Health System Equity, Egalitarian Democracy & COVID-19 Outcomes: An Empirical Analysis

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Abstract: Scholars of public health typically focus on societal equity for explaining public health outcomes. Indeed, the COVID-19 pandemic has led to a spate of studies showing a tight connection between inequitable access to healthcare, welfare services, and adverse outcomes from the pandemic. Others have argued that democratic governments have generally failed relative to more autocratic ones, simply because autocrats can make the hard choices required for stemming the spread of viruses. We address this question a bit differently by asking whether more 'egalitarian' forms of democracy matter, given that they should contain more equitable healthcare access *and* societal infrastructure, such as social capital and trust, for achieving a broader collective good. Our results suggest that more equitable access to healthcare does indeed increase testing rates and lower the death rate from COVID-19. Broader egalitarian processes, measured as egalitarian democracy, however, show the opposite effects, suggesting that factors associated with healthcare capacity to reach and treat matter more than broader societal factors associated with social capital and trust. The results are robust to alternative testing procedures, including the application of instrumental variable technique for addressing endogeneity concern.

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The celebrated economic historian, Barry Eichengreen, suggests that the Black–White disparity in COVID-19-related deaths in the United States can be traced directly to differences in welfare policies, which in turn can be blamed on racism and societal injustice (Eichengreen 2020). His analysis is based on the well-established claims about the weakness of welfare states when ethnic differences are high and social capital and trust are low (Alesina, Baqir and Easterly 1999, Rothstein 2011). Jeffrey Sachs writes:

> *High inequality undermines social cohesion, erodes public trust, and deepens political polarization, all of which negatively affect governments' ability and readiness to respond to crises. This explains why the United States, Brazil, and Mexico account for nearly half of the world's reported deaths since the start of the pandemic* (Sachs 2020).

Indeed, a number of celebrated public health scholars argue that the lack of inclusive, pro-poor, governance is at the heart of the spread of many epidemics, such as obesity, drug abuse, and even homicide (Kawachi and Kennedy 2002, Marmot 2005, Wilkinson and Pickett 2009). These so called "neoliberal pandemics" are blamed directly on policies favoring capital and markets at the expense of community health and welfare (Schrecker and Bambra 2015). Apparently, existing societal inequity, including health inequalities, exacerbate the unequal effects of COVID-19, in what some call a "syndemic pandemic" (Bambra et al. 2020). These general observations leads one to ask whether an 'egalitarian democracy',[1] that contains greater equality in the distribution of political power resources, greater inclusivity and access to public goods, including health, generate favourable outcomes during the COVID-19 pandemic? Naturally, more egalitarian governance contains more equitable health systems, with greater capacity for reaching and treating people, thus stemming the spread of the virus. Using data on Covid-19 testing and death rates, we examine to what extent COVID-19 related outcomes might be explained by health system capacity compared with broadly egalitarian social and political governance. We also assess how an accessible health system conditions specific pandemic-targeting policy, such as testing policy and the stringency of lockdown, on Covid-related deaths.

For illustrative purposes, consider the example of Taiwan versus Sweden. Taiwan is hardly a Scandinavian-style democracy but has a capable health system where all citizens, and foreign residents (for at least six months), are entitled to a government insurance plan. Thus, an equitable and capable health system perhaps explains the country's success in containing the virus. Similarly, Australia, which has a relatively equitable healthcare system even if a Scandinavian-style welfare state is absent (Maizland and Felter 2020), has experienced a lower death rate than some other advanced countries with more egalitarian governance. The idea that equality of access to healthcare reduces the impact of epidemics and pandemics is highly intuitive. A well-functioning healthcare system, where the poor have access to health care on par with the rich, is likely to have high capacity in terms of reaching and treating people, thereby cauterizing the spread of disease and minimizing mortality. Nevertheless, many of these countries also adopted 'emergency' rules and 'extraordinary' measures that targeted the spread of the pandemic. These additional measures are independent of access to the healthcare system, or any other notion of egalitarian processes.

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[1] An egalitarian democracy is one in which individuals from all social groups are equally capable of exercising their political rights and freedoms, have little disparities in terms of rights and power resources, and where most people are capable of meaningfully influencing political and governing processes. See the Varieties of Democracy project's website https://www.v-dem.net/en/ (accessed July 2020).

In the case of Sweden, it was argued that broad societal trust and social capital would be a critical factor in controlling the virus without much need for extraordinary measures (Ellyatt 2020). Sweden's strategy of "lockdown light" was formulated on the basis of mutual trust between citizens and between citizens and the state, where people are urged to use their own judgement and voluntarily follow directives without strict government enforcement of lockdown. Apparently, Scandinavian-style welfare states can afford to fight "neoliberal pandemics" due to state–society dynamics associated with a strong welfare states and high social capital (Bambra et al. 2020). Such egalitarian values and infrastructure apparently help collective outcomes because of shared values of community. Rather than administrative capacity alone, elgalitarian governance apparently strengthens social capacities.

The Swedish expectation, however, has not been met. When taken as a proportion of each country's population, the numbers show that Sweden had 10.3% infections and 0.06% deaths compared with 0.023% infections and a .002% deaths from COVID for Norway. Thus, Sweden shows a death rate rom the pandemic 30 times greater than Norway. Similarly, Finland, Iceland and Denmark also show much smaller death rates compared with Sweden.[2] The equality of access to healthcare, however, is very similar across these countries, as are broad welfare policies and democratic inclusivity, which apparently lead to high social capital and political trust. This comparison might indicate that healthcare equity matters for fighting disease not because of the broader societal implications of societal trust in an egalitarian democracy, but because access to healthcare simply captures organizational capacities of healthcare systems[3] to deal more effectively with a pandemic. The governments of Vietnam, New Zealand, and South Korea invested heavily in critical healthcare facilities, and perhaps, as a result, had the capability to respond effectively to the COVID-19 crisis purely from the perspective of health system capacity rather than the broad societal equity associated with strong welfare states (Mazzucato and Quagiotto 2020). Compared to Norway´s more stricter lockdown, thus, Sweden´s strategy of reliance on social capacity seems to have fared less well, despite very similar health care system capacities as the countries mentioned above.

Equality and justice are goods in their own right and usually identified with democracies, but not all democracies are the same (Coppedge and Reinicke 1990, Sigman and Lindberg 2019). How democracies respond to health crises relative to other regimes is not that clear. For example, the tough choices required to be made by public health experts for fighting disease may clash with competing priorities of ordinary people. If Swedish public health experts could rely on the citizenry to trust their judgement, the same could not be said for many other industrialized democracies, such as the United States, where some armed citizens have even stormed government buildings demanding an end to lockdown. Populist leaders, such as President Jair Bolsanaro in Brazil and Vladimir Putin in Russia, delayed their response to the virus for reason of electoral popularity. Indeed, many less democratic regimes have been quite successful at curbing the coronavirus (e.g. China, Sri Lanka, Vietnam) compared with some full democratic regimes (e.g. the United States, United Kingdom, Spain, Italy), while democracies with robust healthcare systems have been able to deal with the virus more effectively (e.g. Germany, Australia, New Zealand) could it be that these democracies have succeeded due to their broadly egalitarian governance rather than health system capacity alone? After accounting for the capacity of the healthcare system, it is not clear whether there are additional benefits to fighting disease from the broader setting of egalitarian governance, which economists, such as Jeffrey Sachs, and many public health scholars hail as the antidote to

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[2] The figures were obtained on September 20, 2020 from WHO 2020, https://covid19.who.int/table.
[3] This includes medical staff, medication, hospitals, intensive care units, hospital beds, and other necessary infrastructure.

