SEGREGATED SPACES, RISKY PLACES:

The Effects of Racial Segregation on Health Inequalities

JOINT CENTER
FOR
POLITICAL
AND ECONOMIC
STUDIES

SEPTEMBER 2011

SEGREGATED SPACES, RISKY PLACES:

The Effects of Racial Segregation on Health Inequalities

THOMAS A. LAVEIST
DARRELL GASKIN
ANTONIO J. TRUJILLO

FOREWORD

Place matters for health. Research by the Joint Center and others has consistently shown that neighborhood characteristics, often referred to as social determinants of health, such as the quality of schools, access to quality health care and nutritious foods, and exposure to environmental hazards, have a significant impact on how long one lives. Residents of neighborhoods that have poor and under-funded schools, limited access to quality health care and nutritious foods, and high levels of exposure to environmental hazards will, on average, live substantially shorter lives than residents of neighborhoods that don't suffer from these characteristics.

This research report highlights the effects of place on health and health inequities. It outlines the existing evidence of residential segregation's effect on health, and it extends upon existing literature by examining the relationship between segregation and health inequities using the latest federal Census and health data. What the report finds is striking. Using infant mortality as a measure of population health, the authors find that although residential segregation is decreasing, the relationship between segregation and infant mortality disparities appears to have intensified in recent years.

Government at all levels can improve health opportunities by stimulating public and private investment to help make all communities healthier. We can do so by creating incentives to improve neighborhood food options, by aggressively addressing environmental degradation, and by de-concentrating poverty from inner-cities and rural areas through smart housing and transportation policy. Many of these strategies are likely to save money, in addition to human lives. Recent research conducted at the request of the Joint Center by the authors of this report – Drs. Thomas LaVeist and Darrell Gaskin of the Johns Hopkins University – found significant economic consequences of health inequities, which underscores the importance of their elimination. This research found that between 2003 and 2006, 30.6% of direct medical costs faced by African Americans, Hispanics, and Asian Americans were excess costs due to health inequities. Eliminating these inequities would have reduced medical care expenditures by nearly $230 billion during this period. On top of this, more than a trillion additional dollars in indirect costs—such as lost wages and reduced productivity—were associated with health inequities. In total, between 2003 and 2006 the combined costs of health inequities and premature death in the United States were $1.24 trillion.

Given that by the year 2042, according to the U.S. Census Bureau, half of the people living in the United States will be people of color, it is imperative that we be prepared to address the health needs of an increasingly diverse population. It is highly unlikely that we will make significant strides toward eliminating health inequities without attending to their root cause – residential segregation.

Special thanks are due to the authors of this report, Drs. Thomas A. LaVeist, Darrell Gaskin, and Antonio J. Trujillo of the Center for Health Disparities Solutions at the Johns Hopkins Bloomberg School of Public Health. The Joint Center has benefited from a long and productive collaboration with Dr. LaVeist and his team as we work toward elevating the issue of health inequities and their root causes in the national discourse. We expect that our partnership with such outstanding scholars will continue. We also extent our deepest thanks to the W.K. Kellogg Foundation, whose generous support made this research possible.

Ralph B. Everett
President and CEO
Joint Center for Political and Economic Studies

EXECUTIVE SUMMARY

This report is based upon two studies with distinct sets of data analyses. Both studies are designed to test whether geographic location – or "*place*" -- plays a significant role in determining racial and ethnic health inequalities.

The first study updates previously published findings, which document the relationship between residential segregation and racial disparities in infant mortality rates across U.S. cities (LaVeist 1989, 1993). This study sought to determine whether a slight decline in residential segregation by race between 2000 and 2010 coincided with a corresponding reduction in racial health inequalities. Using a range of measures, respective levels of residential segregation between black and white residents as well as the levels between Hispanic and white residents were computed for U.S. cities with populations of 100,000 or more in 2000 and 2010. This first study finds that that segregation continues to play an important role in determining health inequalities. *Places* with high concentrations of black or Hispanic residents tend to be *places* characterized by limited opportunity and failing infrastructure, which results from a lack of investment in social and economic development. The results are communities and neighborhoods which produce bad health outcomes. So, racial health inequalities may result primarily from lack of ce exposure to communities that facilitate good health.

