Income and Health in African America:
Evidence from Union Army Pensions

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Abstract

We present the first analysis of the relationship between income and health for African Americans in the late nineteenth and early twentieth century using the cohort of Union Army veterans. Since veterans received pensions based on disability, estimates of income effects on mortality may be biased as ill veterans received larger pensions. Therefore, we propose an exogenous source of variation in pensions: the discretion of individual Pension Bureau doctors when certifying illness. We find large effects which suggests that some of the black-white disparities in health status over this past century stem from black-white differentials in access to government programs.

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By SHARI ELI AND TREVON D. LOGAN[*]

In 1900, the black-white differential in life expectancy was approximately 10 years.[1] Over the twentieth century, the gap has narrowed and today is approximately 5 years (2010 US Census).[2] Given the recent literature on the mortality decline for both black and white populations, it is clear that the two most important determinants of health outcomes have been socioeconomic status and the introduction of public health interventions.[3] Public health interventions such as water purification and construction of sewer systems reduced mortality and the provision of public health measures in cities led to some of the convergence of black and white mortality rates because of equity of access to these public goods.[4] However, one question that still remains unanswered by the current literature, and that is the focus of this research,

concerns the role that *income* has historically played in the black-white mortality gap in the U.S.

We investigate the effect of income on black and white mortality by using evidence from pensions received by veterans who served as Union Army soldiers during the American Civil War (1861-1865). The benefit of using this cohort of veterans is that their pension income, health status and causes of death have been preserved and digitized. In particular, information on their health status is available because veterans were required to undergo medical exams by qualified surgeons and to furnish the Pension Bureau with surgeons' reports in order to qualify for pensions.

Since veterans received pensions based on proof of disability at medical exams,

[1] Troesken (2004), p. 2.
[2] 2010 U.S. Census
[3] Scholars Robert Fogel and Thomas McKeown have emphasized the role of increases in the standard of living, and in particular improvements in nutrition, as the main factors responsible for the decline in mortality prior to the introduction of modern medical techniques and drugs such as antibiotics (Fogel 2004; McKeown 1976; Cutler, Deaton, Lleras-Muney 2006).
[4] See Troesken (2004).

estimates of the effect of pension income on mortality will be biased such that it will seem as though increases in pension income lead to a higher risk of mortality. To circumvent endogeneity bias, we use an exogenous source of variation in pension income: the random assignment of veterans to an examining surgeon. We find that surgeons hired by the Pension Bureau rated the severity of similar illnesses differently, which led to larger (or smaller) pension receipt and which is exogenous to the true severity of the health condition faced by the veteran. In particular, the Pension Bureau relied on surgeon subjectivity when determining pension amounts for a particular illness. We argue that doctor bias in disability rate was related to income but unrelated to the true underlying health of the pension recipient.

We construct a proportional hazard model to estimate income effects on the probability of death. When instrumenting for pension income, we find that an extra dollar of monthly pension income reduces the probability of death from any cause by 29% for black veterans on the pension rolls between 1893 and 1906. Said differently, receiving an average pension of approximately $10 per month led to an extra 1.4 years of life. We find similar, though smaller, effects for

white veterans. Our results suggest that black veterans' health was more sensitive to income fluctuation and that the black-white mortality gap during the late nineteenth and early twentieth century can partly be explained by differences in income.

I. Race Differentials in Pension Receipt

Nearly 2.7 million white men and over 186,000 black men served in the Civil War. Between 1861 and 1934, the pension application success rate for white veterans was 92.6% while the rate for blacks was 75.4%.[5] Conditional on receiving a pension between 1879 and 1900, the white/black ratio in pension awards climbed from 1.106 to 1.273.[6] The reasons for the black-white differentials stem from racial discrimination during and after the war.

The most common reason for pension denial, or the receipt of a reduced pension, was the inability of black veterans to prove their disabilities. After the passage of the Invalid Pensions Act of 1890, both white and black veterans could claim pensions for disabilities they faced which were unrelated to the war experience. Pensionable disabilities deserving included those which were verifiable during an exam by a Pension

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[5] Shaffer (2004), p. 209.

[6] Wilson (2007).

Bureau doctor, such as hernias, and those which were diagnosed on the basis of symptoms stated by the veteran, such as chronic diarrhea.[7] Symptom lists from white veterans were trusted by examining surgeons while lists from black veterans were considered suspect.[8] Because the surgeons' certificates for black veterans frequently had lower disability ratings, the medical examiners at the Pension Bureau were more likely to award lower pensions to black veterans.

II. Empirical Strategy and Data

We use the sample of veterans who began collecting pensions by 1893.[9] We follow this sample until 1906, which was the last year before the passage of the age-based laws.[10] Prior to 1907, the Pension Bureau awarded payments to veterans based on the degree of their disabilities, which causes pension income to be endogenous with respect to

health outcomes. We instrument for pension income amount by using the random assignment of a veteran to a surgeon.

To use the random assignment of veterans to surgeons as an instrument, the instrument must satisfy the following exclusion restriction: Conditional on controls, the surgeon cannot impact the health of a veteran through any channel except pensions. Additional assumptions including the following: 1) the surgeon must have a relevant impact on pension income; 2) veterans cannot move to regions with a more "lenient" surgeon.[11]

Following the framework of Eli (2015), we use a proportional hazard model (censoring on death) to estimate the effect of an extra dollar of monthly pension income on the probability of death by cause.[12] The dependent variable is an indicator equal to 1 if a veteran died in year t. Therefore,

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[7] Testimony from black veterans was considered to be "reliable" by examining surgeons if the veteran displayed appropriate behavior typical of middle-class whites. Wilson (2007) shows that the black/white approval ratio for pensions in which veterans claimed a hernia was 0.896 whereas the rate was 0.404 for diarrhea. For other unverifiable conditions, such as back pain and hearing loss, the black-white approval rates were 0.397 and 0.216 respectively.

