Privatization and Pandemic: A Cross-Country Analysis of COVID-19 Rates and Health-Care Financing Structures

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Abstract

The outbreak of coronavirus and the infectious disease it causes (COVID-19) have taken different paths around the world, with countries experiencing different rates of infection, case prevalence and mortality. This simultaneous yet heterogenous process presents a natural experiment for understanding some of the reasons for such different experiences of the same shock. This paper looks at the privatization of healthcare as one key determinant of this pattern. We use a cross-section dataset covering 147 countries with the latest available data. Controlling for per capita income, health inequality and several other control variables, we find that a 10% increase in private health expenditure relates to a 4.3% increase in COVID-19 cases and a 4.9% increase in COVID-19 related mortality. Globalization also has a small positive effect on COVID-19 prevalence, while higher hospital capacity (in beds per 1,000 people) is significant in lowering COVID-19 mortality. The findings suggest caution regarding policies which privatize healthcare systems in order to boost efficiency or growth in the short-run, as these reduce countries' long-term preparedness for dealing with pandemics.

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1. Introduction

The global infection and mortality rates of COVID-19 have increased dramatically within the space of a few months, from around 12,000 cases (and 259 deaths) on February 1 - mostly in China - to 5.2 million cases and 338,000 deaths by May - now mostly concentrated in North America and Western Europe. Unlike previous epidemics or pandemics - such as SARS or TB - the latest data on the coronavirus - which causes COVID-19 - show that richer countries have been hit as hard as, on average, or harder than, poorer countries. The United States, Italy and Spain are among the countries most affected, for example.

Given the enormous pressure the virus has put on national health systems, the structure of funding for these systems is one potential explanatory factor for the different effects of this pandemic across countries. The uneven speeds of spread of COVID-19 around the world and the differential rates of infection, death and recovery present us with a natural experiment in this regard.

Given the drastic changes in health-care systems since the 1980s, private health expenditure in many countries has increased faster than public spending on health, due to neoliberal policies such as deregulation and privatization, usually promising to increase efficiency and economic growth. While there are indeed some advantages to private health facilities such as reduced waiting times, there are many concerns about quality of private health care, especially relating to the relative lack of regulation, over-prescription of antibiotics or unnecessary treatments (Basu, Andrews, Kishire, Panjabi and Stuckler 2012, Collyer and White 2011).

Much of the literature on the privatization of healthcare involves case studies, and there is thus a lack of comparative studies across countries in this area. In this paper we look at structural determinants of COVID19 rates across 147 countries, and link it to the privatization of healthcare systems. Section 2 provides an overview of COVID-19's differential impact, especially among the richest countries. Section 3 surveys the debates in the literature on the relative strengths of private vs.

public health care. Section 4 presents our data and methodology, while Section 5 states our hypotheses and predictions. Section 6 provides the results of OLS regressions of COVID-19 prevalence and mortality on health care financing as well as several control variables. Section 7 concludes with a discussion of policy implications for making health systems sustainable.

2. The Differential Spread of COVID-19

Covid-19 is an infectious disease caused by the most recently discovered strand of coronavirus. This virus belongs to a family of viruses which can lead to respiratory infections in both humans and animals. Mild infections include the common cold, while more severe illnesses include the Severe Acute Respiratory Syndrome - SARS - as well as the Middle East Respiratory Syndrome - MERS - (Chan et. al. 2020, Chen et. al. 2020, Guan et. al. 2020, Huang et. al. 2020, Li et. al 2020). The last two resulted in 1632 deaths (Mahase 2020), combined, compared to almost 350,000 COVID-19 related deaths as of the end of May 2020.

Covid-19 is transmitted between people via sneezing, coughing or speaking, or by touching surfaces and objects with droplets from an infected person and then touching their nose, mouth or eyes. At the time of writing, there is not yet a cure or preventive medication for COVID-19.

People with pre-existing conditions such as high blood pressure, diabetes, cancer, and heart or lung disease) at any age are more likely than others to become seriously ill as a result of the virus, as are older people and people with limited access to healthcare (Guan et. al. 2020, Huang et. al. 2020, Zhou et. al. 2020).

While COVID-19 first appeared in Wuhan, China and peaked there in February, it then spread to other regions rapidly, but differentially. As of 20 May 2020, there are 5.2 million confirmed cases around the world, of which 2.3 million are in the Americas, 2 million in Europe, and the rest in the eastern Mediterranean, South-East Asia, the Western Pacific and Africa.