Major findings emerging from the first study are as follows:

1. *Between 2000 and 2010, residential segregation by race declined – but did not disappear -- with respect to African Americans and Hispanics. Racial segregation in housing, however, remains a persistent pattern in many communities nationwide*;

2. *Segregation continues to be a predictor of significant health disparities -- as measured by divergent rates of infant mortality – in comparisons between African Americans and whites and between Hispanics and whites*;

3. *Although residential segregation is decreasing, the relationship between segregation and infant mortality disparities appears to have intensified*; and

4. *Simulations of how varying levels of segregation affect racial gaps in rates of infant mortality disparity showed that complete black-white residential integration would result in at least two fewer black infant deaths (2.31) per 1000 live births. With full integration, Hispanics would have a lower rate of infant mortality rate than whites.*

The second study tested whether the correlation between segregation and health disparities varies more in accordance with the racial composition of neighborhoods or the concentration of neighborhood poverty. Data from the 2006 Medical Expenditure Panel Study (MEPS) along with zip code level data from the 2000 US Census (Summary File 1) were used to examine the relationships between segregation, concentrated poverty and racial and ethnic health inequalities. The study revealed that for certain health conditions, *place does matter*. When controlling for the variable of living in a high-poverty zip code, racial health disparities were diminished. In other words, living in a high poverty zip code is most likely to have negative effects on health status and outcomes. *Place matters* for minority communities not because they are predominantly black or Hispanic but rather due to higher rates of poverty. Even persons with middle and relatively higher incomes are at greater risk when more of their neighbors are poor.

This study tested whether racial and ethnic disparities in five selected health status measures were associated with the racial composition and poverty level of neighborhoods. The primary findings from the second study are as follows: *Place matters* and it makes a significant difference for 3 out of 5 common health indicators, including (a) general health, (b) mental health and (c) diabetes.

5. *Community-level poverty proved a more important determinant of health status than neighborhood racial composition. To the extent that neighborhood factors influence the health of residents in minority communities, concentrated poverty is the most damaging*; and

6. *After controlling for concentrated poverty, health status advantages for whites were diminished in comparison with blacks and Hispanics. Thus, to reduce or eliminate racial and ethnic health disparities, policy makers should address the problems associated with concentrated poverty*.

Racial and ethnic segregation has previously been documented as a predictor of health disparities. Segregated communities in the U.S. tend to be environments which produce poor health outcomes. The research literature documents that "*places*" which are racially segregated with high concentrations of blacks or Hispanics tend to be places with limited opportunities and failing infrastructure, resulting from a lack of investment in social and economic development. The result is a community that produces bad health outcomes. So, racial inequalities in health status and outcomes are predominantly the result of *place*. Race helps to determine *place*, and in turn, *place* influences health.

INTRODUCTION AND BACKGROUND

In 1817, Louis Villerme observed that residents of the 12th district of Paris had a 37 percent higher risk of premature death in comparison with the residents of the 1st district. He ascribed this difference to "good housing, food and sanitation, and freedom from excessively arduous work" [as quoted in Amick, et al. 1995]. In other words, *place matters*. Villerme's observation was as elegant in its simplicity as Isaac Newton's "discovery" of gravity much earlier, triggered by his careful observation of an apple falling from a tree. Clearly, Villerme lacked knowledge of the advanced research techniques and public health surveillance methods used today. Nevertheless, Villerme's discovery has stood the test of time, proving to be as universal, , and consequential as Newton's. (In 2011 another French research team reanalyzed his data using 21st century state-of-the-art research methods and verified Villerme's conclusions (Julia & Valleron 2011). After nearly two hundred years and countless systematic studies, we must conclude – as Villerme did – that when it comes to health, *place matters*.

Race, Place and Health Inequalities

In recent years, health professionals have focused increasing attention on racial health inequalities. Preliminary scholarly work on racial health disparities outlined the defining characteristics and dimensions of the issue. Such research proved invaluable in creating awareness of a problem that had been little-known outside of professional public health circles. Researchers have been searching for causes of race inequalities in health status. Noting obvious visual differences between race groups, a large body of research has been devoted to the concept that genetic differences between races are responsible for differences in health status and outcomes. Efforts to find genetic differences between racial groupings have proved of limited relevance at best in predicting health outcomes (Goodman 2000; Whitfield et al. 2003). Studies of health behavior have yielded some explanatory insights (Jackson et al. 2010). Yet even health behavioral explanations beg the fundamental question of: "Why are there racial disparities in health behavior and outcomes?"

Most recently, scholars have begun to examine research findings from disparate but related academic fields, ranging from demography and geography, to urban planning and the environmental sciences. A multidisciplinary framework is best-suited for investigating the complex set of social and environmental factors associated with the high rates of poor health and premature death among racial and ethnic minorities. The consensus is that racial disparities are largely the result of differences in the social and physical environments in which people of different races and ethnic groups typically reside. Social factors influence health behavior (Allamani et al. 2011; Lacaille et al. 2011; Brenner et al. 2011), such as access to preventive and primary health care (Gaskin et al. 2009). A growing consensus among researchers suggests that social factors may even influence genetic and biological variables via gene-environment interactions (Nugent et al. 2011; Zanobetti et al. 2011; Song et al. 2011).