[8] Shaffer (2004), p. 130.
[9] The application process for pension awards under the Act of 1890 sometimes took as long as a year. By 1893, the majority of men learned whether their applications had been successful.
[10] After the passage of these laws, the Pension Bureau began dispersing pensions based on age, and thus the ratings of examining surgeons were not a factor in the majority of applications.
[11] The first stage is represented as $pen_{it} = \gamma_0 + \gamma_1 S_i + \Gamma C_{it} + u_{it}$ where pen = monthly pension income, i = individual, t = year, S = set of surgeon indicator variables, and C = set of demographic and socio-

economic controls. Controls in include slave status at birth, birth year, location of residence, POW status, battle wounds, and prior health status. Details of disease conditions faced during life come from surgeons' certificates and are grouped into the following categories: respiratory, digestive, infectious, cardiovascular, endocrine and genitourinary. To construct our instrument, we used *The Register of Boards of Examining Surgeons, 1862-1928*, found at the National Archives. Annual rosters contain the name of surgeon(s), the location of the exam (town, county and state) and the reason for surgeon removal (death, resignation, or Congressional removal). We then match the surgeon to veterans for each exam by linking the surgeon(s) address from the rosters to the address found on each surgeons' certificate in the USCT dataset.

[12] The average monthly income for a farmer (black or white) was $24 in 1900. Therefore, an extra dollar of pension income was equivalent to 4% of monthly income. Pensions likely replaced a higher percentage of monthly income for blacks than whites.

coefficients are semi-elasticities representing the effects of income on the hazard rate.

We use the Union Army (UA) and United States Colored Troops (USCT).[13] Information in the dataset comes from three sources: 1) the military, pension and medical records, which contain socioeconomic and demographic data; 2) surgeons' certificates, which provide individual-level descriptions composed by examining surgeons of a veteran's health status at the time of each exam; and 3) census records, which contain all data on veterans collected by enumerators in census years from 1850 to 1900.

The sample of 40,000 white UA veterans has been shown to be representative of white men found in the 1900 Census, who were born in the late 1830s in the Northeast or Midwest.[14] It is less clear to what extent the sample of the black USCT veterans, consisting of over 6,000 men who came from Border states or the South, is representative of black men in the late 19th and early 20th century. However, no other individual-level data for blacks in the era exists and so our analysis of the mortality of black veterans provides the first insights into factors causing high black mortality and the black-white health gap.

Despite being subject to the same laws, whites were able to secure higher pensions than blacks. Of veterans who survived to 1893, black veterans received an average monthly pension of $9.64 while whites received $11.92. Black veterans were also less likely to undergo exams. The average black veteran underwent 4 exams while the average white veteran had 5 exams.

Table 1 contains estimates from probit regressions in which we use wartime demographic indicators to predict entry onto the pension rolls in 1893. Only .6% of black veterans in 1893 had wartime injuries, which is likely because blacks saw fewer wartime battles relative to whites.

III. Results and Discussion

Our main results are presented in Table 2, which shows the effect of pension income on mortality from any cause for both blacks and whites. Column 1 shows estimates without instrumenting for pension income: The black-white differential of the coefficient estimate is positive suggesting that the estimates for blacks are even more biased than for whites.

When instrumenting for pension income, we find that an extra $1 of monthly pension income reduces the probability of death from any cause by 29% for black veterans. Our results show that income

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[13] ibid.

[14] Costa and Kahn (2008), p. 2-3.

reduced mortality rates for blacks to a larger extent than whites. With pension income, veterans changed their household composition and often chose to retire (Eli 2015; Costa 1995). These factors were likely mechanisms leading to improvements in health status.

Finally, our results suggest that discriminatory practices in the veterans' pension system widened the black-white mortality gap.

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Table 1— Probit Regression: Predicting Veterans entry onto pension Rolls

	Black- USCT	
	Coefficient (%)	Mean (%)
War Injury	7.3**	0.6
	(2.09)	
War Illness	8.1***	59.6
	(2.98)	
POW	22.5***	3.9
	(3.68)	
Birth Year	-1.6***	1839
	(-8.43)	
No. of Vets on Rolls	1035	
Tot. no. of Vets	1549	

Source: Author calculations. ***, **, * Significant at the 1 percent level, 5 percent level and 10 percent level, respectively.

Table 2— Mortality Estimates for Black and White Veterans

	% Decline in Hazard	% Decline in Hazard	Hazard Rate per 1000
White – UA	-1.0**	24.7	2.8
(No. Vets = 13.011)	(.00)	(.13)	
Black – USCT	-1.6**	29.1	4.2
(No. Vets = 903)	(.02)	(.07)	
Specification	Hazard Regression	Hazard with Instrument	

Note: % Decline in Hazard = (1-exp(β))*100. Standard errors in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001 Controls: Top 100 city (in population size), time trend, birth year and place, rank in the army, prisoner-of-war status, war wounds and previous illnesses. *Source:* Author calculations. ***, **, * Significant at the 1 percent level, 5 percent level and 10 percent level, respective