Deaths from COVID-19 are approaching 350,000 at this point, but the death rates also vary greatly across countries, whether measured per 1 million population or as a ratio of cases (i.e. the case fatality ratio). Unlike previous epidemics or pandemics, the mortality rate at this point is highest in the richer countries. Of the top 20 countries in terms of deaths per million population, 16 are OECD members:

Table 1: Top 20 Countries in COVID-19 Mortality

Country Name	Income per capita	Deaths per million population	Death Ratio
Belgium	43,582	790	16.3
Spain	34,831	596	12.0
Italy	35,828	535	14.2
United Kingdom	40,522	526	14.4
France	39,556	430	15.7
Sweden	47,718	379	12.2
Netherlands	49,787	335	12.9
Ireland	70,855	318	6.5
United States	55,719	282	6.0
Switzerland	59,317	219	6.2
Luxembourg	96,793	174	2.7
Ecuador	10,412	164	8.3
Canada	44,078	163	7.5
Portugal	28,999	124	4.3
Germany	45,936	97	4.6
Denmark	48,419	96	5.0
Peru	12,794	92	2.9
Brazil	14,283	89	6.5
Iran (Islamic Republic of)	19,098	86	5.7
Austria	46,260	70	3.9

Source: COVID-19 deaths data from the Johns Hopkins University COVID-19 Dashboard (downloaded May 20, 2020).

As the table shows, however, there are also significant differences between the mortality rates and case fatality rates among the rich countries. In particular, Canada, Portugal, Germany, Denmark and Austria have far less COVID-19 related deaths - either per million or per cases - than the US, UK and several other countries at the top of the list.

The difference in COVID-19 prevalence and mortality is especially stark between several neighboring countries, which share not only a border but also a similar level of economic development and some cultural affinities. As shown in Table 1 above, The U.S. has nearly double the mortality rate of Canada (and more than double its prevalence rate). An even more dramatic comparison can be made between Spain and Portugal, with the former showing nearly six times the mortality rates of the latter. Belgium and France are another such example. In all these cases, it is the richer countries in per capita terms that are the worst affected.

Given that the pandemic is still ongoing, as well as the speed of its spread and the heterogeneity of public measures to contain it, there is not yet much cross-country research on the structural determinants of COVID-19 prevalence and mortality. One recent study of 118 countries found that the extent of a country's globalization is positively related to the scale and speed of the virus in it, but negatively to fatality rates (Zimmermann 2020). However, given the fact that many of the top 20 countries in Table 1 above are highly globalized, we find this explanation incomplete.

Instead, we look at the structure of healthcare systems - specifically the balance between private and public expenditures on health care - as a potential explanatory variable for the international heterogeneity in COVID-19 prevalence and mortality. A cursory look at the latest data shows, for example, that per capita public expenditure on healthcare in Canada is nearly three times its per capita private health care, while in the U.S. private health care expenditures per person are as high as public health spending.

Previous research has found a significant and negative effect of healthcare privatization on tuberculosis (TB) rates (Austin, DeScisciolo and Samuelsen 2016), although TB - unlike COVID-19 - has been mostly non-existent in developed countries in recent decades. As we have seen, however, COVID-19 affects nearly all countries in the world, and this paper therefore examines the implications of health care privatization for the differential trends of this pandemic.

3. The Debate on Privatizing Healthcare

The 1980s and 1990s witnessed a rise in the support for and implementation of neoliberal policies - often referred to under term "Washington Consensus" - which include deregulation and privatization of previously state-owned sectors, liberalization of trade and financial markets, and an overall withdrawal of the state from public service provision (Arrieta et al. 2011, Bundey 2014, Collyer & White 2011, Larbi 1998, Maclean 2011, McMichael 2012).

These policies have been promoted by international financial institutions such as the IMF and World Bank, especially following the debt crises in many developing countries, and partly justified as a necessary step to increase economic growth and thus revenue for the payments of external debts. These policies have often had adverse effects on domestic conditions, including water, sanitation and healthcare (Herrera, 2014; Maclean 2011, Navarro et al. 2006, Shandra, Shandra, & London 2011, Wilder & Lankao, 2006).

Some studies have linked neoliberal policies to a deceleration in life-expectancy increases in poor countries (Cornia et al. 2009, Navarro 2002, 2007), while others link economic conditionality policies to higher rates of various diseases such as tuberculosis (Austin 2015, Maynard et al., 2012, Stuckler, King, & Basu, 2008). These studies, however, all look at neoliberal reforms broadly, and so far, only one paper has specifically studied the role of healthcare *privatization* on rates of infectious disease (Austin, DeScisciolo & Samuelsen 2016). Furthermore, there is lack of research on the effects of privatization on health care outcomes across all countries - both developed and developing.

Overall, private and public health care systems have different strengths and weaknesses. Some of the advantages of private health facilities in developing countries include shorter waiting times and better interaction with staff compared to public facilities. Their disadvantages include lower accuracy in diagnostics, lower adherence to medical management standards, lower-level staff (e.g. assistant physicians, pharmacists or midwives rather than doctors), and sometimes over-prescription of antibiotics (Basu et al. 2012, Das, Hammer, & Gbotosho et al. 2009, Leonard 2008, Lonnroth et al. 2001, Lu et al. 2010, Maclean 2011, Naterop & Wolffers 1999).

