Racial Inequality in Health Care During a Pandemic

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Abstract

This paper provides evidence that a person's race influences the probability of receiving proper health care during a pandemic. In order to do so, we use country-wide individual-level data of people hospitalized due to respiratory infections in Brazil during the COVID-19 crisis. We find that white individuals are more likely to receive intensive care treatment than their counterparts from different races, even after accounting for observable characteristics such as symptoms, comorbidities, and hospital and epidemiological-week fixed effects. We also find that this effects comes mostly from private hospitals, where only patients with insurance can have access to ICU units. No racial disparity is found in public hospitals, where ICUs are allocated regardless of access to private insurance. Our findings are consistent with the presence of institutional racism in Brazilian health care markets, where racial inequalities in the economy are reproduced in this market through race-neutral rules.

Keywords: Race, Inequality, Health, COVID-19
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1 Introduction

Does a person's race influence the way they receive emergency health care? The answer to this question has important implications for understanding racial inequality in health outcomes, particularly for how much of this difference is not due to different exposure to diseases, but how patients are treated once they arrive at the emergency room. In the middle of a global crisis such as 2020's COVID-19 pandemic, finding that, because of their skin color, citizens are having a higher chance of being denied proper care is a troubling sign for any society. Nevertheless, in this paper, we present findings consistent with this scenario using Brazil's data, the second country most affected by the pandemic.

This paper empirically tests whether race influences the way patients receive health care treatment during a pandemic. Using individual-level data from the *Severe Acute Respiratory Infections* (SARI) registries for Brazil, we find that black individuals are 0.622 percentage points less likely to being allocated to an ICU unit, even after conditioning on being in the same hospital and the same week and having the same set of characteristics as white individuals.

We also find that this effect comes mostly from private hospitals, where the disparity in treatment more than doubles in magnitude, while in public hospitals the effects are not statistically distinguishable from zero. Finally, in order to disentangle whether this disparity is coming from income or racial discrimination from the hospital staff, we test for the presence of heterogeneity depending socioeconomic status measured by education. We find that, within private hospitals, there's effect only for those without college education, while at public hospitals there's no difference between the two groups. Our findings suggest that most of the disparity in health care is driven by socioeconomic differences which affect the probability of an individual access private ICU units.

Our paper speaks to several diverse strands of the literature. First, we contribute to the broader research agenda on health provision in developing countries (Dupas, 2011). Some of the main issues identified in this literature are absenteeism among nurses and physicians (Chaudhury et al., 2006; Banerjee et al., 2004, 2008), limited knowledge and training of health providers (Das et al., 2008), and corruption among them (Dizon-Ross et al., 2017). However, there is still little research on racial disparities in health for developing countries.[1]

Our work also adds further evidence to the literature on racial bias in health pro-

[1]One notable exception is Tanaka (2010) for post-apartheid South Africa.

vision. In Eli et al. (2019) and Feigenbaum et al. (2019) the authors show how this bias is not a recent phenomenon. Using data on black and white veterans from the US Civil War, Eli et al. (2019) shows how physicians' bias during that time led to white veterans receiving more generous pensions than blacks. This difference also led to differences in life expectancy between both races. In Feigenbaum et al. (2019), the authors find that cities in the south of the US had the highest yearly rate of death from infectious diseases in the first half of the 20th century, primarily because they had larger shares of black residents. Goyal et al. (2015) the authors show how, for appendicitis patients, black individuals were prescribed fewer pain medications and fewer treatment options relative to their white counterparts. The literature also presents evidence on how physicians exhibit bias in assessing pain and treatment of black patients (Hoffman et al., 2016), and how this bias leads to the assignment of different treatments to them (Van Ryn and Burke, 2000). Most of this literature, however, focuses on high-income countries. We fill an important gap by providing evidence on this phenomenon for a middle-income country with over two-hundred million inhabitants. The case of Brazil is even more relevant since health services are universally provided (Castro et al., 2019).