"syndemic pandemic." From the observations above, thus, we derive the following hypotheses to be tested empirically.

>**HYPOTHESIS 1.** *Equality in access to healthcare reduces the societal impact of health pandemics.*[4]

>**HYPOTHESIS 2.** *Healthcare equity should matter more than broad egalitarian governance for reducing the harm from health pandemics.*

2. Data and methods

2.1 Model specifications

We utilize a cross-section of data for 210 countries (see Appendix Table A1 for the list of countries). The COVID-19 testing and death rates are measured on the 25th of May. The correlation between the May data and June 25th are almost identical at r = 0.96, suggesting that the cross-sectional variation remained steady over a month of measurement. We also test the data accumulated upto the month of September. We estimate the following equation:

$$\ln(COVID)_c = \varphi_c + \beta HCE_c + \beta Z_c + \lambda_r + \omega_c \qquad (1)$$

Wherein, $ln(COVID)_c$ captures COVID-19 tests per million (log) and COVID-19 deaths per million (log) in country c as of 25 May 2020.[5] The *Worldometers* data is real-time data that are also the main source for the "Corona virus Government Response Tracker" maintained by Oxford University and utilized by several others (Hale et al. 2020, Petherick et al. 2020).[6]

HCE_c, measures the extent of equity in healthcare in country c. The Varieties of Democracy (V-Dem) project measures the degree to which any given country at any given point in time provides access to adequate healthcare for the poor that is comparable to the healthcare accessed by the rich. The V-Dem Egalitarian democracy index includes several aspects of equity that measure the equality in distribution of political power in any given society in terms of gaining access to government and to resources that empower people politically and enable all people to participate meaningfully (Coppedge et al. 2020, Sigman and Lindberg 2019). The V-Dem data on equity are generated by asking several country experts to score countries on the following question, according to the scale in Box 1.

>**Box 1. To what extent is high-quality basic healthcare guaranteed to all, sufficient to enable them to exercise their basic rights as adult citizens?**
>
>**0**: Extreme. Provision of high-quality basic healthcare is extremely unequal, and at least 75 per cent of citizens receive such low-quality healthcare that it undermines their ability to exercise their basic rights as adult citizens.
>
>**1**: Unequal. Provision of high-quality basic healthcare is extremely unequal and at least 25 per cent of citizens receive such low-quality healthcare that it undermines their ability to exercise their basic rights as adult citizens.

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[4] Access to healthcare is defined according to the VDEM project as adequate health care for the poor that is comparable with the health care accessed by the rich. This variable is explained in greater detail in Section 2.

[5] The Worldometer Covid-19 Data are available here: https://www.worldometers.info/coronavirus/about/ (accessed June 2020).

[6] See https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker.

2: Somewhat equal. Basic healthcare is relatively equal in quality but 10–25 per cent of citizens receive such low-quality healthcare that it undermines their ability to exercise their basic rights as adult citizens.

3: Relatively equal. Basic healthcare is overall equal in quality but 5–10 per cent of citizens receive such low-quality healthcare that it probably undermines their ability to exercise their basic rights as adult citizens.

4: Equal. Basic healthcare is equal in quality and less than 5 per cent of citizens receive such low-quality healthcare that it probably undermines their ability to exercise their basic rights as adult citizens.

The expert codings are subject to rigorous scrutiny and testing using item response theory that reduces uncertainty and assigns a single value to each country for each year. The ordinal coding is then transformed to be an interval scale indicator suitable for analysis across countries. Equality of access to health shows a strong correspondence with the World Bank's World Development Indicators (WDI) data on infant mortality rate ($r=-0.75$) and a measure of government healthcare expenditure as a share of gross domestic product ($r=0.69$), as well as with the Global Burden of Disease project´s indicator of health access and quality index ($r=0.84$).[7]

Our second main variable of interest is V-dem´s *egalitarian democracy index*. An egalitarian democracy builds on the theorized notion that individuals from all social groups ought to be equally capable of exercising their political rights and freedoms, and of influencing political and governing processes. Underlying this broad principle are two main sub-components: equal protection and equal distribution of resources and income protection (stronger equity). Equal protection implies that the state grants and protects rights and freedoms evenly across social groups (Sigman and Lindberg 2019). They argue that greater egalitarian processes make a democratic polity more effective. Equality among groups would produce lower levels of polarization and help resolve political and policy disputes more effectively than less egalitarian democratic processes (Rothstein 2011, Sigman and Lindberg 2019). The index of egalitarian democracy related only moderately with equitable access to healthcare, where one explains roughly 65 per cent of the variance of the other.

Additionally, we test the conditional effects of two government policy stances towards fighting the COVID-19 epidemic with our two main variables of interest on the outcome measured as deaths per million. The first of these two broad policy stances, "government testing policy," is an index developed by Oxford University researchers (Hale et al. 2020). The index capture the extent to which testing is available freely to asymptomatic people. The second policy stance is the "stringency of lockdown" which captures variation in containment and closure policies of governments as of 25 May 2020. The index is a composite measure consisting of seven different response indicators: school and workplace closures, cancellation of public events, restrictions on public gathering size, closure of public transport, internal movement restrictions, international travel restrictions, and public information campaigns (Petherick et al. 2020). These conditional effects should tell us more about how health system equity and egalitarian governance matters for fighting Covid-19.

The vector of control variables (Z_c) includes other potential determinants of COVID-19 outcomes that might be related with our main variables of interest. We include the level of

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[7] The Global Burden of Disease data are accessed here: http://www.healthdata.org/research-article/healthcare-access-and-quality-index-based-mortality-causes-amenable-personal-health (last accessed July 2020). The World Bank´s World Development Indicators online database is accessed here: https://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on#. (last accessed July 2020).

development measured as *per capita income* in US dollars 2010 constant prices obtained from the World Bank (2019). Income level has a bearing on COVID-19 tests and deaths via its impact on healthcare equity, as richer countries should have greater demand for social equity and have higher infrastructural capacity. Next, we include a measure of *urbanization* (percentage share of urban population) as studies show transmission of COVID-19 cases are higher in urban centres because of ease of transmission and contraction due to travel, connection to outside world etc., and urbanization relates to the nature of egalitarian processes associated with modernization (Chen and Krieger 2020). Finally, we also include a measure of population share above 65 years in country *c* sourced from the WDI data platform as research shows that fatality rate from COVID-19 rises sharply with age (Ciminelli and Garcia-Mandicó 2020). We use the past five-year average on each of these variables. The descriptive statistics are provided in Appendix Table A3 and the details on definitions and data sources are provided in Appendix Table A4. We limit the controls to avoid over-fitting the data. We estimate Ordinary Least Square (OLS) specifications that include Huber–White corrected standard errors robust to heteroskedasticity. We add geographic regional dummies (λ_r) to account for regional heterogeneity which may hide time invariant local-level factors, such as climate, geographic distances and cultural practices that influence the spread of disease.