Public health expenditure and universal healthcare systems, by contrast, have been linked to higher well-being in several studies (Anderson 2010, Bokhari et al. 2007, Dekker & Wilms 2010, Oglobin 2011, Palmer 2014, Pfutze 2014).

Privatization also has distributional effects, as private clinics and doctors often charge user fees which the poor cannot pay, a situation which deters some people from seeking medical testing and treatment (Baker 2014, Basu et al. 2012, Blumenthal & Hsiao 2005, Herrera 2014, Navarro et al. 2006, Palmer 2014).

This adverse effect of privatizing health care on health outcomes is not limited to developing countries. Many countries in transition from communism to a market-system have experienced mass privatization of many sectors, including health-care. This has led to treatments becoming unaffordable, denial of services or health insurance for people with pre-existing conditions, and a decrease in people's willingness to visit a doctor when ill (Balabanova et al. 2004, King and Stuckler 2007, Reiss et al. 1996).

This positive relationship between private health-care provision and health inequality is confirmed by the latest data for 147 countries on inequality in life-expectancy (UNDP 2019) and the ratio of private to public health expenditures (WHO 2020):

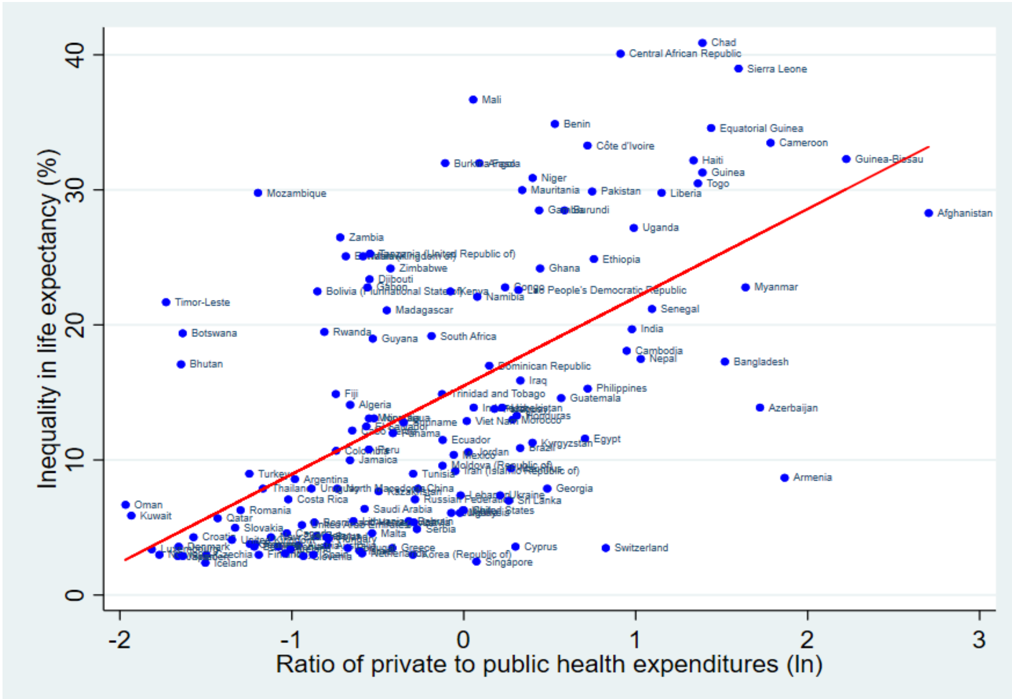

Figure 1: Inequality in Health (life-expectancy) and the Ratio of Private to Public Health Expenditures (ln)

This positive relationship between more privatized healthcare and inequality is critical in the case of COVID-19, as this disease has an unequal impact on more vulnerable populations. First, poorer people are more likely to suffer from chronic conditions and thus be at higher-risk of COVID-19 mortality. Poorer people without medical insurance or the means to pay private health care fees may also disregard social distancing in order to keep working, thus reducing the efficacy of control measures (Ahmed et. al. 2020).

4. Predictions

We predict that the relative importance of private and public funding of health care systems plays a major role in relation to the recent impacts of COVID-19 across countries. Literature on other pandemics suggests that privatization weakens countries' ability to provide sufficient preparedness to and coping capacity for pandemics. We predict that higher private health expenditures relative to public health expenditures are, ceteris paribus, related to a higher incidence (cases per million population) and mortality (deaths per one million population) of COVID-19.

Figure 2 shows the association between the natural logarithm (ln)[1] of COVID-19 prevalence (cases per million population) and the ln of private health expenditure[2].