In 1950, Al Yankauer – former editor of the *American Journal of Public Health* – observed that in New York City, comparative differences in infant mortality rates for whites and African Americans were greatest in the most segregated black neighborhoods. In other words, racially segregated *places* tended to be environments with higher levels of exposure to toxic and hazardous conditions (Yankauer 1950). In 1987, the United Church of Christ (UCC) Commission for Racial Justice released a groundbreaking report, entitled *Toxic Wastes and Race in the United States*. This report documented that race proved to be a powerful predictor of where toxic waste sites would be situated within or adjacent to communities across the country (Chavis & Lee 1987). The UCC report was followed by Robert Bullard's classic book,

Dumping in Dixie: Race, Class, and Environmental Quality, which provided a rigorous examination of the importance of race as a deciding factor in siting unwanted toxins-producing facilities. A 1989 study by Thomas LaVeist provided what may be the first systematic investigation empirically linking residential segregation to racial health disparities (LaVeist 1989; LaVeist 1993). The study demonstrated that American cities characterized by the highest degrees of residential segregation also exhibited the greatest gaps in black and white infant mortality rates. Since 1989, numerous replications using varying study designs, methods and health outcomes have definitively led to the consensus that racial segregation is a profoundly important determinant of health disparities (Williams & Collins, 2001). Racial segregation places people of different racial/ethnic groups in varying community environments, exposing some to higher levels of social and environmental health risks.

This report outlines the (1) current state of knowledge concerning segregation and health inequalities, (2) establishes a framework for understanding the interaction of *place*, segregation and health status, and (3) releases the findings from two new empirical studies on the correlations between residential segregation, *place* and health inequalities.

Why does *place* matter?

People who feel they have been victims of discrimination may be more inclined to segregate themselves voluntarily into ethnic enclaves. This was the case in the establishment of communities such as Eatonville, a Florida town incorporated in the late 1800s by newly emancipated slaves. Contemporary examples of the same phenomena can be observed in suburbs of large cities such as Baltimore, Washington, DC and Atlanta. In these cases, affluent African Americans who can afford to live nearly anywhere choose to reside in high-income, racially segregated communities. Although preliminary research remains limited, the health status of the residents of such voluntary enclaves may differ from that found in racially integrated or segregated white communities of similar socioeconomic status.

Even though a few select communities are now segregated by choice, most residential segregation is not voluntary. Throughout American history, well- documented laws and policies have fostered and enforced racial segregation, including practices of redlining, blockbusting, and racial covenants. These policy mechanisms were used with great success to prohibit home sales to African Americans and other minorities within certain communities, or to promote "white flight" of residents and capital to other communities. The consequences of racial segregation are clear and wide-ranging, from constrained black wealth creation (through depressed property values), the concentration of poverty concentration, and deterioration in the quality of community life, to low-performing educational systems and fewer employment opportunities (Massey & Denton 1993). Racial segregation can be viewed as a manifestation of racism or discrimination either by way of policy structures which create segregated communities or through informal processes whereby individuals elect to live in racially segregated communities to limit their exposure to discrimination (Williams & Collins 2001).

In recent years, the health consequences of segregation have become more evident. Racial segregation has been shown to affect health disparities by way of two primary pathways, namely: (1) exposure to health risks, and (2) access to resources.

Exposure to risk – Segregation results in racial health disparities due to the higher levels of industrial toxins and environmental hazards residents of predominantly minority communities are exposed to on a daily basis. Segregation thus creates race differences in the "health risk profiles" of communities in which African Americans and other minorities often live.

According to a 1983 report from the General Accounting Office (GAO), three out of every four hazardous waste landfills in the South at that time were located in predominantly African American communities. Four years later, the United Church of Christ (UCC) Commission on Racial Justice (Chavis & Lee 1987) was the first to shine a spotlight on the disproportionate location of toxic waste sites within or adjacent to minority communities. The UCC study found that nationwide, three out of every five African Americans and Hispanics nationwide lived in a community with an illegal or abandoned toxic dump.   Moreover, communities which had a hazardous waste facility within or adjacent to their borders had twice the percentage of ethnic minority residents than communities without any hazardous waste sites. The UCC report is widely regarded as the touchstone for the establishment of a movement to combat environmental racism. This movement continues to advance public policy and program reforms designed to bring environmental justice to minority communities.

A few years later, the National Research Council (NRC) took the UCC report findings to the next level, by investigating the adverse health consequences associated with greater exposure to industrial toxins and biological hazards found in minority communities. The NRC study documented the adverse health effects associated with living near a superfund site or other toxic waste dumps.   These sites contained billions of pounds of highly toxic chemicals, including mercury, dioxin, polychlorinated biphenyls, arsenic, lead and such heavy metals as chromium. The study found a corresponding pattern of the higher prevalence of such significant health problems as heart disease, spontaneous abortions, congenital malformations, leukemia, learning disabilities, hyperactivity, and Hodgin's disease (NRC 1991) in communities with or nearby toxic sites. A 1992 review of 15 studies examining the location of environment hazards found support for the United Church of Christ (UCC) commission study, and a later review of the available evidence concluded that "the overwhelming bulk of evidence supports the environmental justice belief that environmental hazards are inequitably distributed by class, and especially race" (Brown 1995).

