
The Impact of Hospital Integration on Black-White Differences in Mortality: A Case Study of Motor Vehicle Accident Death Rates

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Abstract

Prior to the Civil Rights Era hospitals in the American South could, and routinely did, refuse medical care to Black patients even in emergency situations. When in need of medical care a sick or injured African-American would have to find a “Blacks-only” facility, or face very limited accommodations in “Whites-only” institutions. This situation changed, however, in the mid-1960s when hospitals became racially integrated.

This paper studies the impact of hospital integration on racial differences in deaths from motor vehicle accidents. Focusing primarily on Mississippi, we use detailed micro-data from the US Vital Statistics matched with race-specific hospital survey information from 1959-1972. Using GIS methods to compute a race-specific measure of distance to the nearest hospital before and after integration, this occurred in 1965. We find that, on average, distance to nearest hospital fell by 50 miles for blacks after integration. We also show that distance and accident mortality were positively correlated: increases in distance to the nearest hospital were associated with higher mortality. Combining the treatment effects of distance with integration, we conclude that hospital integration reduced African-American mortality from car accidents by 15 percent.

Key words: hospital integration, motor vehicle accidents, hospital access, racial disparities

JEL No: J15, I18, I11, I38, N32

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Introduction

Currently in the United States there are large racial disparities in health outcomes. Previous research has attributed some of the racial difference in health to racial differences in access to hospital care (Staiger et al. 2005; Skinner et al. 2003). Differential racial access to hospitals, however, has very deep roots in American history and has, in fact, changed significantly over time. This paper examines a period of substantial change in black access to hospital care, the mid-to-late 1960s. During this period the federal government implemented policies that effectively outlawed de jure segregation in hospitals which previously had been practiced throughout the American South. I study how the elimination of de jure segregation affected black health outcomes in situations in which timely access to hospital care was critical – motor vehicle accidents.

The South was a deeply segregated society in the 1950s and early 1960s. This separation of the races extended to all areas of life, including the provision of health care in hospitals. When in need of hospital treatment a sick or injured African-American would have to find a “Blacks-only” facility, or face very limited accommodations in “Whites-only” institutions. The color line in hospital care was so rigid that even medical emergencies did not blur it. There is abundant anecdotal evidence that White hospitals refused outright to provide emergency care, or provided only a limited amount of care, to African-Americans in need (see below). This situation changed, however, in the mid-1960s when hospitals became racially integrated with the passage of Medicare at the federal level.

Did hospital integration matter? We seek to answer this question by examining the effect of integration on the black mortality rate from motor vehicle accidents. The idea is quite simple: if an accident is severe enough timing will be everything -- a few miles less to the nearest hospital may literally mean the difference between life and death.

Certainly motor vehicle accidents are a leading cause of deaths among all accidents in United States, especially for younger Americans. The death toll from motor vehicle accidents roughly equals the combined number of suicides and homicides, and motor vehicle deaths are 30 times as frequent as accidental deaths due to firearms. There is a huge literature examining factors behind motor vehicle deaths such as seat belts (Peltzman 1975) and alcohol consumption (Levitt and Porter 2001). However, to the best of our knowledge, the possibility that improved health care access resulting from racial integration may have reduced motor vehicle accident deaths for blacks has not been previously investigated. The paper closest in conception to this one is Almond, Chay, and Greenstone (2003) who show that hospital integration reduced racial differences in infant mortality – an analogous situation in which life-threatening conditions (infant pneumonia, for example) depends on quick access to appropriate medical care.

After a brief presentation of the historical context, the paper begins by examining detailed micro-data on motor vehicle accident death rates from US vital statistics over the period 1959-1980. We conduct a difference-in-difference analysis to determine if racial differences in mortality declined in the South relative to the non-South after integration. We find, instead, that there was a sharp increase in the black mortality rate in the South in the mid-1960s. The problem, however, is not with the underlying hypothesis but rather a fundamental difficulty in controlling for the population at risk: in the mid-1960s the economic conditions of African-Americans improved, especially in the South. One consequence was that African-Americans were driving more, leading to an increase in the population at risk and, consequently, higher mortality.

With this empirical problem squarely in mind, it becomes apparent that finding a link between hospital integration and racial differences in mortality requires a more intricate

measure of integration than a “before-after” approach using state level data. We therefore turn to an analysis of Mississippi for which we have race-specific data on hospital locations. Building on previous work by Almond, Chay, and Greenstone (2003) we create a race-specific county-level variable, “distance to the nearest hospital” that can be linked to race specific county level data on accident mortality. We show that, before integration, there was a severe geographic racial imbalance in hospital access: a black motorist who was injured would potentially have to be transported (by ambulance or private vehicle) a lengthy distance to get to the nearest black hospital. Hospital integration had a dramatic effect on this distance for African-Americans, reducing it by approximately 50 miles. In a panel data analysis we also show that distance and mortality were positively related: the longer the minimum distance, the higher mortality rate. It is clear from our data that identification is coming from the variation across counties with respect to black access because, for whites, hospitals were (more or less) close by throughout the period.

A Brief History of Hospital Segregation

Currently in the United States there are large racial disparities in access to health care. Although economic historians have studied the long-term evolution of racial differences in certain health outcomes (for example, infant mortality; see Collins and Thomasson 2004; Almond, Chay, and Greenstone 2007) relatively little is known about how this evolution was shaped at different points in time by racial differences in health care access. This paper focuses on racial disparities in hospital services in the 1960s and 1970s, a period during which change was shaped by federal government policy towards racial integration.