2.2 Endogeneity issues

It is plausible that healthcare equity is an outcome rather than cause of poor health, or if both outcome and the independent variable were explained by some unmeasured higher order variable. This issue is not trivial because those who argue that healthcare equity affects how the system responds to health pandemics also make causal claims (Price 2020, Quinn and Kumar 2014). To address the problem of endogeneity, we use a two-stage least-squares instrumental variable (2SLS-IV) estimator, using the *number of years since independence* as our instrument. The longer a country has been independent, the less likely it is to reverse historic inequities inherited at the time of independence. This feeds into the institutional persistence mechanism highlighted by many scholars who suggest that weak institutions inherited at the time of independence become irreversible as they tend to persist and endure over time (Banerjee and Iyer 2005, Nunn and Wantchekon 2011). The duration of independence, however, should have no systematic bearing on how many COVID-19 tests and deaths a country has incurred, since viruses don't follow colonial history. The validity of the instrument depends on two conditions. The first is instrument relevance; that is, the selected instrument must be correlated with the explanatory variable in question, otherwise it has no power. Several experts on the topic suggest examining the joint *F*-statistic on the excluded instrument in the first-stage regression and the Kleibergen-Paap *F-statistic* (Baum, Schaffer and Stillman 2007). The second condition is that the selected instrument should not differ systematically with the error term in the second stage of the equation; that is, [$\omega_{it}|IV_{it}$]=0, it should not have any direct effect on the outcome variable of interest—COVID-19 tests and deaths—except through the institutional channel. Our instrument satisfies these conditions as noted by the F test and Kleibergen–Paap *F-statistic*.

3. Results

Table 1 reports the impact of equity in healthcare on COVID-19 tests and deaths: Columns 1 and 2 show the results estimated with OLS using basic control variables and controlling for geographic regional dummies; Columns 3 and 4 present findings using the 2SLS-IV estimator. Column 5-6 captures estimations based on September 7th data on COVID-19 tests and deaths.

**********TABLE 1 ABOUT HERE**********

As seen there, equal access to healthcare has a positive impact on COVID-19 tests, which is significantly different from zero at the 1 per cent level. Furthermore, Column 2 shows that equity in healthcare access has a negative effect on COVID-19 deaths, which is statistically significant at the 5 per cent level. Interestingly, egalitarian democracy is negative on tests and positive on deaths at conventional levels of statistical significance. These results are robust across the columns in Table 1. Broad egalitarian governance, once the health system is controlled, have negative effects on fighting pandemics. These results support both hypotheses stated above.

The substantive effects are large. A standard deviation increase above the mean value of health care access yields an increase of 1.31 per cent increase in Covid-19 tests per million (log), which is roughly two-thirds the standard deviation of our dependent variable. A standard deviation increase above the mean value of the healthcare equity index is associated with a 0.38 per cent decrease in COVID-19 deaths per million (log), which is roughly 20 per cent of the standard deviation of the dependent variable. Similarly, a standard deviation increase of egalitarian democracy above the mean reduces Covid tests by 15% of a standard deviation of Covid testing and 26% of a standard deviation of the death rate. These results are substantively quite large.

With respect to controls, both per capita income and urban population share show positive effects on tests. Interestingly, while the effect of income on COVID-19 deaths is positive, the effect of urbanization, especially on deaths, remains statistically insignificant. These results are intuitive as richer countries have had higher exposure. It seems that the greater egalitarian values and processes contained within egalitarian democracy does not distinguish it from other democracies, since some find higher democracy measured in standard ways also associate with higher COVID deaths (Cepaluni, Dorsch and Branyiczki 2020). Notice that the effect of urbanization on COVID-19 tests remain positive and significantly different from aero at 105 level. We also do not find any statistical correlation between COVID-19 outcomes and age structure. Our results suggest that equality in access to healthcare matters more than broad egalitarian governance for reducing the harm from health epidemics because access to healthcare most likely increases the capacity to deal with them. It seems that broader forms of equity captured by egalitarian democracy reduces a state´s effectiveness against COVID.

In column 3-6 we present the results with instrumental variable (IV) estimations of our variable of interest. Notice that the results in column 5-6 are estimated with the newly released September 7th data on COVID-19 tests (column 5) and deaths (column 6). As discussed, we correct for endogeneity of health equity using an instrumental variable. While column 3 and 5 reports the results of COVID-19 tests, column 4-6 captures COVID-19 deaths. There are three observations drawn from these results. First, as seen there, the IV estimation results of health care equity on COVID-19 tests per million in column 3-5 and deaths per million in column 4-6 are similar to those reported in our baseline estimates in column 1-2. Second, as seen from column 3-6, not only the effect of health equity is statistically significant, but the impact is large. Third, notice that the additional statistics provided in Columns 3-6 in Table 1 suggest that the selected instrument is valid. The joint F-statistic from the first stage rejects the null that the instrument selected is not relevant. In fact, we obtained higher joint F-statistic and a Kleibergen-Paap *statistic* on both estimation models reported in column 3- respectively which remains significantly different from zero at the 1% level. Taken together, our results on the impact of equity in healthcare access remain robust to alternative estimation techniques and

endogeneity concerns. The results of the control variables are roughly the same as reported in Columns 1 and 2.

In Table 2, we introduce interaction terms between healthcare equity and measures capturing specific government actions; namely, testing policy and stringency of policy aimed at COVID-19. Columns 1 and 2 show the conditional effect of healthcare equity and government testing policy and healthcare equity and the stringency index on COVID-19 deaths per million; Columns 3 and 4 report the interaction effects for egalitarian democracy, testing policy and the stringency index respectively on COVID-19 deaths per million. It should be noted that neither of these policy measures alone have any statistically significant effect on the COVID-19 outcomes tested above.

**********TABLE 2 ABOUT HERE**********

As seen in Column 1, our interaction term is positive but statistically not different from zero. The healthcare equity index on its own (i.e. when the testing policy is 0) has a positive significant effect on COVID-19 tests per million. However, it is important to note that the interpretation of the interaction terms even in linear models is not so simple. Consequently, a simple *t*-test on the coefficient of the interaction term is not sufficient to examine whether or not the interaction term is statistically significant (Ai and Norton 2003, (Ai and Norton 2003, Vadlamannati and de Soysa 2020). In Figure 1, we display the marginal effect of healthcare equity on COVID-19 tests, along the testing policy index on a 0–3 scale.