More recent research has confirmed these early findings, signifying that little has changed (Mohai et al. 2009; Norton et al. 2007; Wing et al. 2008). A 2010 study by Crowder & Downey, for example, documented that profound racial and ethnic differences persists in community proximity to industrial pollution.   By examining migration patterns, the researchers found that blacks and Hispanics were more likely to move into neighborhoods with greater exposure to pollution hazards than their white counterparts with comparable income and education. Collins et al. (2010) concluded that "a system of white-Anglo privilege shapes the way in which race/ethnicity articulates with other dimensions of inequality to create unequal cancer risks from air toxics." And, Chakraborty & Zandbergen (2007) documented "a consistent pattern of racial inequity in the spatial distribution of all types of air pollution sources examined, with black children facing the highest relative levels of potential exposure at both school and home locations." Morello-Frosch & Jesdale (2006) refer to this body of research as documentation that minorities tend to live in a health "riskscape" that is facilitated by racial residential segregation. Their study of 309 metropolitan areas in the United States found that disparities in cancer rates were highest in more highly segregated communities.

Characteristics of the "built environment" (social characteristics of a community) may also create health risks. Studies have found that such risks were more pronounced in minority communities. For example, Luke et al. (2000) found that tobacco billboards were more likely to be found in low-income neighborhoods and those with a higher percentage of African American residents. Other studies have found similar results (Balbach et al. 2003; Hackbarth et al. 1995; Hackbarth et al. 2001; Pucci et al. 1998; Stoddard et al. 1997).

LaVeist & Wallace (2000) found that liquor stores in Baltimore City were eight times more likely to be located in low- income African American neighborhoods than others.   Lillie-Blanton et al. (1993) found that race differences in the utilization rates of crack cocaine were a function of easy access to the illegal drugs.   Among persons living in communities where crack cocaine was widely available, there were no racial differences in patterns of use. Rather, racial differences in the use of crack cocaine resulted from differences in residence: blacks were more likely to live in communities with easy access to the drug. This was an important discovery because prior to Lillie-Blanton's study, it was widely believed that blacks had an inherent predisposition to use crack cocaine.

Access to Resources – Not only does residential segregation expose people to differing levels of health risks, it also reduces access to the resources necessary to support healthy lifestyles. This reduced access is not limited to healthcare alone. For example, racial segregation has been linked to reduced access to social capital and constructive social networks (Small 2006; Small, Jacobs, and Massengill 2008). These researchers found that persons living in segregated communities were less likely to have access to important pro-social networks associated with such information vital to personal and family development as quality childcare resources and promising job opportunities. Compared to whites, minorities have less informal access to physicians and other health professionals because they are less likely to be in the same social networks. Fewer medical experts reside in predominantly black or Hispanic neighborhoods, particularly those that are low-income (Cornwell and Cornwell 2008; Wilson 1987). People in one's social network tend to influence the information used for decision-making a as well as preferences for healthcare service utilization and health behaviors. Studies report higher rates of perceived discrimination and lower levels of trust in medical providers among African Americans and Hispanics in comparison to whites.   Such negative perceptions have contributed to disparities in healthcare use (Burgess et al 2008; Casagrande et al 2007; Hausmann et al 2010; Johnson et al 2004; LaVeist et al 2000; LaVeist et al 2003). In general, the perceptions formed by the negative healthcare experiences of some African Americans and Hispanics may bias respective social networks against visits to health care providers and utilization of health care services.

Research literature in the U.S., UK and other countries has documented the existence of "food deserts," which are communities with limited access to nutrient-rich food and in some cases, no food access at all (Gordon et al. 2011; Larson et al. 2009). Research has shown that several vulnerable social groups are at greater risk of food insecurity. Those at risk include homeless persons (Holland, Kennedy & Hwang 2011; Cutts et al. 2011), children (Pilgram et al. 2011), low-income residents (Rose & Richards 2004), and racial and ethnic minorities (Powell et al. 2007). One study found that chain supermarkets were half as likely to be located in predominantly black neighborhoods in comparison with predominantly white neighborhoods. Moreover, Hispanic neighborhoods had only one-third as many chain supermarkets available as white neighborhoods.

A study which examined the association between segregation and the availability of vegetables and fruit within Brooklyn, Morland & Filomena (2007) found that a lower proportion of predominantly black neighborhood stores carried fresh produce, except for bananas, potatoes, okra and yucca.   The researchers revealed that: "A supermarket was located in approximately every third census tract in predominantly white areas (prevalence = 0.33) and every fourth census tract in racially mixed areas (prevalence = 0.27)." Moreover, no supermarkets were located in predominantly black residential areas. In contrast, supermarkets carried the largest variety of different types of produce. Although canned and frozen fruits and vegetables were found in the majority of stores, the sale of prepared and organic produce was limited to predominantly white neighborhood stores. Another study led by Morland (Morland and colleagues 2002) demonstrated an association between the location of food stores and food service places and the racial composition of the community. In this study,   supermarkets

were 2.9 times more likely to be located in racially integrated neighborhoods and 4.3 times more likely to be located in predominantly white neighborhoods in comparison with predominantly black neighborhoods. Full-service restaurants were 3.4 times more prevalent in integrated neighborhoods and 2.4 times more prevalent in predominately white neighborhoods (see Figure 1 below).