The history of hospital care and hospital services provided to African-Americans can be divided into three phases: -- slavery, segregation, and integration. During the antebellum period

the health care facilities for African Americans, so-called “sick-houses” and “lying-in rooms,” were set up on a few large Southern plantations by whites who had an economic stake in slave labor. Certain urban hospitals in the southern United States provided health care for slaves (Savitt 1978), even though the quality of care slaves received from these hospitals is questionable (Pritchett and Yun 2008). For obvious economic reasons, the maintenance of slave health was an important and necessary activity. Fogel and Engerman observed that on many plantations, medical care included the establishment of plantation hospitals and infirmaries. As the most important part of a plantation owner’s property, slaves sometimes received more care than did Southern poor whites or Northern factory workers (Fogel and Engerman 1974). The primary interest of the white population was in managing the health of the pregnant slaves, who reproduced the slave population, and of the slave children, who would provide the future work force for plantations.

The establishment of the Freedmen’s Bureau during the Civil War led to some of the first black hospitals in the United States. The motivation for the establishment of hospital facilities for blacks in the mid- to late 1800s was the federal government’s desire to control diseases that were thought to be most prevalent among the African American population. Such illnesses included leprosy, syphilis, and sickle cell anemia. The Freedmen’s Hospital in Washington, D.C. (which later became Howard University Hospital), for example, was established in 1863 by the United States government to provide health care to former slaves, “freed men.” A few other hospitals exclusively for blacks were established by whites in the late 1800s, including St. Agnes Hospital in Raleigh, North Carolina (1896), and MacVicar Infirmary in Atlanta (1900).

The Freedmen’s Bureau policy eventually led to the establishment of segregated hospital facilities in cities and towns, especially in the South. Towards the end of the nineteenth

century black physicians and concerned whites began the development of black hospitals and medical schools. Due to segregation black hospitals could provide black medical professionals a place to treat patients and a professional gathering place to improve their skills. African-American communities hoped that the hospitals could improve the poor health status of the black community. For black patients, they were welcome alternatives to being treated in neglected corners of segregated hospitals. By 1900 there were about forty black hospitals around the country, located in virtually every Southern state as well as in several Northern cities (McBride 1989). Among these were the Tuskegee Institute's Nurse Training School in Alabama (1892), Provident Hospital in Baltimore (1894), and the Frederick Douglass Memorial Hospital in Philadelphia (1895). This number, however, was far from adequate. In the state of Mississippi, for example, there were only 65 dedicated hospital beds and 69 physicians to service a black population of approximately one million.

The number of deaths among blacks in 1925 was one and a half times what it was for whites. Cases of needless suffering and wrongful death from lack of hospital care engendered the belief among black physicians, immediately upon their graduating from medical schools in the late 1800s, that hospitals were critically needed. Hospitals were crucial not only for the health of black Americans but also for the advancement of black physicians in the medical profession. Through the efforts of black physicians and civic-minded African Americans, some 40 black hospitals were established by 1900 in the United States, and by 1923 there were about 200, a number which only began to fill the need. The number of black hospitals continued to grow over time, such that, by the 1950s and early 1960s, 370 facilities were available.

Racial integration can be initially dated from 1964 when federally mandated policies began to take effect. These events involved all three branches of government in turn: judicial, legislative, and executive. The 1963 decision *Simkins v. Moses H. Cone Memorial Hospital*

held that the Hill-Burton Act's¹ separate-but-equal stance was not constitutional. Of the events that led to the mandated desegregation, two stand out as central. The passage of Title VI of the Civil Rights Act in July 1964 prohibited discrimination and segregation in any institution receiving federal funds. Second, hospital eligibility for payments under the new Medicare program (begun on July 1, 1966) was conditioned on the elimination of the racially discriminatory practices that were common at the time. Together, the Civil Rights Act and the financial leverage exercised by the Johnson administration led to the opening of previously "white-only" hospitals to blacks and the end of explicit racial segregation in health care. These policies are thought to have improved black access to hospital services, with attendant effects on health status.

The Civil Rights Movement, ironically, had the effect of decreasing the number of black hospitals. Since 1965 the need for black hospitals has decreased, because black patients and black physicians have gained access to white-run hospitals, and many black hospitals have closed. Before integration black patients and medical staff could not use segregated facilities open to whites. Integration gave black patients access to white institutions which diminished the use of black hospitals by black physicians, leading to their closure. The impact of integration was dramatic; by 1984, only 32 facilities of these facilities remained open. By 1990 the number of black hospitals in the United States had decreased to eight.

Prior to integration black motorists in the South faced a higher fatality risk than white motorists because there were far fewer hospitals willing to treat black accident victims. Since certain life-saving treatments for motor vehicle accidents such as surgery and blood transfusion were only available at hospitals, segregation often led to tragic and fatal consequences. The

¹ The Hospital Survey and Construction Act, also known as the Hill-Burton Act 1946 was a federal law designed to provide federal grants and guaranteed loans to improve the physical plant of the nation's hospital system. The law invoked the principle of "separate but equal" with regard to access of different races to hospitals built using Hill-Burton funds.

Southern Conference Education Fund (Mound 1952) compiled a twenty year account of incidents from testimony and media reports in which whites-only hospitals refused to provide adequate emergency care or provided no care at all to black accident victims. In 1927, for example, a young man named George Moore was in an automobile accident in Alabama and sustained a critical fracture of his third cervical vertebra with a compressed spinal cord. His father, a black physician, observed that his son “was absolutely refused admittance to any hospital available in that territory on the ground that there were no hospital facilities for Colored patients, regardless of the severity of the disability.” The boy died the following day from pneumonia, the result of rough handling while being moved from place to place in search of emergency medical care.

Similarly, in 1931, Juliette Derricotte, the dean of women at Fisk University in Nashville, Tennessee, died shortly after an automobile accident because she was unable to obtain medical care in a hospital. Instead she was given summary treatment at a white physician’s office and then moved to the home of an untrained black woman, where black patients were sent because the local hospital would not admit them. Derricotte died several hours later after being rushed to a hospital that had a black ward 50 miles away in Chattanooga.

Perhaps the most poignant measure of the difficulties posed by the lack of hospital care for black people was the 1931 fatal case of George White, whose son Walter was an administrator at the National Association for the Advancement of Colored People (NAACP). The fair-skinned black man was admitted as a patient in the white ward of an Atlanta hospital after being run over by a car. But he was quickly removed from the examination table and taken through a blinding rainstorm to the black ward across the street after the arrival of his daughter’s dark-skinned husband alerted the staff to the fact that George White was not white.