Most importantly, our paper contributes directly to the literature on racial disparities in healthcare during the COVID-19 pandemic. Due to the unavailability of race-disaggregated individual data on patients, most papers that have tried to measure race's effect on COVID-19 outcomes used aggregated data. Using information at the zipcode level, Almagro and Orane-Hutchinson (2020), Borjas (2020), and Schmitt-Grohé et al. (2020) look at race when trying to measure the relationship between socioeconomic characteristics and COVID-19 incidence and infections within the city of New York. A similar exercise is done by Desmet and Wacziarg (2020) and McLaren (2020) at the county level for the US. In Wiemers et al. (2020) the authors rely on survey data to examine pre-existent health conditions associated with COVID-19. They find large differences across races and socioeconomic status for these conditions. In a retrospective cohort study, the authors in Ayoubkhani et al. (2020) use 2011 UK Census data linked with death records and find descriptive evidence that people from ethnic minority groups were at elevated risk of COVID-19 mortality.

The papers that are most related to ours are Bertocchi and Dimico (2020) and Baqui et al. (2020). Unlike the papers mentioned in the previous paragraph, Bertocchi and Dimico (2020) provide evidence on a disproportional effect of COVID-19 on racial minorities using individual-level information. Their dataset allows them to account for several individual characteristics such as age, gender, pre-existing conditions, and home address for one county in the United States. The authors find that racial disparities in COVID-19 outcomes are caused by socioeconomic status and household composition, through which past discrimination is carried over to current times. Their evidence, however, is limited to data on individuals from Cook County, Illinois. Unlike this and the rest of the literature, which relies on aggregated data, we use individual-level country-wide information for every SARI and COVID-19 patient in Brazil.

In Baqui et al. (2020), the authors conduct a cross-sectional observational study of COVID-19 hospital mortality using data from the SIVEP-Gripe to characterize the COVID-19 pandemic in Brazil. They find evidence that compared to white Brazilians, *Pardos* (mixed-ethnicity) and black individuals who were admitted into hospitals had a significantly higher risk of mortality. The authors speculate that this difference may be related to differences in susceptibility to COVID-19 and access to healthcare. In our analysis, we account for both epidemiological week and hospital fixed-effects and also for several socioeconomic factors such as age, gender, schooling, and all recorded comorbidities and symptoms. Ultimately, this means that we are able to measure the relationship between race and health outcomes net of confounding factors within each hospital and each epidemiological week, enabling us to tell apart the effect we are interested in from the effects of access to hospitals or susceptibility to COVID-19. In this sense, we shed light on an important mechanism driving health disparities during the pandemic.

The paper is structured as follows. In Section 2 we provide a summary of the institutional information relevant for this study and an overview of the data we use. In Section 3 we explain our empirical strategy and present the results. Finally, in Section 4 we conclude the paper.

2 Background and data

2.1 Racial inequality in Brazil

Brazil is a country marked by the long shadow of its colonial heritage. It has received multiple waves of African slaves since the beginning of its occupation by Portugal in 1500. For centuries, black slaves were trafficked from Africa, and their descendants were the main form of capital in agricultural production. This happened for several reasons, among them the Portuguese's failure to explore local indigenous people and the need to populate the territory to avoid invasions from other European countries (Fujiwara et al., 2019). According to Klein and Luna (2010), Brazil had one million black slaves in 1800, more than any other country. It was also the last country to end the slave trade, the last to enact a "free birth" law (i.e., a law that declared that descendants of slaves were free citizens) and the last to abolish slavery in the Americas (Andrews, 2004).

Even though after the abolition there was no *de jure* segregation, blacks are still over-represented among those in the lower socioeconomic strata. Recent research has shown how firms adopt inefficient hiring policies by offering higher wages to white employees relative to similar nonwhites with the same skill (Hirata, 2017). Similar findings have been found by Gerard et al. (2018), who show that this racial wage gap is even worse at high-paying jobs. There is also evidence of bias against black students in the provision of education (Botelho et al., 2015).