Figure 1. Density of supermarkets and full-service restaurants by neighborhood racial segregation category
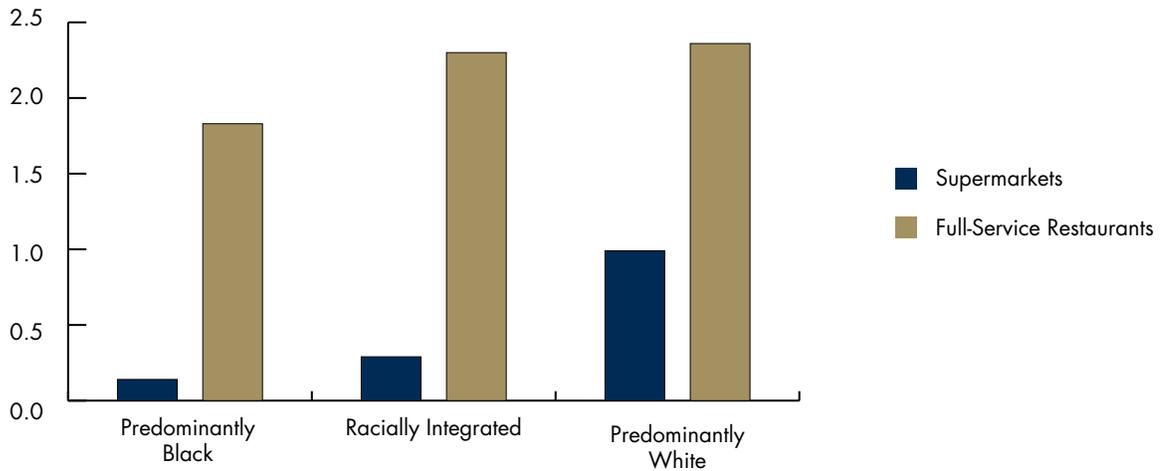
In addition to the "food deserts" likely to be found in segregated neighborhoods, historical factors in the health care industry and broader society have led to contemporary and continuing segregation in health care facilities. As a result, racial and ethnic minorities are more likely to receive care in under-performing hospitals, which deliver a lower-quality of care (Gaskin et al. 2008; Sarrazin, Campbell & Rosenthal 2009; Sarrazin, Campbell, Richardson & Rosenthal 2009). A study by Jha et al. (2008), for example, found that hospital care for Hispanic seniors was highly concentrated within a small number of facilities, nationwide. This study found that nearly half of all elderly Hispanics were cared for by only 5 percent of area hospitals. Moreover, hospitals with the highest proportion of elderly Hispanic patients were more likely to be for-profit institutions, with higher numbers of Medicaid patients as well as lower nurse-patient staffing ratios. Overall, these hospitals provided a lower quality- of-care for common medical complaints and conditions. Hispanics were also less likely to have access to diagnostic imaging services (Kim, Samson and Lu 2010).

At the same time, pharmacies in predominantly minority communities are less likely to have sufficient stocks of certain pain medications (Morrison et al. 2000; Cooper et al. 2009). Morrison conducted a survey of New York City pharmacies to determine whether the availability of pain medications (opiods) was associated with the racial/ethnic composition of the neighborhoods that respective pharmacies served. As illustrated in Figure 2, the study findings show that as the proportion of each minority group increased, the percentage of pharmacies with adequate supplies of pain medications decreased.