The anecdotes – and there are many more – provide a prima facie case that segregation increased the black fatality rate from motor vehicle accidents. However, to go beyond the anecdotal evidence, it is necessary to link integration econometrically to the racial difference in fatalities

Regional trends in motor vehicle accident mortality

To our knowledge, there has been virtually no systematic research on long-run trends in the black-white mortality rate from motor vehicle accidents. Consequently, evidence on the specific factors underlying significant changes in black-white motor vehicle death outcomes is sparse and often anecdotal.

To undertake our study we use a variety of data sources.² In particular, we use micro-data from US Vital Statistics (USVS) and from annual surveys of hospitals conducted by the American Medical Association (AMA). The USVS data provide race-specific information on motor vehicle fatalities. The AMA surveys provide exceptionally rich information on the types of medical services provided at the hospital level, as well as exact street addresses of facilities. Prior to integration it is possible to identify “blacks-only” facilities in these data; thereby allowing us to study how integration changed black access to hospital care (see the appendix for more details). An important limitation of the data is that we do not have race specific data on the occurrence of an accident; thus we cannot express the fatality outcomes conditional on an accident occurring but rather must express them per person (see below).

Figures 1 and 2 show, respectively, race-specific and the racial-difference in motor vehicle deaths, expressed per 100,000 people. Motor vehicle fatality rates increased gradually

² The Fatality Analysis Reporting System (FARS) which provides a full county of fatal traffic accidents is not used in this paper because the system was not operational until 1975.

from 1950 to the middle of the 1970s. It is noticeable that blacks in general had fewer fatalities than whites, which is not surprising since blacks owned (and drove) fewer automobiles than whites. However, it is also noticeable that, after 1965, the black rate increased, especially in the South.

Table 4 provides more detailed information about motor vehicle accidents mortality rate by race and region. In general rural areas had higher mortality than urban areas, a pattern that is present for both races and all regions. The rural-urban disparity likely reflects a higher incidence of mortality conditional on the occurrence of an accident in part because rural areas had fewer health care facilities, especially for blacks.

The data also reveal an upward trend in black fatalities. From the early 1960s to the mid-1970s the economic status of African-Americans improved relative to whites. This increase in relative status was mostly confined to the South, where it was a consequence of Civil Rights legislation (see Donohue and Heckman 1991). As a result of the increase in relative incomes African-Americans purchased more cars and (presumably) drove them more often, so much so that, in the rural South, the racial gap in car ownership fell over the 1960s, as shown in Table 5. As a result, the black “population at risk” of experiencing a motor vehicle accident (drivers and of passengers) increased relative to whites.

Because of the strong race-specific trend in automobile ownership, a conventional state-level difference-in-difference analysis does not reveal the impact of hospital integration. To show this we examine the association of hospital integration around 1965 and mortality of motor vehicle death rate across states by black, white and black-white separately in south and non-south region from 1959 to 1980. Table 1 presents the results from the following regression equations:

$$Y_{st} = \alpha t + \beta * 1(t > 1965) + \delta s + \epsilon$$

Here s and t index state and year, the explanatory variables are a time trend, t , and an indicator variable equal to one if the year is after 1965. The coefficient of interest is β , as it measures whether mortality decreased after 1965, which is the year that hospital integration began. Table 1 shows the same result as Figure 1 and 2 tells us: after 1965, blacks' motor vehicle death rates increased faster than whites both in South and non-south. This problem arises fundamentally because, as noted earlier, we do not have race-specific data on the occurrence of an accident. Including state-level data on race-specific car ownership does not alter this substantive finding.

The Impact of Hospital Integration in Mississippi

In this section we focus on Mississippi, the southern state that had the most rigid segregation policy and the most serious shortage of black hospital care. In particular, Mississippi lagged behind other Southern states in desegregating its hospitals in response to Medicare. As of June 23, 1966, only 20 percent of Mississippi's hospitals had been found to be in compliance with Title VI (Smith 1999:140). Less than half of its hospitals received Medicare certification by February 1967, with 64 percent certified by February 1968, and 71 and 78 percent receiving certification by October 1968 and October 1969, respectively (computed from data in *American Hospital Association Guide* issues).

In comparison with other southern states at the time whites in Mississippi had higher motor vehicle fatality rates while blacks had somewhat lower rates (see table 4c). The higher white rates can partly be attributed to greater mortality in metro counties whereas a likely explanation of the lower than average mortality among blacks is lower than average car ownership. That

said, Mississippi blacks increased their rate of car ownership at a faster pace in the 1960s than in other southern states, causing the population at risk of an accident to rise more rapidly as well (see Table 5).

We link several sources to construct a database for Mississippi's counties. From USVS we have motor vehicle deaths by race, by county, from 1959 to 1972. Data on each Mississippi hospital, including dates of certification for Medicare, come from the annual issues of the *American Hospital Association Guide*. Medicare certification status was taken from the approval code section which indicates "Certified for participation in the Health Insurance for the Aged (Medicare) Program by the Department of Health, Education, and Welfare." The Appendix provides more details on each data source.

Traditional indicators of access include distance to the nearest facility, presence of services, and density of services in a given administrative area. In this study, we used the simplest one: the distance to the nearest hospital to measure the accessibility for each race group in a specific county. To construct the "minimum distance to hospital" variable, we first map the hospital's geographic coordinates. AMA survey data provides the names of all medical facilities as well as street addresses, zip codes, and the year the hospital was integrated. With this information, each facility was then marked on boundary maps defined by ZIP Code Tabulation Areas from the US Census Bureau Geography³. Using GIS map projection, we were able to geocode each facility by recording its coordinates on the map.