**********FIGURE 1 ABOUT HERE**********

The graph on the left of Figure 1 shows that healthcare equity increases COVID-19 tests per million (log) by 0.62 per cent when the testing policy index is at a maximum score of 3, that is, when a country has an open public testing system in place. This result is significantly different from zero at the 5 per cent level. Regardless, it seems that an equitable health system matters to a far greater extent than the testing policy, suggesting that capacity to carry out testing and act on it is what is critical, and not just policy intentions.

The conditional effect of healthcare equity and the stringency index presented in Column 2 of Table 2 shows a negative effect. Once again, we resort to the marginal plot to provide a graphical interpretation of the magnitude of the interaction effect. The *y*-axis of the graph on the right (Figure 1) shows that the marginal effect of an additional increase in a unit of the healthcare equity index along the stringency index decreases COVID-19 deaths per million (log) when the stringency index is above 60 (on a scale of 0–100). The marginal effects are statistically not significant when the stringency index is below the score of 60. For instance, healthcare equity reduces COVID-19 deaths per million (log) by 0.30 per cent when the government responses to COVID-19 is very strict (i.e. stringency index of 100), which is statistically significant at the 5 per cent level. Once again, the results suggest that countries with a robust healthcare system matters more than the targeted policies since the effect of an equitable health system on its own has stronger substantive effects. General levels of equity in terms of broad and inclusive governance continue to have the opposite effect independently of all the controls.

**********FIGURE 2 ABOUT HERE**********

In column 3 of Table 2, the interaction between egalitarian democracy and testing policy shows a positive effect but the result is statistically not different from zero. The marginal effect of an additional increase of a unit of egalitarian democracy appears on the *y*-axis of Figure 2 (left graphic), while the stringency index marginal effect is evaluated on the *x*-axis. Figure 2 reveals that egalitarian democracy is conditioned positively on tests but the effects are not significant along the entire scale. Quite surprisingly, the conditional effect of egalitarian democracy and the stringency index on death is positive. The graphic on the right of figure 2 reveals that as egalitarian democracy increases in the stringency index above 60, Covid deaths increase. There is, thus, no additional benefits from broader egalitarian governance processes, even when conditioned by targeted policies. Of course, the targeted policies might also be responses to increasing deaths, which would mean that our conditional effects would be biased. Regardless, our results taken together suggest strongly that it is an accessible public health infrastructure that matters for fighting COVID-19 and not broad egalitarian governance captured in a measure of egalitarian democracy. These results do not support arguments suggesting that policy consensus for fighting a pandemic is easier, or that health outcomes are fairer, when social capital and trust gained through broad egalitarian governance are obtained.

4. Conclusion

There seems to be a large body of literature in public health blaming neoliberal epidemics for damaging health outcomes, arguments that have resurfaced following the COVID-19 outbreak (Bambra et al. 2020, Sachs 2020). Mortality from epidemics are blamed on inequitable governance, where inequities hinder societal cooperation required for achieving collective goods. While equity and welfare should be societal goods pursued for their intrinsic value, how has egalitarian systems of inclusivity and equity broadly helped against the COVID-19 pandemic? We find, like many others, that greater equity in terms of access to healthcare has mattered for reducing the societal impact of COVID-19, but the mechanism is most likely based on factors associated with healthcare system capacity rather than the broad societal impact of egalitarian governance. We find that broad egalitarian societal processes outside the healthcare sector has increased deaths from COVID-19, perhaps due to the competing pressures associated with balancing the fight against the virus with economic and political demands from competing interests. Fighting deadly diseases that require extraordinary measures entail more than just societal resources; namely, a clear and targeted physical infrastructure geared for reaching and treating people. Relying too heavily on societal processes associated with trust and collective action for cauterizing the spread of a deadly virus might be mistaken, a hard lesson countries such as Sweden seem to be realizing quite late (Ellyatt 2020). Governments will do well to increase the capacities of healthcare systems for fighting deadly diseases.

Our results support others that suggest that building an equitable health system increases capacity for fighting disease. Williams and Cooper (2020) in a study of the U.S., argue that COVID-19 has served as a "magnifying glass" that has called attention to the larger issue of health disparities. They note the need for the U.S to focus on developing a new "herd immunity" by increasing the resistance of the poor to the spread of disease. Berkowitz, Cené and Chatterjee (2020) voice similar concerns, stating that the patterns of power, privilege, and inequality in U.S life are once again observed through this health crisis. The same concerns are raised by Wang and Tang (2020) who note that in the case of China, health equity should be the focus of all policies designed to strengthen the country's health system and emergency responses during health crises in the future. Okoi and Bwawa (2020) similarly highlight the difficulty for those in Sub-Saharan African countries in dealing with the covid outbreak in the

absence of basic hygiene facilities. Future studies might examine why some democracies have managed to put in place more targeted policies over others and identify the precise policies and processes that have affected the disparities in the death rates. Our results suggest that broad egalitarian processes are goods in their own right, but for fighting disease, targeted heath system capacity building seems like the better bet.

Table 1: The relative effects of healthcare equity & egalitarian democracy on COVID-19 tests and deaths per million (log)

	(1) Tests	(2) Deaths	(3) Tests	(4) Deaths	(5) Tests	(6) Deaths
Health care Equity	0.557***	-0.321**	0.650**	-1.361***	0.479*	-1.477***
	(0.136)	(0.140)	(0.318)	(0.434)	(0.278)	(0.387)
Democracy index	-1.162	2.176***	-1.356	4.545***	-1.069	2.819**
	(0.751)	(0.805)	(0.963)	(1.357)	(0.858)	(1.215)
Per capita GDP (log)	0.465***	0.519***	0.431**	0.927***	0.484***	0.806***
	(0.165)	(0.171)	(0.189)	(0.240)	(0.158)	(0.245)
Urban Population share	0.0144*	0.00957	0.0138*	0.0146	0.0157**	0.0250***
	(0.00806)	(0.00890)	(0.00799)	(0.0105)	(0.00618)	(0.00954)
Population share 65 years old	-0.00676	0.0139	-0.0102	0.0353	-0.0321	0.0327
	(0.0375)	(0.0358)	(0.0360)	(0.0421)	(0.0328)	(0.0463)
Constant	4.701***	-3.616***	5.058***	-7.631***	6.263***	-4.472*
	(1.145)	(1.303)	(1.513)	(2.073)	(1.229)	(2.321)
Estimator	OLS	OLS	2SLS-IV	2SLS-IV	2SLS-IV	2SLS-IV
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
First-stage *F-statistics*			21.97***	24.60***	23.26***	24.82***
Cragg-Donald Wald *F-statistic*			16.64***	21.13***	16.26***	17.25***
Kleibergen-Paap Wald *F-statistic*			16.72***	19.17***	17.53***	18.20***
No. of countries	152	151	152	151	161	167
R-squared	0.705	0.624	0.703	0.493	0.670	0.295
First Stage Regressions						
Years since independence			-1.211***	-1.265***	-1.223***	-1.234***
			(0.258)	(0.255)	(0.253)	(0.247)
Control variables			**Yes**	**Yes**	**Yes**	**Yes**
Regional Fixed Effects			Yes	Yes	Yes	Yes
No. of countries			152	151	161	167

Notes: OLS, ordinary least square; 2SLS-IV, two-stage least-squares instrumental variable. * denotes September data. Standard errors in parentheses. Statistical significance: ***$p<0.01$, **$p<0.05$, *$p<0.1$. Source: Authors' compilation based on estimation.

