to access the NHS services you need...

Hospital or clinic inpatient?

1. Yes
2. No, postponed or cancelled by NHS
3. No, I postponed or cancelled
4. No, different treatment provided
5. Not required

#### **nhsnow111 [Use of NHS now for condition – NHS111]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Have you been able to access the NHS services you need...

NHS 111 in England, Wales and Northern Ireland or NHS 24 in Scotland?

1. Yes
2. No, not able to access
3. No, I decided not to seek help at this time
4. Not required

#### **chscnowpharm [Use of CH&SC now for condition – pharmacists]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Thinking about your situation now, have you been able to access the community health and social care services and support you need to help manage your condition(s) over the last 4 weeks?

Local pharmacists for advice?

1. Yes, in person
2. Yes, online or by phone only
3. No, not able to access
4. No, decided not to seek help at this time
5. Not required

#### **chscnowotcm [Use of CH&SC now for condition – otc meds]**

Universe: Ask if not completed a previous monthly survey, and reported at least one health condition or currently having/waiting for treatment, or if completed a previous survey and reported at least one health condition in a previous or the current monthly survey, or currently having or waiting for treatment.

Source: UKHLS covid-19 survey

Text: Still thinking about your situation now, have you been able to access the community health and social care services and support you need...  
Over the counter medications?

1. Yes
2. No
3. Not required

## Appendix B.

**Table B1. Sample size for the health services utilisation variables conditional on those of health care need across the COVID-19 UKHLS waves.**

		April	May	June	July
GP					
	Sample size	4,120	3,551	3,299	3,045
Outpatient					
	Sample size	2,646	2,269	2,175	2,015
Inpatient					
	Sample size	1,007	901	883	794
Prescription medicine					
	Sample size	6,598	5,870	5,570	5,268
Emergency service call centre					
	Sample size	1,057	774	658	608
Local pharmacist for advice					
	Sample size	1,939	1,488	1,345	1,194
Over the counter medication					
	Sample size	3,212	2,415	2,239	2,122

Notes: Missing data for our long-running income measure are excluded from our analysis sample.

**Table B2. Wagstaff index of income-related inequity**

	April wave	May wave	June wave	July wave
GP	0.058*** (0.020)	0.030 (0.024)	0.054** (0.028)	0.018 (0.030)
Outpatient	-0.015 (0.023)	0.034 (0.024)	-0.011 (0.026)	-0.004 (0.028)
Inpatient	0.056 (0.039)	0.022 (0.041)	0.010 (0.039)	-0.015 (0.041)
Prescription medicine	0.183*** (0.047)	0.168*** (0.057)	0.076 (0.062)	0.092 (0.069)
Medical helpline	0.108*** (0.037)	0.080* (0.044)	0.015 (0.051)	-0.027 (0.057)
Local pharmacist for advice	0.054* (0.031)	0.075** (0.036)	0.043 (0.040)	0.133*** (0.047)
Over the counter medication	0.228*** (0.037)	0.303*** (0.052)	0.272*** (0.062)	0.517*** (0.074)

Note: Standard errors are in parenthesis.

\*p<0.10; \*\* p<0.05; \*\*\*p<0.01.