The second step was to calculate the geographic distance from the centroid of the hospital zip code to the centroid of each county. For accuracy and simplicity, we adopt the "spherical

³ A ZCTA is a statistical geographic entity that approximates the delivery area for a U.S. Postal Service five-digit or three-digit ZIP Code. According to US Census Bureau, there exist some inconsistency between U.S. Postal Service Zip codes and ZCTA. This is because individual U.S. Postal Service ZIP Codes can cross state, place, county, census tract, block group and census block boundaries.

law of cosines”⁴ to calculate the distance between two sets of the latitude and longitude coordinates⁵. We then calculate the distance between each county to each hospital within Mississippi from 1959 to 1971. In the last step, we pick the minimum distance for each county. As noted above, prior to integration black patients received services in blacks-only facilities or in separate wards of white hospitals. Here we assumed that unless there is a black hospital or a white hospital that was known to have been integrated, blacks would have to travel out of county to obtain services. In short, except in rare circumstances, blacks are assumed to only have access to black hospitals prior to integration.⁶ This understates black access but not by much, to the best of our knowledge.

In order to visualize and compare spatially across each county, we linked geocoded data on mortality and medical services to a GIS that also included digital maps on the administrative division of Mississippi (see map 1). In this map, we overlaid each county’s motor vehicle accident mortality rate and the number of hospitals available layered by race and by year. From this map it can be seen that most of the black hospitals were located in northwest Mississippi. Before hospital integration, a black might have to travel as much as a hundred miles in order to receive hospital treatment for a motor vehicle accident. After integration, the distance fell significantly (see figure 4). On average, the change in minimum distance was slightly more than forty miles – that is, the average distance for blacks in Mississippi reduced from around fifty miles to less than ten miles. Note, as well, that the distribution of “high incident” counties (those with high mortality) was distributed more evenly after integration than before; this is consistent with distance to the nearest hospital being an important factor in determining whether an accident victim lived or died.

⁴ Spherical law of cosines: $d = \text{acos}(\sin(\text{lat}_1) \cdot \sin(\text{lat}_2) + \cos(\text{lat}_1) \cdot \cos(\text{lat}_2) \cdot \cos(\text{long}_2 - \text{long}_1)) \cdot R$

⁵ We thank Eric Nelson for sharing MATLAB code.

⁶ For a list of black hospitals, see appendix.

Table 6 gives a more general description of the change of motor vehicle accidents mortality rate among different groups of counties by race before and after integration. We categorize 82 counties in Mississippi into four groups by their initial distance to the nearest black hospital in 1959. The first group includes 20 counties (e.g. Adams, Bolivar) which have an average distance of 30 miles to black hospitals for blacks whereas group #4 has the longest distance. Before integration, white mortality rates are distributed more evenly across these groups of counties (range from 34 to 36.8 per 100,000 populations) in years 1959-1961. However, for blacks mortality clearly varies by group. The first group of counties had the lowest level of motor vehicle mortality rate for blacks --- 16.4 death per 100,000 people whereas group #4 has the highest mortality rate for blacks (41.6), almost two and half times the first group.

After hospital integration, as the average distance to hospitals was reduced dramatically across Mississippi for blacks we also see a change of mortality distribution in years 1968-1970. First of all both groups experienced an increase in motor vehicle mortality rates due to increased car ownership and more driving. However, note that the mortality rate of both blacks and whites are distributed more evenly than before integration, which is consistent with an “integration” effect – that is, holding the population at risk constant, the likelihood of a fatality declined for blacks because distance to the nearest hospital fell.

We can formalize the insights from the mapping by using regression analysis. We examine the association of access to hospital (distance to nearest hospital) and mortality of motor vehicle death rate across counties separately by race. Table 2 presents the results from the following regression equations:

$$(1a) y_{ct} = \gamma_t + \beta \cdot mindistance_{ct} + \alpha_c + \varepsilon_{ct}, \text{ and}$$

$$(1b) y_{ct} = \gamma_t + \beta \cdot mindistance_{ct} + \alpha_c + mindistance_{ct} \cdot integrate_{ct} + \varepsilon_{ct}$$

Here, c and t index county and year; the coefficient of interest is β , as it measures whether mortality increased with distance to the nearest hospital. The year fixed effects capture factors that influenced year to year variation in accident risk, such as the number of miles driven, law enforcement behavior, and changes in automobile safety and design. The county fixed effects capture time-invariant factors such as the general quality and quantity of roads, weather, traffic density, and so on. The term ε is an error that is allowed to be heteroskedastic. Equation (1b) adds one interaction term to test whether there is quality improvement after the hospital is integrated in that county.

Table 2 presents the regression results for motor vehicle mortality rates in the two sets of columns. Within each set of columns, results for black and white mortality rates explained by nearest distance are shown. Only in the column (1a), the variable of interest is significant. For regression on whites, lack of variation on key variables may explain the insignificant result. Also separate estimation of county fixed effect on black might absorb some effect of distance to hospital on mortality rate. Still the positive value of this variable shows that the longer a black has to travel to a hospital the higher was the mortality rate.

We then pooled the black and white observations together to make sure they face the similar year fixed effect and county fixed effect, using data from 1959 to 1972. Table 3 presents the results from the following regression equations:

$$(2a) y_{crt} = \lambda \cdot mindistance_{crt} + \beta \cdot Black_{crt} + \gamma_t + \alpha_c + \varepsilon_{crt}, \text{ and}$$

$$(2b) y_{crt} = \lambda \cdot mindistance_{crt} + \beta \cdot Black_{crt} + (t-1959) + Black_{crt} \cdot (t-1959) + \gamma_t + \alpha_c + \varepsilon_{crt}, \text{ and}$$

$$(2c) y_{crt} = \lambda \cdot mindistance_{crt} + \beta \cdot Black_{crt} + (t-1959) + Black_{crt} \cdot (t-1959) + \gamma_t + \alpha_c + \gamma_t \cdot \alpha_c + \varepsilon_{crt}, \text{ and}$$

$$(2d) y_{crt} = \lambda \cdot mindistance_{crt} + \beta \cdot Black_{crt} + (t-1959) + Black_{crt} \cdot (t-1959) + \theta \cdot Black_{crt} \cdot mindistance_{crt} + \gamma_t + \alpha_c + \gamma_t \cdot \alpha_c + \varepsilon_{crt},$$