Table 2. Conditional effects of health care equity and government policies and egalitarian democracy and government policies on COVID-19 deaths

	(1) Tests	(2) Deaths	(3) Deaths	(4) Deaths
Health care Equity **X** Covid-19 Testing Policy	-0.00721			
	(0.126)			
Health care Equity **X** Stringency index		-0.000288		
		(0.00621)		
Democracy index **X** Covid-19 Testing Policy			0.119	
			(0.829)	
Democracy index **X** Stringency index				0.0232
				(0.0307)
Covid-19 Testing Policy	0.203		0.151	
	(0.218)		(0.424)	
Stringency index		0.00192		-0.00711
		(0.00861)		(0.0146)
Health care Equity	-0.252	-0.309	-0.270*	-0.348**
	(0.270)	(0.608)	(0.151)	(0.159)
Democracy index	2.365***	2.512***	2.189	0.626
	(0.892)	(0.912)	(1.596)	(2.669)
Per capita GDP (log)	0.419**	0.533***	0.422**	0.547***
	(0.194)	(0.199)	(0.193)	(0.196)
Urban Population share	0.00596	0.00332	0.00619	0.00431
	(0.00902)	(0.00932)	(0.00917)	(0.00939)
Population share 65 years old	0.00601	0.0233	0.00696	0.0246
	(0.0350)	(0.0363)	(0.0349)	(0.0353)
Constant	-2.898*	-3.790**	-2.875*	-3.235*
	(1.472)	(1.524)	(1.463)	(1.706)
Estimator	OLS	OLS	OLS	OLS
Regional Fixed Effects	Yes	Yes	Yes	Yes
No. of countries	126	127	126	127
R-squared	0.665	0.651	0.665	0.652

Notes: OLS, ordinary least square; Standard errors in parentheses. Statistical significance: ***$p<0.01$, **$p<0.05$, *$p<0.1$. Source: Authors' compilation based on estimation.

Figure 1. Conditional plots of the marginal effects of health care equity and government policies on COVID-19 deaths

Health care equity, Testing policy & Marginal Effect on Covid-19 deaths (per mn)

Health care equity, Government Stringency & Marginal Effect on Covid-19 deaths (per mn)
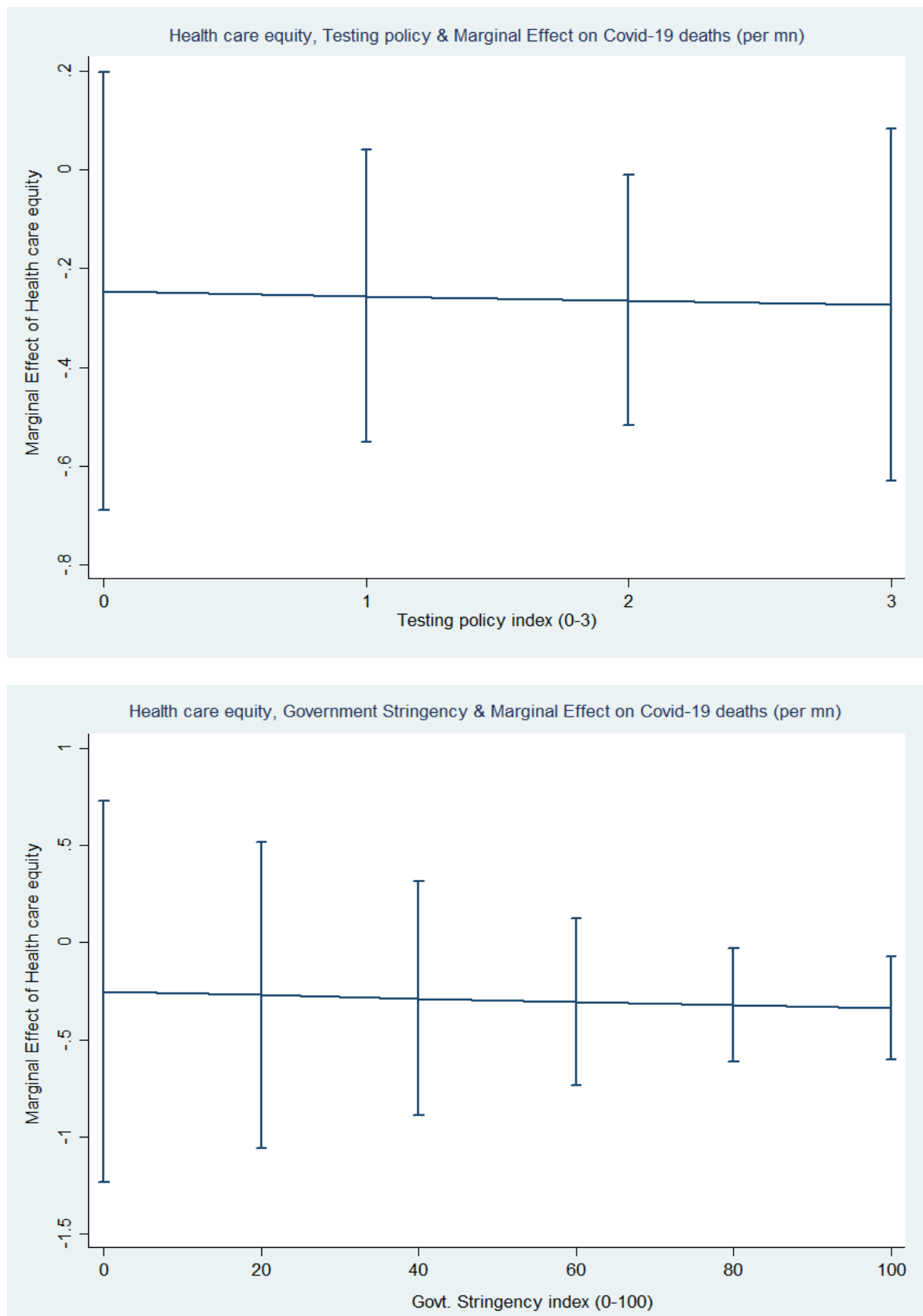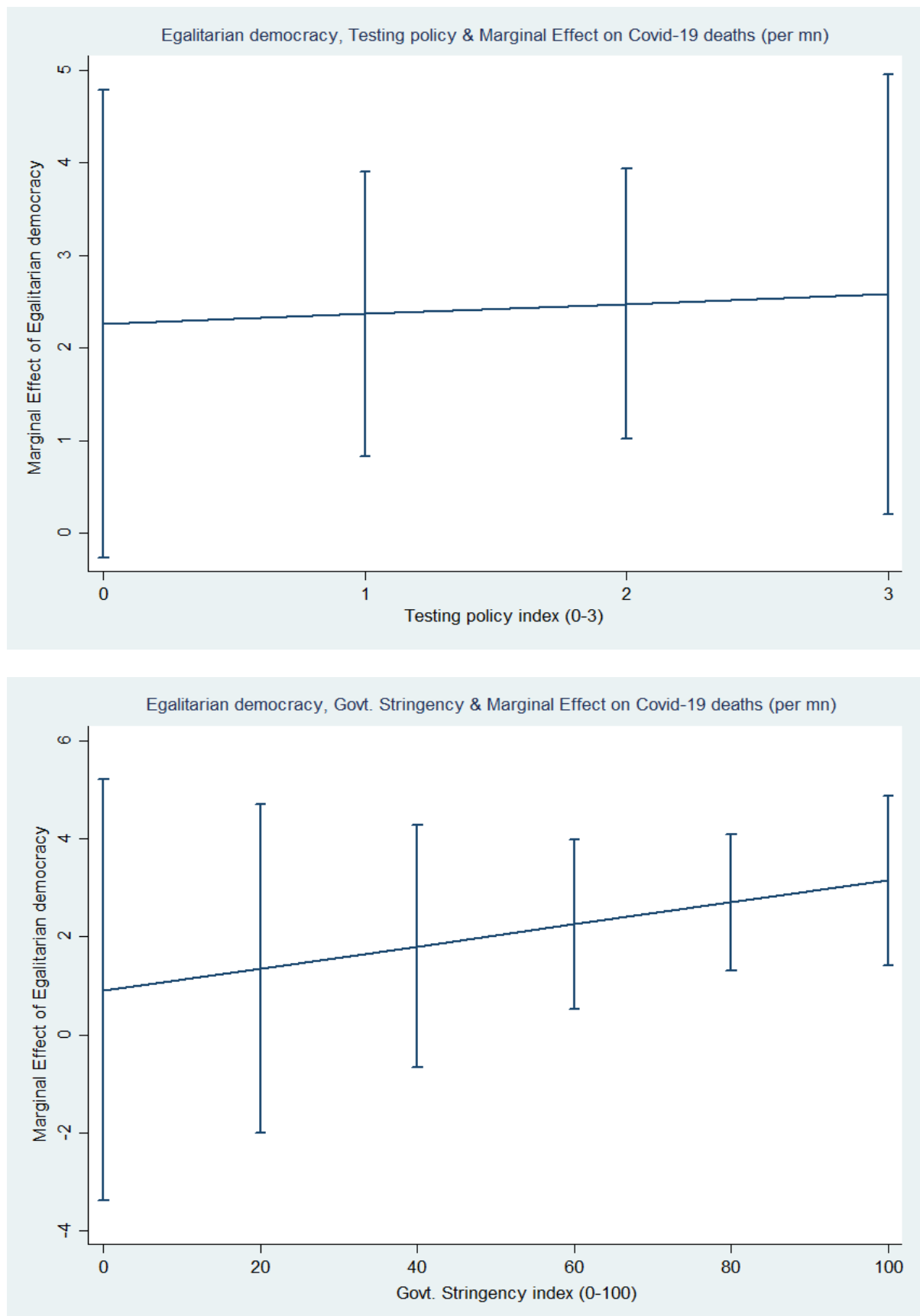
Figure 2. Conditional plots of the marginal effects of egalitarian democracy and government policies on COVID-19 deaths