There are different mechanisms through which racial discrimination can take place. The first, and simplest one, is through taste: people discriminate if they are willing to incur in a cost to avoid interaction with a different group (Becker, 1971). In order to illustrate this, let's make the reasonable assumption that a doctor faces some level of discomfort when his patient dies, and that a limited supply of a certain medicine can save this patient with a positive probability. To make the example more straightforward, let's suppose there's only one dose of such medicine and only two patients under his care,the doctor has information only on their race, and one patient is black and the other is white. If the doctor faces less discomfort with the death of the black patient than with the white patient, he or she will give the medicine to the white one.

The second mechanism is statistical discrimination (Phelps, 1972). In order to illustrate this, let's suppose now that our doctor from the example above is equally uncomfortable with the deaths of both white and black patients. Nevertheless, he believes that, knowing nothing else about the patients but the color of their skin, being white is correlated with having higher income and a healthier lifestyle. Since he is worried about maximizing the number of lives saved, he then decides to give the medicine to the white patient. This happens because the doctor believes that the chance of survival of white patients under the treatment is higher than the chance of survival of black patients after taking the same medicine, due to factors correlated to their races that can increase their probability of survival.

Finally, the last mechanism is one often forgotten by economists: institutional racism. The aforementioned mechanisms are all based on the fact that individuals are making choices to consciously discriminate (Bertrand et al., 2005). These approaches miss institutional factors that perpetuate racial inequality in a society, what is known as structural or institutional racism (Reskin, 2012). More specifically, this kind of racism can be defined as the differential treatment by race which is driven by organizational rules (Small and Pager, 2020). These rules do not need to be explicit as the South African apartheid or slavery laws from the 19th century. The decision of a bank to provide a loan based on income or place of residence of the applicant, when both of these features are negatively correlated with, can perpetuate racism. Both are features embedded in rules followed by individuals which merely enforce them. The same reasoning applies to insurance companies which may refuse treatment based on socioeconomic characteristics correlated with race (e.g. income). Different from statistical discrimination, correlational reasoning does not need take place in the acts of either the writer of enforcer of the rules. Being unaware of these relations is enough to create institutions that increase racial inequality in a society.

Professionals who work in the health system are not immune to these biases, whether interpersonal or institutional. The current Brazilian Constitution determines that access to health is a universal right to all citizens and mandates the state's responsibility to deliver it. Despite this constitutional ruling, there is also evidence suggestive of racial bias in health provision (Leal et al., 2005). To minimize this potential issue, the Brazilian Council of Medicine (*Conselho Federal de Medicina*) has a key piece of regulation for which patients should be prioritized in transfers to ICUs. The enforcement of this ruling should avoid decisions based on race, socioeconomic status, or simple arrival order at the hospital (Wang and de Lucca-Silveira, 2020). The priorities are, from highest to lowest:

- **Priority 1:** Patients who need life-supporting interventions, with a high probability of recovery and with no limitation in therapeutic support
- **Priority 2:** Patients who need intensive monitoring due to their high chance of needing immediate intervention and no therapeutic support limitation.
- **Priority 3:** Patients who need life-supporting interventions with a low chance of recovery or with some limitations in therapeutic support.
- **Priority 4:** Patients who need intensive monitoring due to their high chance of needing immediate intervention, with some limitation in therapeutic support.
- **Priority 5:** Patients with an illness in terminal stage or dying patients with no possibility of recovery. In general, these patients are not suitable for the ICU (except for organ donors). However, they may be admitted if their case is deemed exceptional by the intensivist in charge.

Despite this, Ribeiro et al. (2020) and Baqui et al. (2020) provide descriptive results which indicate that, during the 2020 COVID-19 pandemic, not being white can be a risk factor. Ultimately, this suggests that the biases present in society may manifest themselves in health care procedures through the discretion of professionals. However, racial disparities in the health outcomes can also be driven by factors outside the healthcare system.

