Are Black-White Disparities in Mortality Increasing over the Twentieth Century?

Dejun Su

Introduction

Despite the vast literature on black-white disparities in health and mortality, so far only a few studies have examined trends in these disparities over time (e.g. Crimmins and Saito 2001; Manton, Patrick, and Johnson 1987; Pappas et al. 1993). Findings from these studies suggest that the magnitude of black-white disparities in health and mortality in the U.S. was not constant during the second half of the 20th century; rather, it varied over time with the evolvement of mortality and morbidity, the epidemiological environment, and the social distribution of health care resources. Due to the paucity of data, however, little has been known about black-white disparities in health and mortality in the beginning of the twentieth century and the extent to which the magnitude of these disparities has changed ever since. Given the unprecedented decline in mortality in the twentieth century, a probe into the long term black-white disparities in health and mortality can help illustrate how the disparities change under drastically differential mortality regimes.

In this study, I seek to assess and explain trends in black-white disparities in mortality over the twentieth century through a comparative analysis of longitudinal data from the Union Army (UA) Sample and the Health and Retirement Study (HRS). In particular, the study aims to assess black-white disparities in adult mortality among males of ages 51 to 61 in 1900 and 1992 respectively, and to reveal the trends in these disparities by comparing corresponding findings across the samples. In light of the observed trends and related findings from previous studies, I then propose a theoretical framework to explain racial and ethnic disparities in health and mortality in the U.S. and their changes over time.

Data and Methods

Data

The data used in this study come from the UA Sample and the HRS sample. The UA sample (Fogel 2000, 2001) contains detailed records on major life events from childhood to death for roughly 36,000 white soldiers and 6,000 black soldiers who fought the American Civil War. Analysis of possible sample selection bias indicates that the white UA sample is generally representative of the population of white recruits into the Union Army. Comparisons between the white UA sample and the northern population in the same age group suggest these two groups resemble each other in terms of wealth in 1850 and 1860 and in terms of mortality circa 1900 (Fogel et al. 2001). Most of the soldiers in the black UA sample were former slaves, with twenty-six percent of all recruits coming from the free states, 22% from the border states and the District of Columbia, and 50% from the Confederacy (Costa, Helmchen, and Wilson 2007). For purpose of comparison with the HRS data, the working UA sample used in this study contains

7,191 white veterans and 781 black veterans who survived to 1900 with ages between 51 and 61 in 1900.

The part of the HRS data used in this study come from the initial 1992 wave that contains information on demographics, health, height and weight, and other variables for a nationally representative sample who were born between 1931 and 1941. The 1992 baseline data can be merged with the 2006 tracker and exit file for information on vital status and its timing. For comparative purpose, the working HRS sample in this study contains 2,961 white males and 620 black males of ages 51 to 61 in 1992.

Methods

I first adopted life table method to estimate survival curves during the follow-up period for blacks and whites in each of the two samples. Then I ran three Cox Proportional Hazard (CPH) models in each of the samples to assess black-white disparities in risk of mortality and to evaluate the importance of height and marital status in explaining the black-white disparities in risk of mortality.

Results

A comparison between blacks and whites in the two samples, as indicated in **Table 1**, suggests that the two groups come close to each other in terms of mean age at the baseline. A notable difference lies in height at the baseline, with white veterans in the UA sample having a height advantage of 0.8 inches over their black counterparts. This advantage, however, reduces to 0.4 inches in the HRS sample, suggesting that blacks were catching up with whites in terms of adulthood height over the twentieth century.

Table 1: A Comparison between White and Black Males in the Two Samples

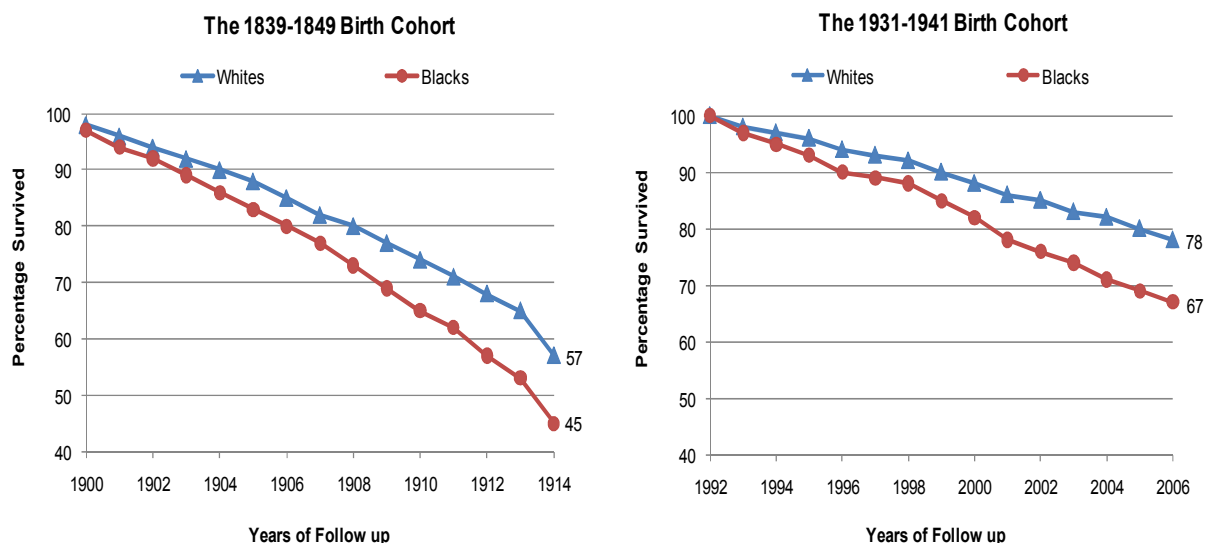| | Union Army Sample | | Health and Retirement Sample | |
	Whites	Blacks	Whites	Blacks
Birth Cohort	1839-1849	1839-1849	1931-1941	1931-1941
Follow-up Period	1900-1914	1900-1914	1992-2006	1992-2006
Age Range at the Baseline	51-61	51-61	51-61	51-61
Variables at the Baseline				
Mean Age	57.0	56.7	55.7	55.6
Mean Height (Inches)	68.1	67.3	70.3	69.9
Marital Status (%)				
Married	71.4	70.6	84.6	64.5
Divorced	0.7	0.9	7.9	8.2
Widowed	3.7	4.0	2.9	6.1
Never Married	6.6	11.8	1.1	4.2
Other or Unknown	17.7	12.8	3.4	16.9
Number of Cases at the Baseline	7,197	781	2,961	620