Figure 2. Adequacy of opioid supplies by race/ethnicity composition of the neighborhood
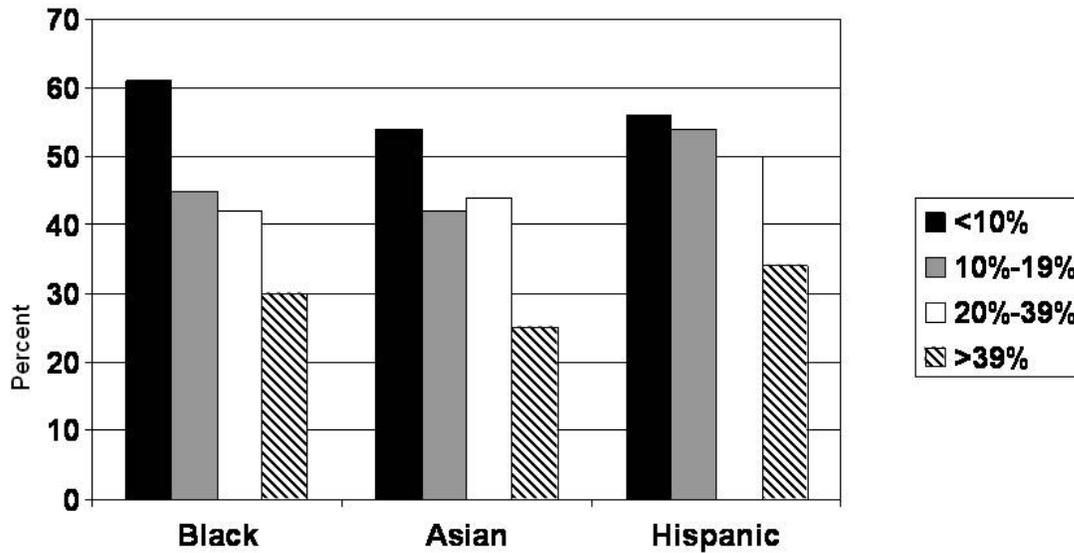
Before enactment of the historic 1964 Civil Rights Act, U.S. hospitals and other healthcare entities remained highly segregated by race. Such racial segregation had been mandated by an entrenched web of state and local laws. It was customary for black and white patients to receive care either in completely separate facilities or on separate floors within the same facility (Sarrazin, Campbell & Rosenthal 2009). Today, it is well documented that economically and socially disadvantaged communities have greater difficulty in attracting and recruiting qualified medical personnel (Auchincloss, Van Nostrand, & Ronsaville 2001; Guagliardo et al. 2004; Hayanga et al. 2009).

Gaskin et al. (2009) found that whenever African-Americans and whites are living in similar social circumstances with equal access to health care, African-Americans are more likely to use health services. This finding is inconsistent with certain national studies, which show lower levels of health service utilization by African-Americans. However, these national studies did not take segregation into account. A series of papers published by the same research group found that when African-Americans and whites live within the same community – with the same access to health promoting resources and reduced exposure to toxins and hazards – health disparities are greatly reduced or nonexistent (Bleich et al. 2010; LaVeist, et al. 2009; Thorpe et al. 2008).

REPORT SUMMARY

This report is based upon two studies undertaken using separate samples and methods of analysis. Both studies are designed to investigate the influence of "*place*" on health behaviors, outcomes and access to care. The first study updates previously published findings, which documented the correlation between racial segregation and disparities in infant mortality across U.S. cities (LaVeist 1989, 1993). This study examines whether the decline in residential segregation between 2000 and 2010 has lessened its impact on health. The first study sample includes all cities with a population of 100,000 or more in 2000 and 2010. In each city, the degree of residential segregation is measured between black and white residents as well as between Hispanic and white residents. The study results show that segregation continues to be an important determinant of health inequalities. In this study, places with high concentrations of blacks or Hispanics tended to be places with limited opportunities and flawed infrastructure, resulting from lack of investment in social and economic development. As a result, the more segregated the city, the higher the incidence of negative health outcomes. In other words, this study confirms that racial health inequalities result from differential access to communities characterized by the promotion of positive health behaviors, easy access to care and good outcomes.

The second study tested whether the relationship between segregation and health is influenced by the racial composition and concentration of poverty within specific neighborhoods. In this study, data from the 2006 Medical Expenditure Panel Study (MEPS) was analyzed alongside zip code level data from the 2000 US Census (Summary File 1) in order to examine the association between segregation, concentrated poverty and racial and ethnic health disparities. For certain health conditions, the study finds that *place does matter*. Racial health disparities are diminished when living in a high-poverty zip code is controlled for. In other words, living in a high-poverty zip code has a negative influence on one's health. This analysis suggests that *place matters* for minority communities not because they are predominantly black or Hispanic Hispanic but rather due to higher rates of poverty. Even persons with middle or relatively higher incomes in the study were at greater risk of negative health outcomes when more of their neighbors were poor.

STUDY 1- DESCRIPTION, ANALYSIS AND FINDINGS

In recent decades, there has been an upsurge in the ethnic diversification of the U.S. population. This population surge in diversity has been fueled by an ever-increasing Hispanic population via higher fertility rates and immigration.   Most prior studies on this topic have focused on black/white segregation and its effects on mortality rates (often rates of infant mortality). The release of 2010 census data presented an opportunity to assess the state of the relationship between residential segregation and infant mortality rates within a broader ethnic framework. More specifically, this study has two objectives. The first is to describe patterns of segregation in American cities between black and white residents and between Hispanic and white residents. The second objective is to conduct an analysis designed to update previous studies of the relationship between segregation and infant mortality rates across U.S. cities.

Methods – The sample population for this study included U. S. cities with respective populations of 100,000 or more persons in 2000 and 2010. Data on the cities was collected from the 2010 and 2000 Census, as well as vital statistics from other government sources.