The dependent variable now is motor vehicle mortality rate by race r , year t and county c . In some specifications we include black and county specific time trends or black times distance. Results are shown in Table 3. The coefficient for the distance to nearest hospital become stronger and remains significant in most of the regressions. Note that the interaction between black and time has a positive coefficient, consistent with an increase in the size of the population at risk due to increased driving. We find little evidence of a racial difference in the distance coefficient. We need to keep in mind, however, that because of data limitations the denominator for motor vehicle mortality is county population not the injury data from motor vehicle accidents. This could make the standard error potentially much larger than the true value. Also the distance to nearest hospital is measured at the county level instead of the level of the individual; again, such kind of simplification could easily underestimate the true effect of distance.

How large was the mortality reduction caused by mandated integration? Answering this question definitively requires additional assumptions, but a simple calculation could shed some light on the effect of hospital desegregation.

The estimates in column (4) of Table 3 indicate that for every mile closer to a hospital the motor vehicle mortality rate was reduced 0.1 per 100,000. The average distance reduction for blacks for each county is around fifty miles, so approximately five black lives (per 100,000) could be saved for each county-year after integration. In the early 1970s the black motor vehicle fatality rate in Mississippi was approximately 38 per 100,000; my calculation suggests that, in the absence of integration, the rate would have been 43/100,000, a difference of about 12 percent.

Concluding Remarks

In Mississippi in the early 1960s a black motorist seeking medical attention after a car accident might have to travel 50-60 miles to get to a hospital. Detailed county level data on the location of accidents and hospitals indicate that the mortality rate from motor vehicle accidents was increasing in the distance to the nearest hospital. Racial integration substantially lowered the distance to the nearest hospital for black motorists. Although the actual quality of care blacks received in these integrated hospitals is uncertain and is a subject for future research, the econometric analysis suggests that the reduction in distance alone reduced the motor vehicle mortality rate.

The results of this paper show that, prior to hospital integration, blacks faced a higher likelihood of death after an accident than whites because, on average, blacks had to travel much longer to get to a hospital that would accept them. The findings also suggest that racial differences in other time-sensitive health crises, such as heart attacks or strokes, may have also been narrowed by hospital integration. More generally, the findings of this paper add to the growing body of evidence that legislation arising from the Civil Rights Movement improved the standard of living of African-Americans in many ways, including health outcomes.

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Appendix

A. United States Vital Statistics Data

Beginning in 1959, mortality microdata are available that provide detailed information on the specific cause of death (in addition to the information reported in the *Vital Statistics of the United States* volumes). For the state-level and Mississippi county level data analysis, we use the same micro level data source from 1959 to 1972 (generally seven years before and after Civil Rights movement). There are two kinds of location of death: death by county of residence and death by county of occurrence. Our paper is interested in death by county of occurrence, and all the analysis is based on county of occurrence.

B. Cause of Death Codes

The coding system used to categorize causes of death changed in 1967 from the 7th Revision of the International Classification of Diseases (ICD-7) to the 8th Revision (ICD-8) in 1968. The National Center for Health Statistics published in 1993 a mapping of ICD Codes across successive revisions to the system for certain common causes of motor vehicle accident:

CAUSE OF DEATH	ICD-7 CODE (1958-1967)	ICD-8 CODE (1968-1978)
Motor vehicle accident	E810-E835	E810-E825

The National Center for Health Statistics (NCHS) publishes a mapping of ICD codes across revisions for certain common causes of death; and assesses its quality by computing “comparability ratios” to measure the degree to which groupings changed between Revisions. Deaths in 1966 were coded according to both systems; and the comparability ratio was calculated as the ratio of the number of deaths due to a given cause in ICD-8 to their number in ICD-7. For both “motor vehicle accident” the comparability ratio was 1.00.

C. List of black hospitals

From the book “Public Policy and the Black Hospital” there is a comprehensive list of black hospitals in the United States. Black hospitals in Mississippi are listed as follows with name and city:

Dumas Infirmary	Natchez
Afro American Sons and Daughters Hospitals	Yazoo City
Colored Hospital	Lexington
Dr. Miller’s Hospital	Yazoo City
King’s Daughter Hospital	Greenville
Mound Bayou Community Hospital	Mound Bayou
Taborian Hospital	Mound Bayou
Plantation Hospital	Scott
Rosedale Colored Hospital	Rosedale
Yazoo Clinic Hospital	Yazoo City
Greenwood Colored Hospital	Greenwood

Figure 1: Black-white differences in motor vehicle accident mortality rate (per 100,000) 1959-1980

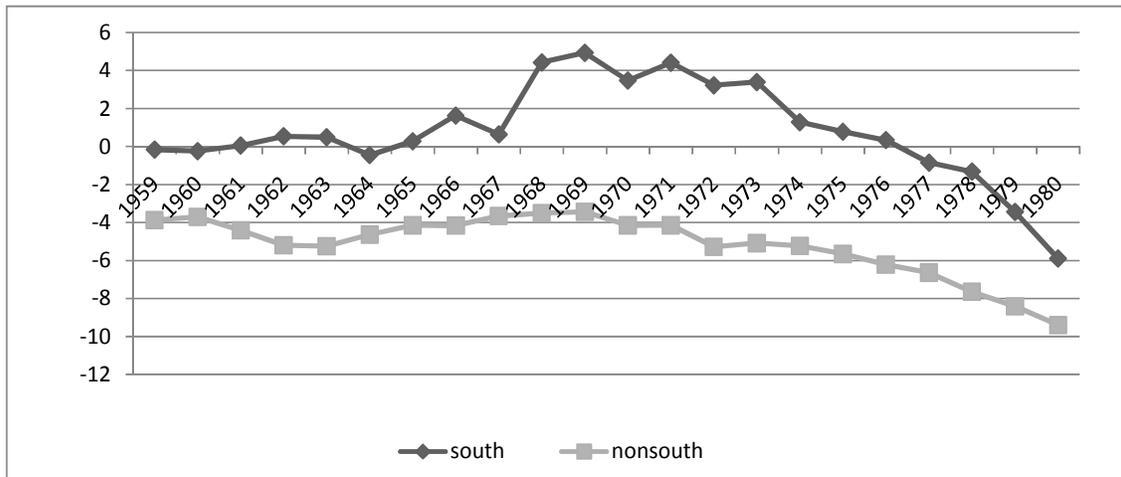


Figure 2: Black and white motor vehicle accident mortality rate by region (per 100,000) 1959-1980