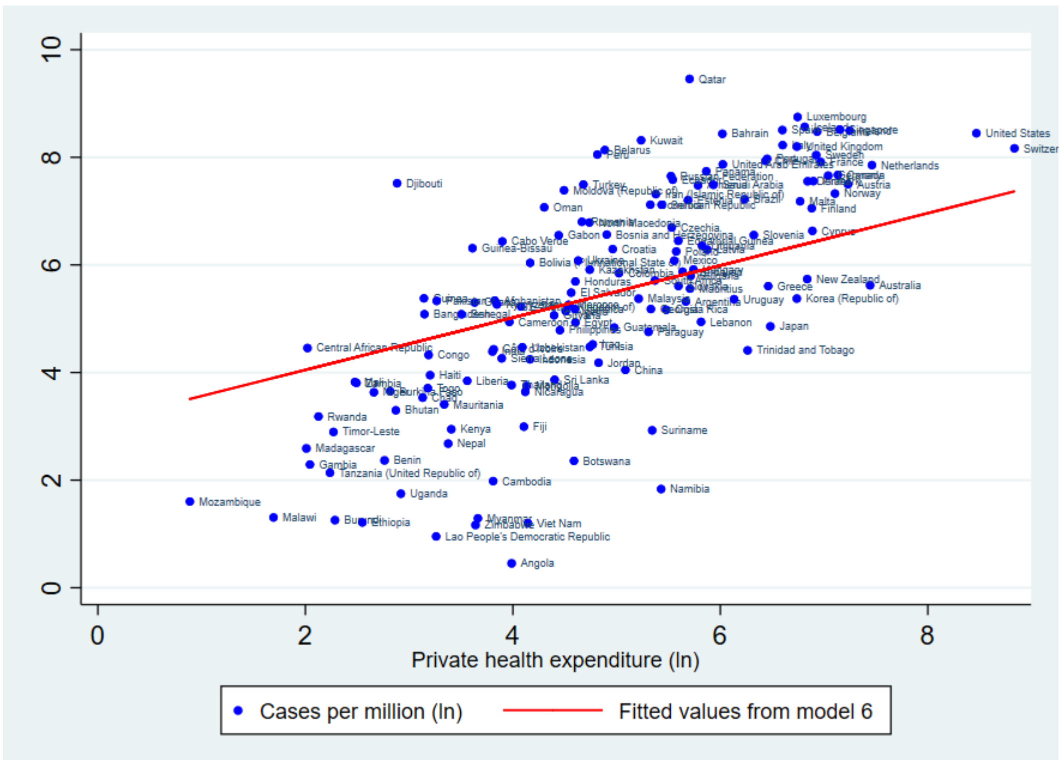

Figure 2: Covid-19 Prevalence (ln) and Private Health Expenditure (ln)

Note: covariates included in the regression are the ones from model 6 in Table 3 and they were held constant at the mean value. When all the covariates are removed, the slope of the regression line is steeper, yet in both cases statistically significant.

Figure 3 shows the same for COVID-19 mortality (deaths per million population) and private health expenditure (both in ln).