Infant mortality rates are a well-established indicator of overall socioeconomic development, availability and utilization of health services, health status of women of childbearing age, and quality of the social and physical environment (Morris 1979). The infant mortality rate is calculated as the number of infant deaths occurring within the first 12 months of birth - per 1,000 live births in the city.   Infant mortality rates were calculated separately for Hispanic, white, and African Americans. To measure ethnic disparities in infant mortality rates, the researcher computed differences between black and white rates as well as those between Hispanic and white rates.

The index of dissimilarity – a common tool used in public health surveillance research – measures degrees of segregation. The index ranges from 0 to 100 and measures the extent to which Hispanics, blacks and whites are residentially segregated within a given city. The findings may be interpreted as the percentage of a particular ethnic group, which would have to relocate to a different census tract in order to achieve proportional   racial diversity, based upon city-wide demographics. For example,   in the case of a city with a black population of 12 percent and a dissimilarity score of 75, three-quarters or 75 percent of black residents would have to move to a different census track in order to achieve proportional integration. Conversely, 75 percent of whites in that city would have to relocate in order to ensure that in each census track, 12 percent of the residents were African American.

In this analysis of the relationship between segregation and infant mortality disparities, statistical adjustments are made for characteristics of the city known to be associated with infant mortality disparities. This includes racial and ethnic disparities in household income, high school graduation rates, per capita medical expenditures for the city, the city's general outstanding debt, crime rate, the size of the city's land area, and the region of the country in which the city is located. These variables are further described in the Appendix.

Patterns in segregation - Table 1 variables analyzed in this study are based upon census data from 2000 and 2010.   This table shows that in 2010, the average white infant mortality rate across the cities was 5.63 white infant deaths per 1000 live white births. The rate for blacks was 12.62 black infant deaths per 1000 live black births. The Hispanic rate was 6.48 infant deaths per 1000 live Hispanic births. Between 2000 and 2010, there was little change in infant mortality rates for blacks, whites, or Hispanics living in the cities in the sample. However, the black and white infant mortality rates increased slightly whereas Hispanic infant mortality rates decreased slightly. As a result of the increases in infant mortality rates

for non-Hispanics, the black-white disparity in infant death rates increased by some 12 percent.. In other words, given an American city of 100,000 persons in 2010, African Americans experienced more than six additional infant deaths on average than Hispanics or whites.

Table 1. Descriptive Statistics. (Cities pop > 100,000)

Variables	N	2000 Mean	SD	N	2010 Mean	SD
1. Dependent Variables						
a. Infant mortality, White	230	5.55	(1.46)	266	5.63	(1.11)
b. Infant mortality, Black	230	11.77	(4.48)	266	12.62	(3.56)
c. Infant mortality, Hispanic	230	6.89	(2.35)	266	6.48	(2.75)
d. Diff infant mortality Black-White	230	6.22	(4.16)	266	6.99	(3.03)
e. Diff infant mortality Hispanic-White	230	1.34	(1.83)	266	0.85	(2.55)
2. Independent Variables						
a. Segregation Black-White	230	0.61	(0.12)	266	0.57	(0.11)
b. Segregation Hispanic-White	230	0.52	(0.11)	266	0.48	(0.11)
3. Control Variables						
3.1. Disparities by race						
a. Diff BW, Household income	230	-10824	(6734)	266	-10215	(12451)
b. Diff HW, Household income	230	-7458	(5276)	266	-6512	(8079)
c. Diff BW, percent 25yrs completed high school	230	-0.031	(0.06)	266	-0.02	(0.08)
d. Diff HW, percent 25yrs completed high school	230	-0.04	(0.05)	266	-0.03	(0.05)
3.2. Aggregate indicators						
a. Per-capita medical expenditure (U.S. $)	230	71.62	(136)	266	142.20	(481)
b. General outstanding debt	227	1.17	(4.54)	266	1.44	(5.72)
c. Total crimes	215	22332	(57792)	266	15702	(24124)
d. Region	230	0.11	(0.31)	266	0.09	(0.29)
e. Land area	230	152	(231)	266	226	(342)

Notes

a. IMR/1,000 live berths
b. General outstanding debt reported by Billion (U.S. $)
c. Regions: 1= North-East; 0= Mid-West; South; West
d. Land area reported per square kilometer
e. Source IMR: National Vital Statistics System, 2000/2007
f. Source for all other variables: Census Data, 2000/2010 and 2005-2009 American Community Survey

As previously noted by the U.S. Census, racial segregation decreased somewhat between 2000 and 2010. For blacks living in cities with resident populations of 100,000 or more, segregation declined by about 6.6 percent and segregation for Hispanics decreased by 7.7 percent. Despite this relatively small decrease in segregation patterns, the U.S. remains highly segregated. For example, African Americans represent about 12.6 percent of the entire U.S. population. In turn, Hispanics represent some 16.3 percent of the population. Overall, there are approximately 38.9 million African-Americans and about 50.3 million Hispanics. To achieve full racial integration in American cities, nearly 57 percent of African Americans and 48 percent of Hispanics would have to move to different neighborhoods. In other words, 21.8 million blacks and 24.2 million Hispanics would need to move, which is roughly equivalent to relocating the entire population of the states of New York and Texas, respectively.