References

Ai, C. and E. Norton. 2003. "Interaction Terms in Logit and Probit Models." *Economics Letters* 80:123-29.

Alesina, Alberto, Reza Baqir and William Easterly. 1999. "Public Goods and Ethnic Divisions." *Quarterly Journal of Economics* 114(4):1243–84.

Bambra, Clare, Ryan Riordan, John Ford and Fiona Matthews. 2020. "The Covid-19 Pandemic and Health Inequalities." *Journal Epidemiol Community Health* DOI: 10.1136/jech-2020-214401.

Banerjee, A. and L. Iyer. 2005. "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India." *The American Economic Review* 95(4):1190-213.

Baum, Christopher F., Mark E. Schaffer and Steven Stillman. 2007. "Enhanced Routines for Instrumental Variables/Generalized Method of Moments Estimation and Testing." *The Stata Journal* 7(4):465-506.

Berkowitz S, Cené C W and Chatterjee A. 2020. "Covid-19 and Health Equity — Time to Think Big." *New England Journal of Medicine* 383:e76, DOI: 10.1056/NEJMp2021209

Cepaluni, G., M. Dorsch and R. Branyiczki. 2020. "Political Regimes and Deaths in the Early Stages of the Covid-19 Pandemic." *APSA Preprints* DOI:10.33774/apsa-2020-5lhhc.

Chen, J. T. and N. Krieger. 2020. "Revealing the Unequal Burden of Covid-19 by Income, Race/Ethnicity, and Household Crowding: Us County Vs Zip Code Analyses." Vol. 19. *HCPDS Working Paper Series.* Cambridge, MA: Harvard Center for Population and Development Studies.

Ciminelli G, Garcia-Mandicó S. 2020, forthcoming. "COVID-19 in Italy: An Analysis of Death Registry Data." *Journal of Public Health*. Doi: 10.1093/pubmed/fdaa165.

Coppedge, M., J. Gerring, S. Lindberg, S-E. Skaaning, J. Teorell, D. Altman, F. Andersson, M. Bernhard, S. M. Fish, A. Glynn, A. Hicken, K-H. Knutsen, K. Marquandt, K. McMann, V. Mechkova, P. Paxton, D. Pemstein, L. Saxer, B. Seim, R. Sigman and J. Staton. 2020. "The V-Dem Codebook V.9." Vol. Gothenburg: The VDEM Institute, University of Gothenburg.

Coppedge, Michael and Wolfgang Reinicke. 1990. "Measuring Polyarchy." *Studies in Comparative International Development* 25(1):51–72.

Eichengreen, Barry. 2020. "Rage against the Pandemic."

Ellyatt, H. 2020. "Sweden's Chief Scientist Admits Lessons Have Been Learned over No-Lockdown Policy." in *CNBC: Health and Science, 7 May*. https://www.cnbc.com/2020/05/07/sweden-coronavirus-chief-scientist-admits-lessons-have-been-learned.html (accessed June 2020).

Hale, T., S. Webster, A. Petherick, T. Phillips and B. Kira. 2020. "Oxford Covid-19 Government Response Tracker." in *Oxford: Blavatnik School of Government, Oxford University*. https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker (accessed June 2020).