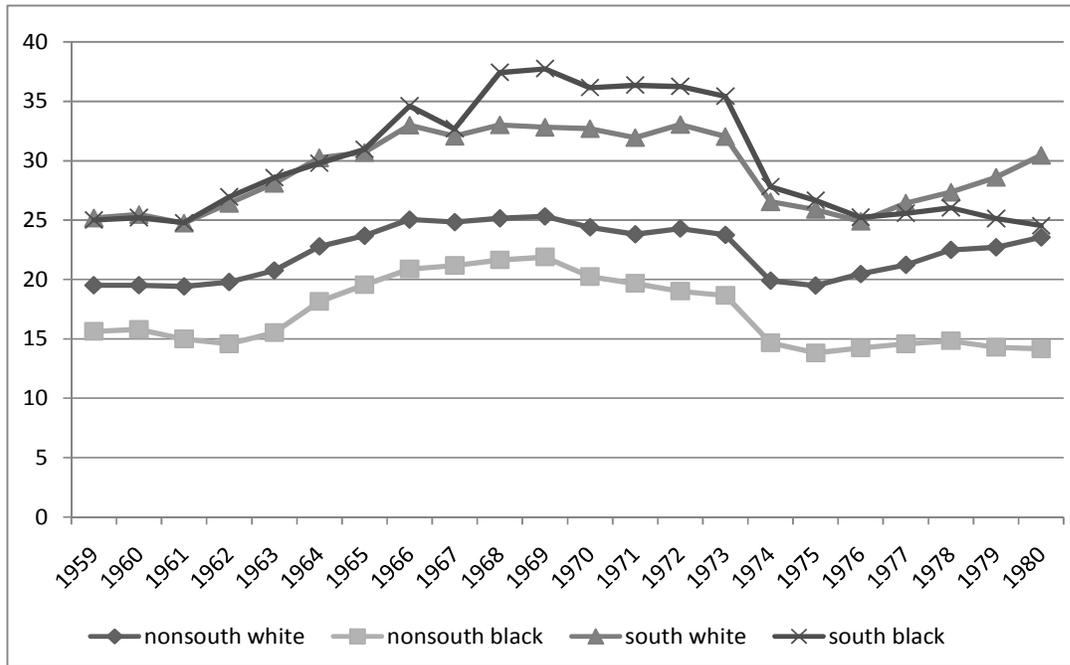


Figure 3: Black and white motor vehicle accident mortality rate in Mississippi 1959-1978

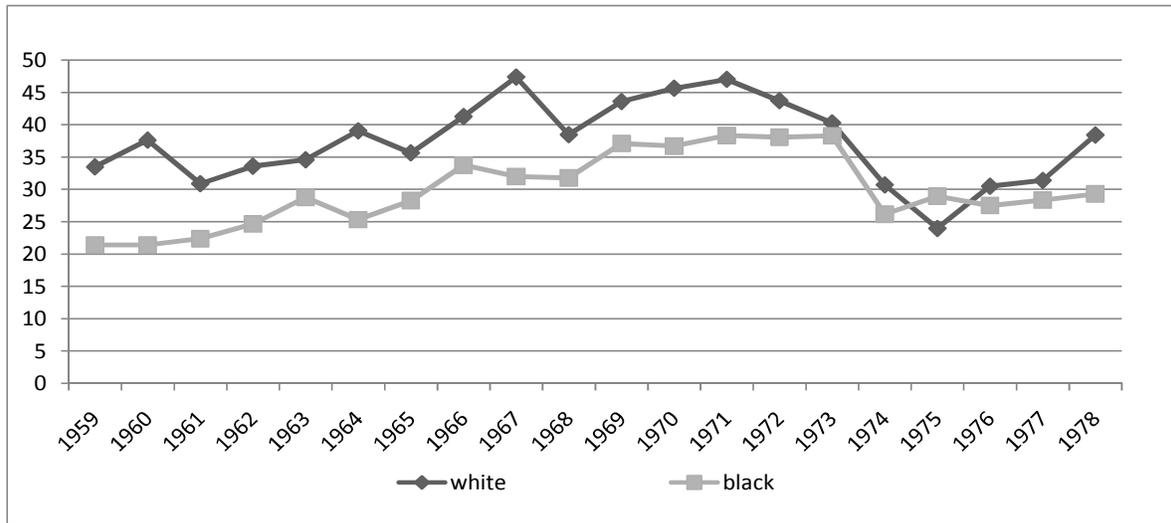
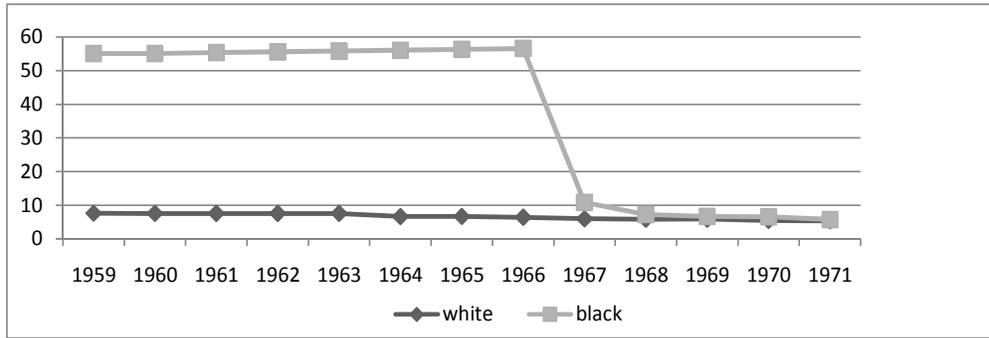