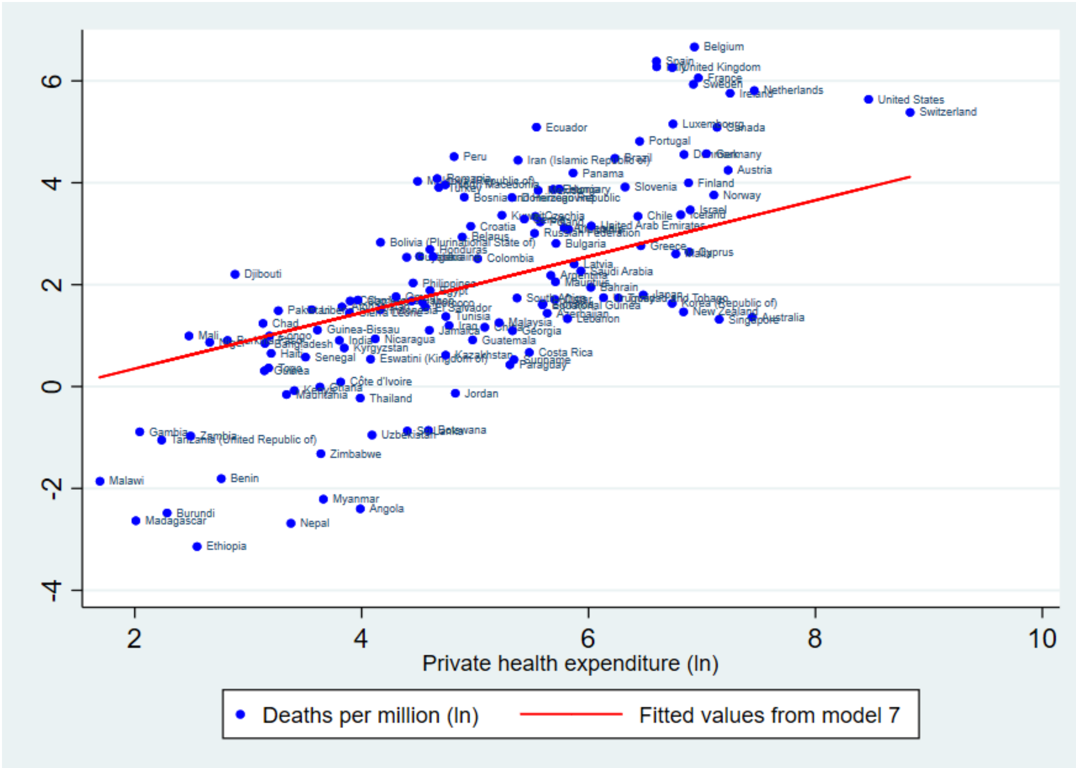

Figure 3: Covid-19 Mortality (ln) and Private Health Expenditure (ln)

Note: covariates included in the regression are the ones from model 7 in Table 4 and they were held constant at the mean value. When all the covariates are removed, the slope of the regression line is steeper, yet in both cases statistically significant.

We also aim to understand the role of other factors on the differential impacts of COVID-19, in particular on mortality. Based on the literature surveyed above, we hypothesize that countries with older populations will have higher mortality rates, while health systems with better infrastructure (e.g. more hospital beds relative to population size) would have lower mortality than others.

5. Methods and Variables

The sample includes 147 countries (see Appendix) for which the latest data on both the dependent and independent variables were available from reliable international sources. The countries included in this dataset account for 93% of the world population. To account for the effect of different healthcare financing structures (private vs. public) on COVID-19 prevalence rates, we use several ordinary least squares (OLS) models.

The key dependent variables are COVID-19 prevalence (P) and mortality rates (M), defined as follows:

Prevalence (P) = COVID-19 confirmed cases (C) / population (P) * 1,000,000

Mortality (M) = COVID-19 related deaths (D) / population (P) * 1,000,000

These variables are based on data for confirmed COVID-19 cases and deaths by country from the Johns Hopkins University COVID-19 Dashboard (last accessed on 20 May 2020). The data on cases were transformed into a rate of prevalence using data on total population for 2020[3], where COVID-19 prevalence is equal to the rate of the virus per one million people. The variable was further transformed using the natural logarithm because the COVID-19 cases per million population indicator follows a log-normal distribution. Since the original COVID-19 cases per million population variable is highly skewed, the ln transformation helps diminish the effect of extreme values (outliers) and also provides an intuitive interpretation of the regression coefficients (see Figure 4).

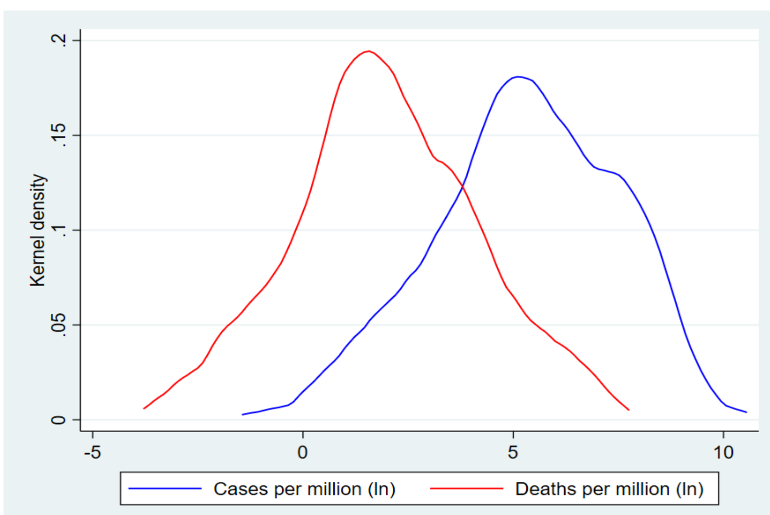

Figure 4: Distributions of Covid-19 Prevalence (ln) and Mortality (ln)

The main aim of this paper is to analyze how the financing structure of health care systems affects COVID-19 trends in different countries. Therefore, the two key independent variables in the analysis are Domestic private health expenditure (PVT-D) per capita in US$ and Domestic general government health expenditure (GGHE-D) per capita in US$ from WHO (2020). To smooth the effects of annual fluctuations, five year averages were used in both cases (2013-2017). Also, as the distributions of these two types of health expenditures are skewed, they enter the regressions in logarithm transformation (see Figure 5).

Figure 5: Distributions of private and public health expenditures, both in natural logarithm scale.

