

An Examination of Racial Bias in Medical Expenditure

Calvin Walker

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1 Introduction

The topic of racial bias within the US Healthcare system has long been a topic of inquiry. Specifically, racial bias has been shown to be present within algorithms used to allocate treatment and attention to patients: “racial bias reduces the number of Black patients identified for extra care by more than half. Bias occurs because the algorithm uses health costs as a proxy for health needs. Less money is spent on Black patients who have the same level of need, and the algorithm thus falsely concludes that Black patients are healthier than equally sick White patients.” (Obermeyer et al. 2019) Understanding the bias that exists in allocating health resources, this paper will seek to examine the effects of such bias, namely, how the existence of racial bias manifests itself in health expenditures among Black and White populations.

2 Methodology

In seeking to examine the differences in health expenditures between Black and White populations, we will be using the *health.dta* dataset, which contains data points for 48,784 patients. We will be focusing on six main variables in relation to race: total medical expenditures, total avoidable medical expenditures, total active illnesses, total emergency medical expenditures, and total chronic illnesses.

In order to gain a good representation of the data, we want to control for the number of illnesses patients experience. I.e. instead of examining the difference in total costs between Black and White patients, we first find the cost per illness for each patient, and then compare these variables between Black and White patients. We do so because we seek to examine the cost differences for the same level of care, not cost differences on aggregate. We do the same for avoidable medical costs, emergency costs, and emergency costs per chronic illness. Lastly, we will use a Ordinary Least Squares regression on each of the resulting variables that control for the number of illnesses and the indicator for race, to gauge the significance of the correlation between each variable and the patient’s race.

3 Results

We obtained the following from comparing the variables of interest (costs controlled for number of illnesses):

Total Costs				Total Avoidable Costs		
Race	Mean (\$)	Std. dev.(\$)	Freq	Mean (\$)	Std. dev.(\$)	Freq
Black	4060.2218	8909.688	3,871	1424.9863	6282.8288	3,871
White	4835.4129	9089.1868	23,585	1389.1513	5361.5293	23,585
Emergency Costs				Emergency Costs (Chronic)		
Race	Mean (\$)	Std. dev.(\$)	Freq	Mean (\$)	Std. dev.(\$)	Freq
Black	308.693	983.30384	3,871	1424.9863	6282.8288	3,871
White	248.61089	784.41404	23,585	1389.1513	5361.5293	23,585

And from the Regression (costs controlled for number of illnesses):

	(1)	(2)	(3)	(4)
	Total Costs	Avoidable Costs	Emergency Costs	Emergency Costs (chronic)
Indicator for Race	-775.2*** (-4.93)	35.84 (0.38)	60.08*** (4.22)	41.22** (2.99)
_cons	4835.4*** (81.93)	1389.2*** (38.78)	248.6*** (45.94)	242.7*** (46.92)
<i>N</i>	27456	27456	26573	27456

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Of the results from regressing the variables and the indicator for race, 2 are highly significant, 1 is significant, and the last is not significant. The negative correlation between Total Costs and the Indicator for Race, with $p < 0.001$, indicates that White patients spend more per illness than Black patients. The other two statistically significant results are positively correlated, which indicate that Black patients have more emergency costs per illness ($p < 0.001$) and per chronic illness ($p < 0.01$) than White patients. While there was a positive coefficient between the Indicator for Race and total Avoidable Costs, the result was not statistically significant, so no conclusion can be drawn on the difference between Black and White patient's Avoidable Costs.

4 Conclusion

White patients spending more per illness on medical care coincides with Obermeyer et al. as we would expect algorithms in the health industry to over identify White patients for treatment, thus leading them to spend more. Interestingly, Black patients spend more per illness and per chronic illness on Emergency Care. This is important because seeking and receiving Emergency Care is not determined by patient history analyzing algorithms, raising the question of why Black patients pay more per illness for Emergency Care. This could be due to a number of factors. First, as described by Obermeyer et al., Black patients are undeserved due to race bias in health care algorithms. This could lead to them seeking more Emergency Care per illness than White patients, as their health conditions deteriorate from a lack of normal treatment. Next, there is the possibility that racial bias exists in how Black patients are charged for Emergency Care. Lastly, there is the possibility of a difference in the average *type* of Emergency Care sought by Black vs. White patients, which could lead to a difference in medical expenditures. The latter two possibilities are outside the scope of this study and, and Research into these possibilities would help shed light on the nature of biases in medical care, and how these biases manifest.