Figure 4: Trend of minimal distance to hospital (miles) by race in 1959-1971 in Mississippi



Map 1: the distribution of integrated hospital, black hospital and motor vehicle mortality rate in Mississippi

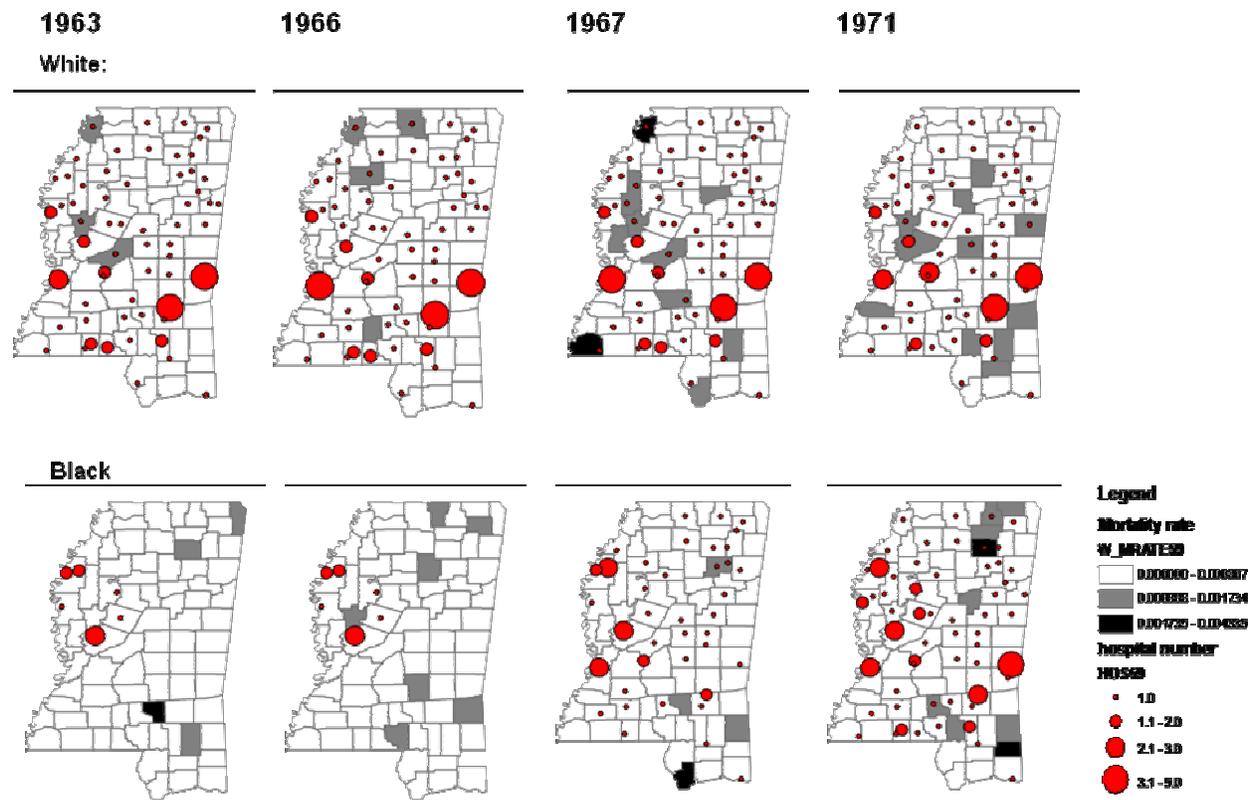


Table 1: Trends in black and white motor vehicle death rate by region, 1959-1980

	Black	White	Black-white
South			
1959-1980 trend	-.0009***	-.0004***	-.0004***
Post 1965 trend break	.0116 ***	.0074***	.0040***
Constant	1.8048	.9296	.8714
Observation	352	352	352
R-squared	0.2951	0.6589	0.2916
Non-south			
1959-1980 trend	-.0006***	-.0002***	-.0003***
Post 1965 trend break	.0063***	.0041***	.0022***
Constant	1.3950	.4858	.9120
Observation	649	649	649
R-squared	0.7063	0.8418	0.6297

Table 2: Effect of nearest distance to hospital on motor vehicle accident mortality rate in Mississippi by race

	Black (1a)	Black (1b)	Black (1c)	White (2a)	White (2b)	White (2c)
Distance to nearest hospital	0.107** (0.05)	0.024 (0.059)	0.026 (0.06)	0.075 (0.124)	0.238 (0.193)	0.261 (0.191)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	Yes	Yes
Distance x After Integration	No	No	Yes	No	No	Yes

Table3: Effect of nearest distance to hospital on motor vehicle accident mortality rate in Mississippi

Distance to nearest hospital	0.072* (0.042) (a)	0.058 (0.041) (b)	0.088*** (0.039) (c)	0.1003** (0.0342) (d)	0.1007 (.1521)
Black = 1	-13.442 (2.1231)***	-12.537 (2.28)***	-22.122 (4.8682)***	-23.6861 (4.6375)***	-23.67*** (4.6948)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	Yes	Yes
Year-1959	No	No	-1.1596* (.7083)	.4350 (.9249)	.4351 (.9221)
Black x (year-1959)	No	No	1.2799*** (.5876)	1.4116*** (.5667)	1.4113*** (.5503)
Year x county	No	No	No	yes	Yes
Black*Distance	No	No	No	No	-.0004 (.1580)
Number of observation	2132	2132	2132	2132	2132
R-squared	0.0452	0.1196	0.1221	0.6172	0.6196