Kawachi, Ichiro and Bruce P. Kennedy. 2002. *The Health of Nations: Why Inequality Is Harmful to Your Health*. New York: New Press.

Maizland, L. and C. Felter. 2020. "Comparing Six Health-Care Systems in a Pandemic."

Marmot, Micheal. 2005. *The Status Syndrome: How Social Standing Affects Our Health and Longevity*. New York: Henry Holt.

Mazzucato, M. and G. Quagiotto. 2020. "The Big Failure of Small Government."

Nunn, N. and L. Wantchekon. 2011. "The Slave Trade and the Origins of Mistrust in Africa." *The American Economic Review* 101(7):3221-352.

Okoi O and Bwawa T. 2020. "How health inequality affect responses to the COVID-19 pandemic in Sub-Saharan Africa." *World Development*, 135: 105067.

Petherick, A., B. Kira, N. Angrist, T. Hale and T. Phillips. 2020. "Variation in Government Responses to Covid-19."

Price, A. 2020. "The Lasting Impact of the Covid-19 Pandemic on Our Healthcare Delivery System."

Quinn, S. C. and S. Kumar. 2014. "Health Inequalities and Infectious Disease Epidemics: A Challenge for Global Health Security." *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 12(5):263-73.

Rothstein, Bo. 2011. *The Quality of Government: Corruption, Social Trust, and Inequality in International Perspective*: University of Chicago Press.

Sachs, J. D. 2020. "How Inequality Fuels Covid-19 Deaths."

Schrecker, Ted and Clare Bambra. 2015. *How Politics Makes Us Sick: Neoliberal Epidemics*. London: Palgrave.

Sigman, R. and S. Lindberg. 2019. "Democracy for All: Conceptualizing and Measuring Egalitarian Democracy." *Political Science Research and Methods* 7(3):595-612.

Wang Z and Tang K (2020) Combating COVID-19: health equity matters, Nature Medicine, 26, 458. https://doi.org/10.1038/s41591-020-0823-6

WHO (2020) WHO Coronavirus Disease (COVID-19) Dashboard; https://covid19.who.int/table

Wilkinson, Richard and Kate Pickett. 2009. *The Spirit Level: Why More Equal Societies Almost Always Do Better*. London: Allen Lane.

Vadlamannati, Krishna Chaitanya and Indra de Soysa 2020. "Oil Price Volatility and Political Unrest: Prudence and Protest in Producer and Consumer Societies, 1980-2013." *Energy Policy* 145: 111-119.

Williams D and Cooper L. 2020. "COVID-19 and Health Equity—A New Kind of "Herd Immunity." JAMA, 323 (24), https://doi.org/10.1001/jama.2020.8051

Appendix

Appendix 1: List of countries

Afghanistan	China	Guinea-Bissau	Mayotte	Saudi Arabia
Albania	Colombia	Guyana	Mexico	Senegal
Algeria	Comoros	Haiti	Moldova	Serbia
Andorra	Congo, Rep.	Honduras	Monaco	Seychelles
Angola	Costa Rica	Hong Kong	Mongolia	Sierra Leone
Anguilla	Croatia	Hungary	Montenegro	Singapore
Antigua and Barbuda	Cuba	Iceland	Montserrat	Sint Maarten
Argentina	Curaçao	India	Morocco	Slovakia
Armenia	Cyprus	Indonesia	Mozambique	Slovenia
Aruba	Czechia	Iran	Myanmar	Somalia
Australia	Denmark	Iraq	Namibia	South Africa
Austria	Djibouti	Ireland	Nepal	South Sudan
Azerbaijan	Dominica	Isle of Man	Netherlands	Spain
Bahamas	Dominican Republic	Israel	New Caledonia	Sri Lanka
Bahrain	Congo, Dem. Rep.	Italy	New Zealand	St. Barth
Bangladesh	Ecuador	Ivory Coast	Nicaragua	St. Vincent Grenadines
Barbados	Egypt	Jamaica	Niger	Sudan
Belarus	El Salvador	Japan	Nigeria	Suriname
Belgium	Equatorial Guinea	Jordan	North Macedonia	Sweden
Belize	Eritrea	Kazakhstan	Norway	Switzerland
Benin	Estonia	Kenya	Oman	Syria
Bermuda	Eswatini	Kuwait	Pakistan	Taiwan
Bhutan	Ethiopia	Kyrgyzstan	Palestine	Tanzania
Bolivia	Faeroe Islands	Laos	Panama	Thailand
Bosnia and Herzegovina	Falkland Islands	Latvia	Papua New Guinea	Timor-Leste
Botswana	Fiji	Lebanon	Paraguay	Togo
Brazil	Finland	Lesotho	Peru	Trinidad and Tobago
British Virgin Islands	France	Liberia	Philippines	Tunisia
Brunei	French Guiana	Libya	Poland	Turkey
Bulgaria	French Polynesia	Liechtenstein	Portugal	Turks and Caicos
Burkina Faso	Gabon	Lithuania	Qatar	UAE
Burundi	Gambia	Luxembourg	Réunion	Uganda
Cabo Verde	Georgia	Macao	Romania	UK
Cambodia	Germany	Madagascar	Russia	Ukraine
Cameroon	Ghana	Malawi	Rwanda	Uruguay
Canada	Gibraltar	Malaysia	South Korea	USA
Central African Republic	Greece	Maldives	Saint Kitts and Nevis	Uzbekistan
Caribbean Netherlands	Greenland	Mali	Saint Lucia	Venezuela
Cayman Islands	Grenada	Malta	Saint Martin	Vietnam
Chad	Guadeloupe	Martinique	Saint Pierre Miquelon	Yemen
Channel Islands	Guatemala	Mauritania	San Marino	Zambia
Chile	Guinea	Mauritius	Sao Tome and Principe	Zimbabwe