The labor market inequalities mentioned before may lead to a racial sorting in the insurance market. Even though there is universal health care in Brazil, individuals can acquire three different categories of private insurance: (i) one that covers only ambulatory expenses, related to medical services that do not require hospitalization for more than twelve hours; (ii) one that covers only hospitalizations, and (iii) a complete one that covers both. According to Brazil's National Health Agency, 91% of insurance contracts cover both kind of expenses. The remaining are split between ambulatory and hospitalization plans, with 7% and 2% of total contracts respectively. Although ambulatory plans represent only a small fraction of the total, they are significantly cheaper than complete plans, leading individuals with lower socioeconomic status to represent a larger fraction of their clients when compared to complete plans (Andrade and Maia, 2007). This suggests an institutional channel where racial disparities in healthcare stem from racial bias in the labor market.

2.2 Data

In order to test whether there are racial disparities in health provision during the COVID-19 pandemic, we use as our main source of information data on *Severe Acute Respiratory Infections* (SARI) hospitalizations provided by the SIVEP-Gripe system, a database developed by Brazil's Ministry of Health in response to the H1N1 epidemic. It contains information on SARI patients, including data on comorbidities, demographic characteristics, and treatment status for each patient diagnosed with SARI. We complement this data with information on the number of ICU units in each hospital which are either private (i.e. only people with private insurance can use) or public (i.e. under the rules of the universal health care system) provided by the National Registry of Health Establishments (*Cadastro Nacional de Estabelecimentos de Saúde*, CNES)

The number of SARI cases is a broad outcome. It includes: (i) confirmed SARI-COVID-19 cases; (ii) suspect SARI-COVID-19 cases, and; (iii) SARI cases from all other causes. Moreover, it's reasonable to expect that COVID-19 statistics in Brazil suffer from non-classic measurement error caused by under-notification. While the number of confirmed COVID-19 cases was higher among individuals with higher socioeconomic status in the beginning of the pandemic, the number of deaths and SARI cases was uncorrelated with income or education (Souza et al., 2020).

Table 1 present the variables used in the analysis that follows according to individuals races. In particular, this table shows that unconditional on any other variable, black individuals present a lower probability of receiving treatment at an ICU. The table also shows that black individuals are, on average, less educated and present different groups of symptoms and comorbidities compared to individuals from other race groups. [2]

3 Empirical strategy and results

This paper's main objective is to empirically test whether the race of a patient is associated with health outcomes and healthcare treatments during a pandemic. To do so, we investigate, using individual-level information from Brazil, how race is associated with the probability of death and the probability of receiving treatment at an intensive care unit (ICU). Since race is associated with certain socioeconomic characteristics and the prevalence of certain diseases, we are not likely to access the effect of race by simply comparing individuals from different races.

To isolate and measure the relationship between the race of a patient and the outcome of interest, we estimate the following model:

$$ICU_{iht} = \alpha + \beta Race_{iht} + \theta' \mathbf{X_{iht}} + \lambda_t + \mu_h + \epsilon_{iht}, \quad (1)$$

where $Race_{iht}$ is a dummy variable for individual i in hospital h at the epidemiological week t, which takes value one if the individual is of a given race. In particular, we focus on identifying how being from a specific race affects the probability of receiving receiving intensive care treatment conditional on entering the hospital with SARI symptoms.

$\mathbf{X_{iht}}$ is a vector of covariates, including comorbidities, symptoms, and demographic characteristics, λ_t is an epidemiological week fixed-effect and μ_h is a hospital fixed-effect. Our coefficient of interest β measures the conditional correlation between an individual's race and outcome y_{iht}.

[2] We consider black individuals as those classified as *Pretos* in the SIVEP-Gripe dataset. *Pardos* (mixed-ethnicity) are not included in the count of black individuals. Similarly, white individuals are those classified as *Brancos*.

Since we take into account the role of observable characteristics of individuals and also include time and hospital fixed-effects, the coefficient β captures the effect of being from a specific race conditional on being at hospital h at the epidemiological week t and on having a set of characteristics given by $\mathbf{X_{iht}}$.