*estimated standard errors are in parentheses and are corrected for heteroskedasticity

Table 4: Summary Statistics from the Vital Statistics of the United States, by region

A. South

	Nonwhite			White		
	1959-1961	1963-1965	1968-1970	1959-1961	1963-1965	1968-1970
	(1)	(2)	(3)	(4)	(5)	(6)
Number of motor vehicle death	2702	3305	4283	10918	13680	16310
Percent in non-metro	59.9	59.8	56.3	59.9	58.7	57.2
Motor vehicle mortality based on population (per 100,000)	24.73	30.52	39.01	26.57	31.97	36.15
<u>Non-Metro Counties</u>						
Motor vehicle mortality based on population (per 100,000)	28.85	36.77	47.62	31.8	39.1	45.4
Motor vehicle mortality based on decedent (per 1000)	24.30	28.73	36.94	32.63	36.16	38.82
Number of motor vehicle death	1621	1979	2414	6545	8034	9336
<u>Metro Counties</u>						
Motor vehicle mortality based on population (per 100,000)	18.58	21.22	27.92	18.76	21.85	23.79
Motor vehicle mortality based on decedent (per 1000)	19.23	22.18	28.26	26.09	29.98	31.45
Number of motor vehicle death	1081	1326	1869	4373	5646	6952

B. North

	Nonwhite			White		
	1959-1961	1963-1965	1968-1970	1959-1961	1963-1965	1968-1970
	(1)	(2)	(3)	(4)	(5)	(6)
Number of motor vehicle death	905	1238	1723	15755	18814	22143
Percent in non-metro	15.9	12.8	10.1	45.8	45.6	43.5
Motor vehicle mortality based on population (per 100,000)	21.13	18.09	20.92	20.82	24.29	26.96
<u>Non-Metro Counties</u>						
Motor vehicle mortality based on population (per 100,000)	34.57	36.89	38.41	30.2	35.4	39.2
Motor vehicle mortality based on decedent	28.34	30.56	32.95	23.97	27.52	30.64
Number of motor vehicle death	144	160	176	7229	8589	9671
<u>Metro Counties</u>						
Motor vehicle mortality based on population (per 100,000)	12.73	15.34	18.96	12.90	15.01	17.58
Motor vehicle mortality based on decedent	13.59	16.64	20.02	14.3	16.86	19.35
Number of motor vehicle death	784	1077	1546	8525	10225	12452

C. Mississippi

	Nonwhite			White		
	1959-1961	1963-1965	1968-	1959-1961	1963-1965	1968-1970
	(1)	(2)	(3)	(4)	(5)	(6)
			1970			
Number of motor vehicle death	197	240	291	423	479	591
Percent in non-metro	89.2	89.1	83.1	84.7	83.8	81.9
Motor vehicle mortality based on population (per 100,000)	21.21	27.12	35.22	31.56	36.30	42.66
<u>Non-Metro Counties</u>						
Motor vehicle mortality based on decedent (per 1000)	18.85	22.38	27.31	36.00	36.76	40.99
Number of motor vehicle death	176	214	241	357	401	483
<u>Metro Counties</u>						
Motor vehicle mortality based on decedent (per 1000)	26.75	29.21	49.6	65.5	70.4	67.73
Number of motor vehicle death	21	26	49	65	77	106

Notes: Data come from electronic micro data of the *Vital Statistics of the United States*. The number of death took a three year average.

Table 5: Car ownership by race and region in year 1960 and 1970

	North		South		Mississippi	
	1960	1970	1960	1970	1960	1970
Percent of Motor vehicle						
Whites					86.1%	92.4%
In Metro area	77.7%	87.9%	86.9%	93.5%		
In Non-metro area	90.7%	92.8%	86.2%	91.6%		
Percent of Motor vehicle						
Blacks					43.3%	61.5%
In Metro area	47.7%	55.7%	50.0%	64.3%		
In Non-metro area	68.9%	74.1%	51.7%	64.4%		

Notes: From IPUMS 1960 1% population sample, IPUMS 1970 1%; North region is census region northeast and Midwest; South region is census region. In 1960 census data Mississippi do not have classification on metro or non metro status.

Table 6: Black and White motor vehicle mortality in Mississippi by the initial distance to black hospitals in 1959

	First group of counties	Second group of counties	Third group of counties	Forth group of counties
	(1)	(2)	(3)	(4)
1959-1961				
Whites	36.8	31.4	34.9	34.0
Blacks	16.4	18.7	23.6	41.6
1968-1970				
Whites	51.4	41.2	40.6	41.0
Blacks	31.9	35.9	35.6	41.2
Average distance to hospitals for black (miles)	31.2	84.0	139.0	209.5

Notes: group of counties have nearest distance to black hospitals in 1959: Adams, Attala, Bolivar, Carroll, Coahoma, Franklin, Grenada, Holmes, Humphreys, Issaquena, Jefferson, Leflore, Madison, Montgomery, Sharkey, Sunflower, Tallahatchie, Washington, Wilkinson and Yazoo; second group of counties closer to black hospitals: Amite, Calhoun, Choctaw, Claiborne, Copiah, Hinds, Lafayette, Leake, Lincoln, Neshoba, Panola, Pike, Quitman, Rankin, Scott, Tate, Tunica, Warren, Webster, Winston, Yalobusha; third group that are far away from black hospitals: Chickasaw, Clay, Covington, De Soto, Jasper, Jefferson Davis, Kemper, Lauderdale, Lawrence, Lowndes, Marion, Marshall, Monroe, Newton, Noxubee, Oktibbeha, Pontotoc, Simpson, Smith, Union, Walthall; forth group that are farthest from black hospitals in 1959: Alcorn, Benton, Clarke, Forrest, George, Greene, Hancock, Harrison, Itawamba, Jackson, Jones, Lamar, Lee, Pearl River, Perry, Prentiss, Stone, Tippah, Tishomingo, Wayne.