Source: The Union Army Sample and the Health and Retirement Sample.

The two samples also differ substantially in terms of marital status. Among white UA veterans, 71.4 percent were married in 1900 as compared to 70.6 percent for black veterans.

The corresponding percentages changed to 84.6 percent and 64.5 percent respectively in the HRS sample, indicating a divergence in marital status between blacks and whites over the twentieth century: while marriage rate increased among whites over time, it decreased among blacks. As a result, the black-white gap in marriage rate was expanding over the twentieth century.

A detailed reading of the survival curves in **Figure 1** suggests that the chance of survival for both black and white males was greatly improved over the twentieth century; however, the substantial black-white gap in mortality persisted in absolute terms. Among the 1839-1849 birth cohort, 57 percent of white males survived the follow-up period of 14 years, as compared to 45 percent of black males. The corresponding percentages changed to 78 percent and 67 percent respectively among the 1931-1941 birth cohort.

Figure 1: Survival Rates during 14 Years of Follow-up in the Two Samples

Source: The Union Army Sample and the Health and Retirement Sample.

The hazard ratios as summarized in **Table 2** reveal an expanding gap in relative risk of mortality between black and white males over the twentieth century. Based on the point estimates from Model 1, relative to whites in the UA sample, the elevated risk of mortality for blacks is 45 percent. The corresponding gap increases to 66 percent in the HRS sample.

This expanding gap in relative risk of mortality between blacks and whites, however, disappears in Model 3 with the incorporation of marital status into the analysis. This suggests that virtually all the increased disparities in risk of mortality between blacks and whites can be explained by black-white disparities in marital status in the HRS sample. While adjusting for marital status makes no difference to the black-white disparities in risk of mortality in the UA sample, it makes a substantial difference in the corresponding disparities in the HRS sample. Almost a third of the gap in mortality risk between blacks and whites in the HRS sample can be explained by their differences in marital status.

Table 2: The Black-White Disparities in Risk of Mortality in the Two Samples

Explanatory Variables at the Baseline	Union Army Sample			Health and Retirement Sample		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Race						
Whites	1.00	1.00	1.00	1.00	1.00	1.00
Blacks	1.45***	1.43***	1.45***	1.66***	1.65***	1.46***
	(1.31, 1.61)	(1.29, 1.59)	(1.30, 1.61)	(1.42, 1.95)	(1.41, 1.94)	(1.24, 1.73)
Age	1.09***	1.09***	1.09***	1.10***	1.10***	1.10***
	(1.07, 1.10)	(1.08, 1.11)	(1.08, 1.11)	(1.07, 1.12)	(1.07, 1.12)	(1.08, 1.13)
Height (inches)		0.98**	0.99*		0.99	0.99
		(0.97, 1.00)	(0.97, 1.00)		(0.96, 1.01)	(0.96, 1.01)
Marital Status						
Married			1.00			1.00
Divorced			1.55**			1.66***
			(1.05, 2.28)			(1.33, 2.07)
Never Married			1.39***			1.48**
			(1.17, 1.66)			(1.07, 2.06)
Widowed			1.18**			1.72**
			(1.03, 1.35)			(1.13, 2.62)
Other or Unkown			1.44***			1.79***
			(1.32, 1.58)			(1.40, 2.30)
Number of Cases	7,978	7,359	7,359	3,581	3,581	3,581

Source: The Union Army Sample and the Health and Retirement Sample. * $p<0.1$; ** $p<0.05$; *** $p<0.01$.

In both samples, being taller is associated with a reduced risk of mortality. This effect of height, however, turns out to be more significant in the UA sample than in the HRS sample. Results from Model 2 in the UA sample suggest that for each inch of increase in height, the risk of mortality on average decreases by two percent.

Discussion and Conclusion

Through a comparative analysis of longitudinal data from the UA sample and the HRS sample, this study reveals that despite the unprecedented decline in mortality for both blacks and whites over the twentieth century, the black-white disparities in mortality remained unchanged in absolute terms. The disparities, however, expanded over time in relative terms. Virtually all the expanded gap can be explained by the increasing disparities in marital status between blacks and whites over the twentieth century.

I explain these findings under a newly developed framework on racial and ethnic disparities in health and mortality in the U.S. This framework consists of five interrelated components: 1) Socioeconomic resources at disposal that can be tapped for health care purpose; 2) Availability, affordability, accessibility, and effectiveness of health care services at any given location and time in history; 3) The consciousness and willingness of racial and ethnic groups to convert socioeconomic resources into health advantages; 4) Health endowment circa birth across racial and ethnic groups; and 5) Exposure to health hazards in homes, workplaces, and local communities.

References (tentatively omitted)