3.1 Results

We now report the main findings of the paper. As previously explained, in all exercises that follow, we take a conservative approach and do not include individuals for which race did not receive any specific value.

In Table 2 we presents estimates of the difference in receiving treatment at an ICU according to individual's race. Panel A reports estimates comparing white white to black individuals. In column (1) we report the estimates without including any control variable. White individuals are 0.787 percentage points more likely to receive treatment at an ICU unit compared to black individuals. In column (2) we include hospital fixed-effects. According to that specification the differential probability of hospitalization between white and black individuals decreases to 0.680 percentage points. In column (3) we include epidemiological week fixed-effect and document a similar estimated effect of 0.687 percentage points. Finally, in column (4) we report the estimates of our preferred specification, including individual-level controls.

In this setting, the coefficient of interest β represents the probability of a patient receiving treatment at an ICU after entering the hospital given that he or she is of a certain race, conditional on a set of controls, and hospital and epidemiological week fixed-effects. According to this specification, white individuals are 0.622 percentage points more likely to receive treatment in an ICU unit. What this last column tells us is that, within the same hospital and same week, after accounting for all observed differences between patients (including symptoms and comorbidities), being white gives a patient a higher probability to be taken to an ICU *vis-à-vis* being black.

In Panel B we report estimates comparing white to mixed-race individuals. In the first three columns we find a positive and significant difference in the probability of receiving ICU treatment. In our preferred specification however, in column (4) we find that white individuals are not statistically more likely to receive intensive care treatment compared to mixed-race individuals. It's important to bear in mind that the mixed-race classification can vary a lot across the Brazilian territory, and may mean different shades of skin color in different regions

Finally, in Panel C, we compare white individuals to black and mixed-race individuals, a common classification in many economic and demographic studies about race. According to our preferred specification in column (3) we find that white individuals are 0.433 percentage points more likely to receive intensive care treatment when compared to individuals from these two other race groups.

In Table 3 we investigate how the probability of going to an ICU differs according to the type of health care facility, i.e., whether the hospital is public or private[3]. In Panel A we report the estimates of our preferred specification for individuals hospitalized in private health care facilities. In column (1) we report the estimates comparing white to black individual and find that white individuals are 1.974 percentage points more likely to receive treatment at an ICU in this type of facility. In column (2) we compare white to mixed-race individuals and find that the first group is 1.358 percentage points more likely to receive intensive care treatment. In column (3) we compare white to both black and mixed-race individuals. On average, white individuals are 1.4 percentage points more likely to receive treatment at an ICU.[4]

In Panel B we focus on public health care facilities and repeat the same exercises reported in the previous panel. For this particular sample we do not find statistically significant difference in the probability of receiving intensive care treatment. Since socioeconomic strata have different access to insurance plans, these findings suggest that income differences in the labor market correlated with race may lead to differences in the health care market when it comes to access to insurance and, ultimately, access to an ICU. Moreover, it also suggests that the universal health care system in Brazil can play a role in alleviating this disparity.

In Table 4 we investigate if the access to ICUs in private and public health care facilities differs according to individual level of education, our proxy for socioeconomic status. The rationale behind this analysis is to test whether the racial disparity is homogeneous over different socioeconomic strata within the same types of facilities. The results for Panel A suggest that the disparity within private hospitals is largely driven by individuals without college education. On the other hand, in Panel B, there is no difference in the allocation of ICUs between difference races, regardless of the socioeconomic group individuals belong to. Once again, we see the universal health care system in Brazil playing a role in bridging racial disparities.[5]

[3]We define a public hospital as one which 100% of hospital beds are allocated to the universal health care system. We consider an hospital to be private if it has 0% of its beds under the control of the universal health care system.

[4]Table 6 in the appendix, present estimates for hybrid hospitals, with both private and public hospital beds. We do not document any differences in the probability of receiving intensive care treatment in hybrid hospitals.