Appendix 2: Covid-19 deaths by countries as on 25th May 2020

Countries	Deaths	Deaths per mn	Countries	Deaths	Deaths per mn	Countries	Deaths	Deaths per mn
Afghanistan	193	5	French Guiana	1	3	New Zealand	21	4
Albania	31	11	French Polynesia			Nicaragua	17	3
Algeria	568	13	Gabon	12	5	Niger	58	2
Andorra	51	660	Gambia	1	0.4	Nigeria	200	1
Angola	3	0.09	Georgia	12	3	North Macedonia	111	53
Anguilla			Germany	8271	99	Norway	234	43
Antigua and Barbuda	3	31	Ghana	31	1	Oman	30	6
Argentina	403	9	Gibraltar			Pakistan	1017	5
Armenia	70	24	Greece	166	16	Palestine	2	0.4
Aruba	3	28	Greenland			Panama	287	67
Australia	100	4	Grenada			Papua New Guinea		
Austria	633	70	Guadeloupe	13	32	Paraguay	11	2
Azerbaijan	44	4	Guatemala	45	3	Peru	3024	92
Bahamas	11	28	Guinea	18	1	Philippines	846	8
Bahrain	12	7	Guinea-Bissau	6	3	Poland	965	25
Bangladesh	408	2	Guyana	10	13	Portugal	1277	125
Barbados	7	24	Haiti	22	2	Qatar	17	6
Belarus	185	20	Honduras	151	15	Réunion	1	1
Belgium	9186	793	Hong Kong	4	0.5	Romania	1151	60
Belize	2	5	Hungary	473	49	Russia	3099	21
Benin	2	0.2	Iceland	10	29	Rwanda		
Bermuda	9	144	India	3457	3	South Korea	264	5
Bhutan			Indonesia	1278	5	Saint Kitts and Nevis		
Bolivia	199	17	Iran	7249	86	Saint Lucia		
Bosnia and Herzegovina	140	43	Iraq	134	3	Saint Martin	3	78
Botswana	1	0.4	Ireland	1571	319	Saint Pierre Miquelon		
Brazil	19038	90	Isle of Man	24	282	San Marino	41	1209
British Virgin Islands	1	33	Israel	279	32	Sao Tome and Principe	8	37
Brunei	1	2	Italy	32330	535	Saudi Arabia	351	10
Bulgaria	120	17	Ivory Coast	29	1	Senegal	30	2
Burkina Faso	52	2	Jamaica	9	3	Serbia	237	27
Burundi	1	0.08	Japan	771	6	Seychelles		
Cabo Verde	3	5	Jordan	9	0.9	Sierra Leone	34	4
Cambodia			Kazakhstan	35	2	Singapore	22	4
Cameroon	146	6	Kenya	50	0.9	Sint Maarten	15	350
Canada	6031	160	Kuwait	129	30	Slovakia	28	5
Central African Republic			Kyrgyzstan	14	2	Slovenia	106	51
Caribbean Netherlands			Laos			Somalia	61	4
Cayman Islands	1	15	Latvia	22	12	South Africa	339	6
Chad	57	3	Lebanon	26	4	South Sudan	4	0.4
Channel Islands	45	259	Lesotho			Spain	27888	596
Chile	544	28	Liberia	23	5	Sri Lanka	9	0.4
China	4634	3	Libya	3	0.4	St. Barth		
Colombia	630	12	Liechtenstein	1	26	St. Vincent Grenadines		
Comoros	1	1	Lithuania	61	22	Sudan	121	3
Congo, Rep.	15	3	Luxembourg	109	174	Suriname	1	2
Costa Rica	10	2	Macao			Sweden	3871	384
Croatia	97	24	Madagascar	2	0.07	Switzerland	1893	219
Cuba	79	7	Malawi	3	0.2	Syria	3	0.2
Curaçao	1	6	Malaysia	114	4	Taiwan	7	0.3
Cyprus	17	14	Maldives	4	7	Tanzania	21	0.4
Czechia	304	28	Mali	55	3	Thailand	56	0.8
Denmark	561	97	Malta	6	14	Timor-Leste		
Djibouti	9	9	Martinique	14	37	Togo	12	1
Dominica			Mauritania	4	0.9	Trinidad and Tobago	8	6
Dominican Republic	446	41	Mauritius	10	8	Tunisia	47	4
Congo, Dem. Rep.	61	0.7	Mayotte	19	70	Turkey	4222	50
Ecuador	2888	164	Mexico	6090	47	Turks and Caicos	1	26
Egypt	680	7	Moldova	228	57	UAE	233	24
El Salvador	32	5	Monaco	4	102	Uganda		
Equatorial Guinea	7	5	Mongolia			UK	36042	531
Eritrea			Montenegro	9	14	Ukraine	579	13
Estonia	64	48	Montserrat	1	200	Uruguay	20	6
Eswatini	2	2	Morocco	196	5	USA	95016	287
Ethiopia	5	0.04	Mozambique			Uzbekistan	13	0.4
Faeroe Islands			Myanmar	6	0.1	Venezuela	10	0.4
Falkland Islands			Namibia			Vietnam		
Fiji			Nepal	3	0.1	Yemen	30	1
Finland	306	55	Netherlands	5775	337	Zambia	7	0.4
France	28132	431	New Caledonia			Zimbabwe	4	0.3

Source: https://www.worldometers.info

Appendix 3: Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum	Observations
Covid-19 Tests per million	23452.77	35390.63	4.00	183981.00	185
Covid-19 Tests per million (log)	8.81	1.95	1.39	12.12	185
Covid-19 Deaths per million	60.32	150.99	0.04	1209.00	178
Covid-19 Deaths per million (log)	2.13	2.16	-3.22	7.10	178
Per capita GDP (log)	8.75	1.53	5.44	12.08	189
Urban Population share	59.81	23.63	11.80	100.00	198
Democracy index	0.41	0.24	0.04	0.86	169
Health care Equity	0.50	1.50	-3.17	3.00	169
Covid-19 Testing Policy	1.41	0.75	0.00	3.00	146
Stringency index	81.64	14.73	20.00	97.00	148

Appendix 4: Data sources and Definitions

Variables	Data definition and sources
Covid-19 tests and deaths per million (log)	Number of Covid-19 tests and deaths per million (log) recorded for country *c* as on 25th May 2020 by The Worldometer COVID-19 Data, sourced from https://www.worldometers.info/coronavirus/#countries
Health equity index	VDEM health equality index measures high quality basic health guaranteed to all, sufficient to enable them to exercise their basic rights as adult citizens. The index ranges from -3 to +3, wherein higher value capture basic health is equal in quality and less than five percent (%) of citizens receive low-quality health that probably undermines their ability to exercise their basic rights as adult citizens . We use Five-year average of this index for 2014-2018 years.
Per capita GDP (log)	Five-year average of GDP per capita (log) for 2014-2018 years measured in US$ 2010 constant prices sourced from the World Development Indicators 2019, World Bank.
Urbanization	Five-year average of percentage share of urban population for 2014-2018 years sourced from the World Development Indicators 2019, World Bank.
Democracy index	VDEM´s egalitarian democracy index includes several indicators capturing equal access to power, political resources, liberties and political inclusion, plus the degree of electoral democracy, or polyarchy, indicated by free and fair elections without coercion or violence in a competitive processes. The index is coded on 0-1 scale wherein higher value denote higher egalitarian democratic processes and we use five-year average of this index for 2014-2018 years.
Covid-19 Testing policy index	Testing policy index is coded on the scale of 0-3, wherein 0 suggests there is no adequate Covid-19 testing policy in place, while 3 indicates an open public testing policy in which Covid testing is made available to asymptomatic people by government. The index is developed by Hale et al. (2020) of OxCGRT.

Stringency index	Stringency index is coded on the scale of 0-100, wherein a higher score indicates more stringent government responses to Covid-19. The index is created by Hale et al. (2020) of OxCGRT based on the ordinal values of government policy response on seven variables namely, restrictions of mass gathering, workplace closures, cancellation of public events, public information campaigns, school closures, internal moment restrictions, international travel controls. The index is the average of these seven scores.