We also include several important control variables in all models to account for factors identified in the literature, such as the level of economic development, urbanization, inequality, globalization and democracy. For the mortality models we further add the percentage of population over 65 years old and hospital capacity (beds per 1,000 people).

Economic development is measured using GDP per capita, PPP (constant 2011 international $). We divide this indicator by 1,000 to make the interpretation of the regression coefficient more intuitive, as thousand units of per capita GDP. Urbanization has also been identified as critical in the rate of spread of infectious diseases, and we measure it using the percentage of the population living in urban areas. Both these variables are from the World Bank (2020).

Globalization has been specifically identified as a key determinant of COVID-19 prevalence and mortality (Zimmerman et. al. 2020). While we suspect that much of this effect will be captured by our privatization variable, we nonetheless include an overall measure of globalization - the KOF index (Gygli et. al. 2019) to account for this dimension. We also include a variable on democracy, given some recent debate on the comparative abilities of states with different political regimes to cope with spread of coronavirus. For example, Frey, Chenand Presidente (2020) found that governments more democratically accountable to the citizenry were less strict in imposing lockdowns but were able to reduce people's mobility by 20% more. We measure democracy using the EIU Democracy Index (EIU 2019).

COVID-19 has been especially fatal for people over 65 years of age (Zhou et. al. 2020, Hopman, Allegranzi & Mehtar 2020), so we include a variable on the proportion of the population age 65 and over (United Nations 2020). We also include a variable on hospital capacity. This was identified as a critical factor in affecting mortality, e.g. in the case of Italy, where a very high load of cases overwhelmed the hospital system capacity and resulted in very high mortality rates (Onder, Rezza & Brusaferro 2020). We measure this with the indicator Hospital beds per 1,000 people (World Bank 2020).

The analyzed baseline equation analyzed in this paper is therefore:

$$\textit{Coronavirus Variables}_i = a + \beta \textit{ Health Expenditure Variables}_i + \gamma X_i + \varepsilon_i$$

6. Results

The correlation matrix and summary statistics for all variables are shown in Table 2. At this stage, it seems that COVID-19 prevalence is negatively correlated with health inequality, but positively with all other variables.

Table 2: Correlation matrix and univariate statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) COVID-19 cases per million (ln)	1										
(2) Per capita income (th)	0.688*	1									
(3) Percentage urban	0.697*	0.667*	1								
(4) Inequality in life expectancy (%)	-0.648*	-0.668*	-0.635*	1							
(5) Private health expenditure (ln)	0.734*	0.758*	0.738*	-0.793*	1						
(6) Public health expenditure (ln)	0.713*	0.807*	0.777*	-0.865*	0.910*	1					
(7) Globalization (KOF)	0.693*	0.710*	0.655*	-0.866*	0.832*	0.875*	1				
(8) Democracy (EIU)	0.394*	0.447*	0.424*	-0.592*	0.635*	0.673*	0.714*	1			
(9) COVID-19 deaths per million (ln)	0.839*	0.587*	0.577*	-0.619*	0.740*	0.726*	0.731*	0.530*	1		
(10) Population Age 65+ (percent)	0.555*	0.517*	0.473*	-0.758*	0.737*	0.763*	0.839*	0.698*	0.688*	1	
(11) Hospital beds (per 1,000 people)	0.391*	0.398*	0.361*	-0.610*	0.511*	0.569*	0.593*	0.367*	0.388*	0.728*	1
Mean	5.44	20.07	61.10	14.07	4.86	5.06	65.95	5.70	2.23	9.66	3.02
S.D.	2.08	20.34	21.95	10.31	1.53	2.08	14.18	2.15	1.72	6.86	2.49

N=147; * p<0.01

Table 3 reports the OLS estimates of COVID-19 prevalence, starting with the baseline regression in Model 1. At this stage only health inequality (%), the proportion of population living in urban areas and GDP per capita (in thousands of PPP dollars) are included. This model already has significant explanatory power (with an R^2 of 0.598). It shows a small but statistically significant positive coefficient for income and urbanization, and a negative coefficient for health inequality. To minimize the risk of multicollinearity, we add further independent variables one by one in each subsequent model.

Models 2 and 3 add the two measures of health care expenditure - first private and then public. As expected, the log of private health expenditure has a large and negative coefficient (statistically significant), while public health expenditure has a much smaller coefficient which is also not statistically significant. Model 2 predicts that a 10% increase in private health expenditure results in a

3.81% increase in COVID-19 cases. Health inequality also ceases to be significant from this point onwards, presumably as its effects are captured by the private health expenditure variable.

Model 4 combines the two measures of health expenditure together, and the coefficients have the same sign, size and significance as above. Model 5 adds the KOF globalization index, which is not significant on its own. But when controlling for democracy in model 6, globalization has a small positive (and significant) coefficient, confirming the insight of Zimmerman et. al. (2020) that globalization matters. However, globalization in this model explains a very small part of COVID-19 prevalence, while private health expenditures explain the most.