[5]Table 6 in the appendix present estimates of a similar analysis for hybrid hospitals. The differences

Finally, in Table 5, we conduct additional analysis and investigate whether the racial disparity in ICU assignment becomes more salient if the demand for health care is near its maximum. In such cases, situations where a physician must decide which patients go to intensive care become more likely (Wang and de Lucca-Silveira, 2020). To do so, we investigate how the probability of receiving ICU treatment differs by race groups according to the number of patients using ICUs in each municipality. Instead of using the actual number of ICU beds, which is likely to change endogenously during a pandemic as local authorities try to respond to it, we define ICUs' capacity at the municipality level as the highest observed number of patients at ICUs within a municipality in a given week. We then restrict our sample to the four weeks centered in the peak week in order to have enough statistical power for our analysis. The coefficients obtained are higher than the ones in Table 2, suggesting that scarcity of ICUs is related to higher racial disparity in the health care system.

There are several ways to interpret the disparities documented above. Among other factors, racial disparities in SARI casualties can be explained by (i) concentration of workers from racial minorities in essential services; (ii) differential incidence of preexisiting conditions; (iii) differential availability of sick leave; (iv) residential segregation; (v) weathering due different exposure to external stressors such as racial discrimination over the lifetime, and; (vi) discrimination in healthcare services [6] Since our main specification takes into account covariates on symptoms and comorbidities, we minimize issues related to point (ii) and (v). By also conditioning on hospital fixed-effects and demographic characteristics such as education, we also minimize issues related to points (i), (iii), and (iv).

After taking into account these adjustments that minimize alternative mechanisms to racial disparities, we believe most of the variation captured by our coefficient of interest, β, should be coming from point (vi), discrimination in healthcare. The fact that the effect is largely driven by private hospitals, where only individuals with insurance contracts that cover hospitalization have access to ICUs, is consistent with institutional racism. Although insurance companies have formal rules which are race-neutral, the presence of segregation in the labor market can negatively affect black individuals disproportionately when it comes to access to private health care.

in the probability of receiving treatment at an ICU is not statistically different from zero for this facilities.

[6] A a longer discussion of these points can be found in McLaren (2020).

4 Conclusion

In this paper, we showed that, in Brazil, a person's race influences how they receive emergency health care. Using individual-level data from the *Severe Acute Respiratory Infections* (SARI) registries for Brazil, we find that we find that black individuals are less likely to receive intensive care than white individuals within the same hospital, the same week, and after accounting for several observable characteristics such as symptoms and comorbidites. We also find that this disparity is largely driven by differences in access to health insurance: within private hospitals, whites without college education have a much higher chance to receive ICU care than black individuals. No difference is found within public hospitals or between whites and blacks with college education. Moreover, we find that racial disparities become more salient if healthcare demand is near its maximum: black individuals are less likely to receive treatment at ICUs when the municipality of residence faces a constraint in the number of units. The fact that the public health care system succeeds in eliminating racial disparities while private hospital perpetuate them suggests that in order to reduce the racial gap in health outcomes we must address the racial gap in health access and its institutional roots.

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Table 1: Descriptive Statistics