The most saturated regression, Model 6, predicts that a 10% increase in private health expenditure results in a 4.85% increase in COVID-19 cases.

Table 3. OLS regression predicting COVID-19 prevalence - Cases per 1,000,000 (ln)

	COVID-19 prevalence - Cases per 1,000,000 (ln)					
	(1)	(2)	(3)	(4)	(5)	(6)
Per capita income (thousands)	0.031***	0.023***	0.030***	0.028***	0.027***	0.022**
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
Percent urban	0.034***	0.026**	0.033***	0.030***	0.031***	0.028**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
Health inequality	-0.044**	-0.02	-0.042	-0.039	-0.019	-0.01
	(0.016)	(0.019)	(0.026)	(0.024)	(0.023)	(0.023)
Private health expenditure (ln)		0.381**		0.527***	0.467**	0.485**
		(0.130)		(0.148)	(0.164)	(0.160)
Public health expenditure (ln)			0.021	-0.275	-0.35	-0.242
			(0.165)	(0.186)	(0.201)	(0.208)
Globalization (KOF)					0.033	0.048*
					(0.018)	(0.021)
Democracy (EIU)						-0.151
						(0.082)
Constant	3.383***	1.803*	3.293**	2.399*	0.573	-0.029
	(0.585)	(0.778)	(1.013)	(0.954)	(1.121)	(1.174)
R^2	0.598	0.617	0.598	0.624	0.633	0.643
Degrees of freedom	143	142	142	141	140	139
BIC	516.9	514.8	521.9	517.2	518.6	519.4
Number of observations	147	147	147	147	147	147
* p<0.05, ** p<0.01, *** p<0.001						

Table 4 shows the OLS results for COVID-19 mortality where the dependent variable is the log of COVID-19 related deaths per million people. The coefficients of per capita income and urban population are positive and significant (but small), as in Table 3, and the coefficient for health inequality is negative. Model 2 predicts that a 10% increase in private health expenditure results in a 6.91% increase in COVID-19 deaths.

While public health expenditures have a positive and significant coefficient in model 3, adding it to models 4, 5, 6, and 7 produces positive signs for both private expenditures and public expenditures. However, private expenditures have positive coefficients in all of these models, while public expenditures are never significant. So we do not add new information by adding public health expenditures from model 4 onwards[4].

In models 4 through 7 we introduce the percentage of the population aged 65 years or older as this group has been identified as especially high-risk for COVID-19 mortality (Guan et. al. 2020, Huang et. al. 2020, Zhou et. al. 2020). On average, these models predict that a 10% increase in the percentage of older people results in a 1.18% increase in COVID-19 deaths.

Neither globalization nor democracy seem to affect COVID-19 mortality in models 6 and 7. However, hospital capacity is critical. Models 5 through 7 predict that, on average, a 10% increase in the percentage of hospital beds per 1,000 people results in a 1.67% *decrease* in COVID-19 deaths, confirming tragic lessons such as that of Italy (Onder, Rezza & Brusaferro 2020).

Table 4. OLS regression predicting COVID-19 mortality - Deaths per 1,000,000 (ln)

	COVID-19 mortality - Cases per 1,000,000 (ln)						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Per capita income (thousands)	0.018	0.003	0				
	(0.012)	(0.009)	(0.010)				
Percent urban	0.017**	0.004	0.002	0.009	0.011	0.011	0.008
	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Health inequality	-0.056***	-0.012	0.006				
	(0.015)	(0.013)	(0.018)				
Private health expenditure (ln)		0.691***		0.457***	0.426***	0.451***	0.379***
		(0.118)		(0.113)	(0.105)	(0.102)	(0.107)

	COVID-19 mortality - Cases per 1,000,000 (ln)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Public health expenditure (ln)			0.610***				
			(0.152)				
Population Age 65+ (percent)				0.083***	0.127***	0.143***	0.119***
				(0.022)	(0.023)	(0.028)	(0.030)
Hospital beds (per 1,000 people)					-0.154**	-0.172**	-0.175**
					(0.055)	(0.057)	(0.055)
Democracy (EIU)						-0.073	-0.102
						(0.058)	(0.063)
Globalization (KOF)							0.028
							(0.015)
Constant	1.589**	-1.276*	-1.075	-1.372***	-1.266***	-1.080**	-1.955***
	(0.502)	(0.612)	(0.765)	(0.268)	(0.265)	(0.332)	(0.555)
R^2	0.461	0.552	0.528	0.598	0.622	0.625	0.634
Degrees of freedom	143	142	142	143	142	141	140
BIC	504.7	482.5	490.1	461.5	457.7	461.3	462.7
Number of observations	147	147	147	147	147	147	147
* p<0.05, ** p<0.01, *** p<0.001							

Taken together, the results shown in Tables 3 and 4 suggest that higher rates of private health expenditure are associated with both higher prevalence and higher mortality related to COVID-19 across countries, controlling for differences in level of development, urbanization, age structure, political regime and the extent of globalization of a country.

7. Conclusions

The current COVID-19 pandemic may be unprecedented in its impacts on global societies and economies, but it is unlikely to be the last. Recent research has shown that the increasing pressure of human activities on natural habitats and the resulting decline in wildlife populations have increased the transmission of zoonotic diseases from animals to humans (Johnson et. al. 2020).

This implies that we could expect more and perhaps worse pandemics as time goes by unless immediate action is taken to reduce the impact of human activity on nature. Given the glacial pace of progress on this front, countries need to prepare themselves for this grim scenario.

Globalization and neoliberal policies have contributed to changes in countries' healthcare systems in recent decades, with more privatization and commercialization justified as means to improve efficiency and boost economic growth. This paper adds to a literature that questions the ability of privately-financed healthcare systems to cope with the scope and magnitude of infectious diseases, including COVID-19.

The results presented above indicate that private spending on health care significantly raises the rates of COVID-19 prevalence and mortality across countries, controlling for their income, urbanization, demographic structure, exposure to globalization and political system. These findings add to the existing literature showing the inadequacy of private healthcare systems in addressing other infectious diseases such as TB.

Another effect of globalization and cost-cutting policies - a reduction in the number of hospital beds per 1,000 people - has been shown to be critical in worsening mortality rates across countries, as hospitals are overwhelmed by case-loads and infected patients require urgent access to specific equipment and treatment.

This paper contributes to the emerging literature on COVID-19 as well as the lengthy debates about the relative effectiveness of private vs. public healthcare systems. Our findings suggest that, to make health systems sustainable at various levels of development and given the expectation of worsening environmental conditions, there is an urgent need to reconsider the neoliberal impulse to privatize health care systems. The short-term benefits from such privatization policies - e.g. reduced costs, shorter waiting times - must be weighed against the long-term damage such policies can do to countries' ability to cope with a rapidly-spreading infectious disease.

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Appendix: Countries Included in the Analysis (N = 147)

Afghanistan	Djibouti	Kenya	Poland
Algeria	Dominican Republic	Korea (Republic of)	Portugal
Angola	Ecuador	Kuwait	Qatar
Argentina	Egypt	Kyrgyzstan	Romania
Armenia	El Salvador	Lao PDR	Russian Federation
Australia	Equatorial Guinea	Latvia	Rwanda
Austria	Estonia	Lebanon	Saudi Arabia
Azerbaijan	Eswatini	Liberia	Senegal
Bahrain	Ethiopia	Lithuania	Serbia
Bangladesh	Fiji	Luxembourg	Sierra Leone
Belarus	Finland	Macedonia	Singapore
Belgium	France	Madagascar	Slovakia
Benin	Gabon	Malawi	Slovenia
Bhutan	Gambia	Malaysia	South Africa
Bolivia	Georgia	Mali	Spain
Bosnia and Herzegovina	Germany	Malta	Sri Lanka
Botswana	Ghana	Mauritania	Suriname
Brazil	Greece	Mauritius	Sweden
Bulgaria	Guatemala	Mexico	Switzerland
Burkina Faso	Guinea	Moldova	Tanzania
Burundi	Guinea-Bissau	Mongolia	Thailand
Cabo Verde	Guyana	Morocco	Timor-Leste
Cambodia	Haiti	Mozambique	Togo
Cameroon	Honduras	Myanmar	Trinidad and Tobago
Canada	Hungary	Namibia	Tunisia
Central African Republic	Iceland	Nepal	Turkey
Chad	India	Netherlands	Uganda
Chile	Indonesia	New Zealand	Ukraine
China[5]	Iran	Nicaragua	United Arab Emirates
Colombia	Iraq	Niger	United Kingdom
Congo, Rep.	Ireland	Norway	United States
Costa Rica	Israel	Oman	Uruguay
Côte d'Ivoire	Italy	Pakistan	Uzbekistan
Croatia	Jamaica	Panama	Vietnam
Cyprus	Japan	Paraguay	Zambia
Czech Republic	Jordan	Peru	Zimbabwe
Denmark	Kazakhstan	Philippines	

End Notes:

[1] Throughout the paper, ln refers to the natural logarithm, i.e. $\log_e x$.

[2] See Section 6 for the rationale for transforming the variables into logarithms.

[3] Population size for 2020 extracted from World Population Prospects: The 2019 Revision. New York. https://population.un.org/wpp/. Accessed May 2020.

[4] Additional estimates are available upon request.

[5] Data for China do not include Hong Kong Special Administrative Region of China, Macao Special Administrative Region of China or Taiwan Province of China.