	Black		White		Other races	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Health outcomes						
Deaths	0.404	0.491	0.323	0.467	0.422	0.494
ICU treatment	0.309	0.462	0.344	0.475	0.297	0.457
Characteristics						
Age	55.268	20.064	56.722	22.922	54.460	22.058
Male	0.555	0.497	0.533	0.499	0.565	0.496
Education	0.083	0.276	0.178	0.383	0.099	0.299
Symptoms						
Fever	0.732	0.443	0.722	0.448	0.784	0.411
Cough	0.818	0.386	0.800	0.400	0.833	0.373
Sore throat	0.249	0.432	0.251	0.434	0.308	0.462
Shortness of breath	0.785	0.411	0.760	0.427	0.800	0.400
Respiratory discomfort	0.709	0.454	0.697	0.459	0.729	0.444
Oxygen saturation	0.672	0.470	0.644	0.479	0.645	0.479
Diarheea	0.170	0.376	0.164	0.370	0.169	0.375
Vomit	0.128	0.334	0.119	0.324	0.119	0.324
Days since first symptom	8.579	11.635	7.673	10.485	10.456	14.117
Comorbidities						
Cardiovascular	0.628	0.483	0.590	0.492	0.564	0.496
Asthma	0.097	0.297	0.102	0.303	0.086	0.281
Diabetes	0.490	0.500	0.429	0.495	0.479	0.500
Pulmonary	0.128	0.334	0.159	0.366	0.111	0.314
Immunosuppression	0.100	0.300	0.104	0.305	0.087	0.282
Obesity	0.093	0.291	0.078	0.269	0.063	0.243
Liver	0.028	0.164	0.026	0.159	0.028	0.165
Neurological	0.092	0.290	0.132	0.339	0.086	0.280
Renal	0.149	0.356	0.101	0.302	0.110	0.313
Observations		13,604		86,404		94,813

Notes: This table displays the descriptive statistics for the variables used in our analyses throughout the paper. All information comes from SIVEP-Gripe, the Brazilian national registry of individuals hospitalized due to Severe Acute Respiratory Infections (SARI). The first group, *Health outcomes*, is comprised of our main outcomes of interest. The second group, *Characteristics*, is comprised of demographic characteristics of patients. The third group, *Symptons*, is comprised of information on SARI symptoms registered by hospital staff while the patient was hospitalized. Finally, the fourth group, *Comorbidities*, is comprised of information on comorbidities of SARI that patients had.

Table 2: Probability of receiving intensive care treatment according to individual race

	(1)	(2)	(3)	(4)
Panel A				
White vs Black	0.787	0.680	0.687	0.622
	[0.353]**	[0.358]*	[0.357]*	[0.343]*
Observations	167,022	167,022	167,022	167,022
R-squared	0.00	0.00	0.00	0.08
Panel B				
White vs Mixed-race	1.455	1.317	1.335	0.406
	[0.293]***	[0.300]***	[0.299]***	[0.273]
Observations	278,567	278,567	278,567	278,567
R-squared	0.00	0.00	0.00	0.07
Panel C				
White vs (Black + Mixed-race)	1.265	1.148	1.165	0.433
	[0.259]***	[0.263]***	[0.262]***	[0.239]*
Observations	298,503	298,503	298,503	298,503
R-squared	0.00	0.00	0.00	0.07
Hospital FE	No	Yes	Yes	Yes
Week FE	No	No	Yes	Yes
Controls	No	No	No	Yes

Notes: The table presents estimates of the difference in receiving treatment at an Intensive Care Unit. Panel A reports estimates comparing white individuals to black individuals. Panel B reports estimates comparing white to individuals to mixed-race individuals. Panel C reports estimates comparing white individuals to black and mixed-race individuals. Estimates in column (1) do not include any control variable. Column (2) includes hospital fixed-effects. Column (3) includes epidemiological week fixed-effects. Column (4) include individual-level controls reported in Table 1. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level.

Table 3: Probability of receiving intensive care treatment for private and public health care facilities

	(1)	(2)	(3)
Panel A: Private Health Care			
White vs Black	1.974		
	[1.014]*		
White vs Mixed-race		1.358	
		[0.674]**	
White vs (Black + Mixed-race)			1.403
			[0.610]**
Observations	33,748	44,274	46,796
R-squared	0.10	0.10	0.10
Panel B: Public Health Care			
White vs Black	0.689		
	[0.745]		
White vs Mixed-race		-0.060	
		[0.558]	
White vs (Black + Mixed-race)			0.168
			[0.511]
Observations	21375	46882	50404
R-squared	0.06	0.05	0.05

Notes: The table presents estimates of the difference in receiving treatment at an Intensive Care Unit. Panel A reports estimates restricting the sample to private health facilities. Panel B reports estimates restricting the sample to public health facilities. All estimates include epidemiological week fixed-effects, hospital fixed effects and include individual-level controls. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level.

Table 4: Probability of receiving intensive care treatment for private and public health care facilities according to education

	College Educated			Non College Educated		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Private Health Care						
White vs Black	-1.597			2.308		
	[2.672]			[1.093]**		
White vs Mixed-race		0.901			1.333	
		[1.574]			[0.708]*	
White vs (Black + Mixed-race)			0.433			1.454
			[1.462]			[0.651]**
Observations	5,483	6,612	6,844	28,265	37,662	39,952
R-squared	0.13	0.13	0.13	0.10	0.10	0.10
Panel B: Public Health Care						
White vs Black	-0.075			0.846		
	[7.152]			[0.801]		
White vs Mixed-race		-3.177			0.169	
		[2.895]			[0.526]	
White vs (Black + Mixed-race)			-3.261			0.413
			[2.826]			[0.492]
Observations	794	1,516	1,588	22,380	49,256	52,989
R-squared	0.31	0.18	0.18	0.06	0.05	0.05

Notes: The table presents estimates of the difference in receiving treatment at an Intensive Care Unit. Panel A reports estimates restricting the sample to private health facilities. Panel B reports estimates restricting the sample to public health facilities. Columns (1)-(3) report estimates for college educated individuals. Columns (4)-(6) report estimates for non-college educated individuals. All estimates include epidemiological week fixed-effects, hospital fixed effects and include individual-level controls. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level.

Table 5: Probability of intensive care around the peak

	(1)	(2)	(3)
White vs Black	0.960		
	[0.452]**		
White vs Mixed-race		0.587	
		[0.334]*	
White vs (Black + Mixed-race)			0.614
			[0.297]**
Observations	84,823	148,055	158,961
R-squared	0.07	0.07	0.07

Notes: The table presents estimates of the difference in receiving treatment at an Intensive Care Unit. Panel A reports estimates comparing white individuals to black individuals. Panel B reports estimates comparing white individuals with individuals to mixed race individuals. Panel C reports estimates comparing white individuals to both black and mixed race individuals. Estimates in column (1) do not include any control variable. Column (2) includes epidemiological week fixed-effects. Column (3) includes week-fixed effects. Column (4) include individual-level controls reported in Table 1. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level.

A1 Appendix

Table 6: Probability of receiving intensive care treatment - hybrid health care facilities

	(1)	(2)	(3)
White vs Black	0.312		
	[0.473]		
White vs Mixed-race		0.079	
		[0.394]	
White vs (Black + Mixed-race)			0.042
			[0.334]
Observations	93,830	154,794	165,320
R-squared	0.08	0.08	0.08

Notes: The table presents estimates of the difference in receiving treatment at an Intensive Care Unit. Sample is restricted to four weeks around the week with a higher number of cases in each municipality. All estimates include epidemiological week fixed-effects, hospital fixed effects and include individual-level controls. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level.

Table 7: Probability of receiving intensive care treatment for hybrid health care facilities according to education

	College Educated			Non College Educated		
	(1)	(2)	(3)	(4)	(5)	(6)
White vs Black	2.159			0.266		
	[2.714]			[0.486]		
White vs Mixed-race		-1.301			0.099	
		[1.539]			[0.405]	
White vs (Black + Mixed-race)			-0.715			0.042
			[1.391]			[0.343]
Observations	5421	7141	7424	88409	147653	157896
R-squared	0.15	0.14	0.14	0.08	0.07	0.07

Notes: The table presents estimates of the difference in receiving treatment at an Intensive Care Unit. Sample is restricted to hybrid hospitals that have both private and public facilities. Columns (1)-(3) report estimates for college educated individuals. Columns (4)-(6) report estimates for non-college educated individuals. All estimates include epidemiological week fixed-effects, hospital fixed effects and include individual-level controls. Standard errors clustered at the hospital level are reported in brackets. Coefficients significantly different from zero at 99% (***), 95% (**) and 90% (*) confidence level.