Figure 1. Black/White Segregation by Region, 2000, 2010
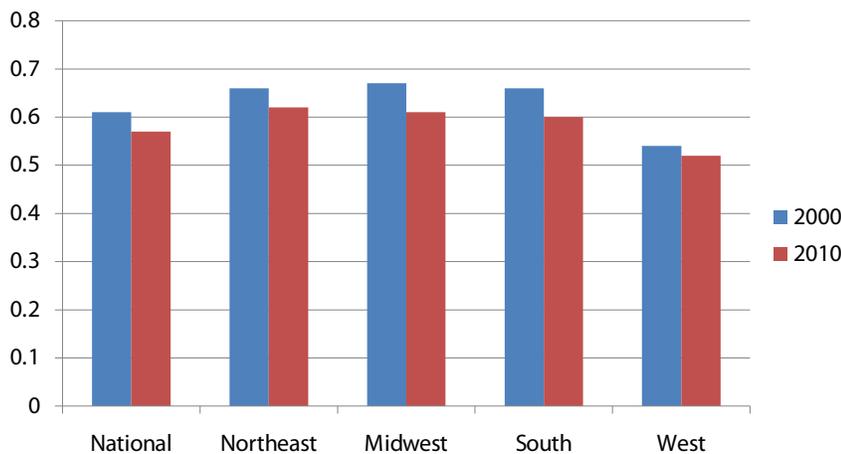
Source: census data, 200 and 2010

In Figures 1 and 2, regional variations in residential segregation for black and Hispanic populations are depicted for years 2000 and 2010. These figures show that the downward trend in segregation that has been previously reported nationwide exists within each region of the country. For blacks, segregation is lowest within Western cities and highest within Northeastern cities. Cities in the Midwest and South are only modestly less segregated than those in the Northeast. Segregation for Hispanics is generally lower than for blacks in all regions, as the patterns of racial segregation across regions is the same for both blacks and Hispanics. The least-segregated cities are found in the West whereas the most highly-segregated cities are located in the Northeast, followed closely by those in the Midwest and the South.

Figure 2. Hispanic/White Segregation by Region, 2000, 2010
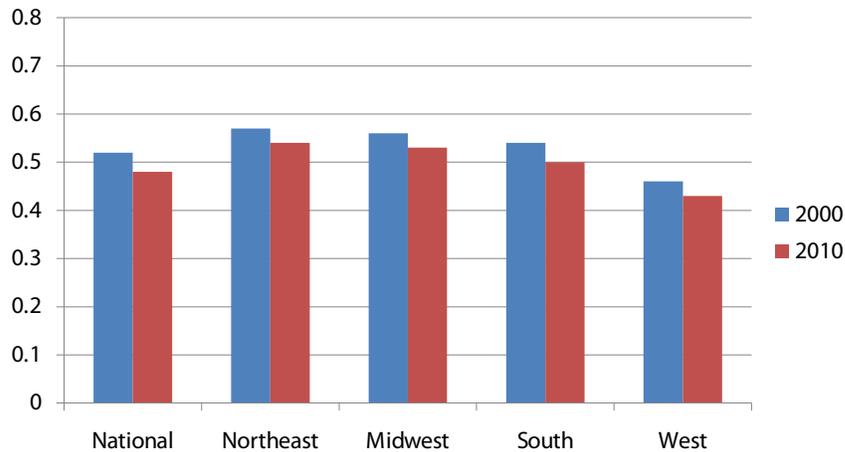
Source: census data, 2000 and 2010

In Figures 3 and 4 on the next page, city-wide segregation rates for blacks and Hispanics are plotted for 2000 and 2010. These figures provide a visual depiction of changes occurring over the past decade. Cities that were highly segregated in 2000 remained segregated in 2010, as displayed on the upper-right quadrants of both figures. Cities that were integrated in 2000 and remained integrated in 2010 are found in the lower-left quadrants of both figures. The upper-left quadrant of the figure depicts cities that were low in segregation in 2000 but high in segregation 2010. Cities that had high levels of segregation in 2000, but experienced a decrease in segregation by 2010 are found in the lower-right quadrants of the figures.

Both figures display a similar pattern, whereby cities that were highly segregated in 2000 remained highly segregated in 2010. In 2000, Ponce, Puerto Rico; New York City, Miami, and Washington, DC ranked among the most highly-segregated locations for African Americans. Each of those cities experienced essentially no change between 2000 and 2010. The same is true for highly-segregated Hispanic cities, such as Jackson, MS; Oakland, CA; Birmingham, AL; and New York City. They were the most highly segregated cities in 2000 as well as in 2010. These stable patterns of residential segregation in cities also apply to integration. Integrated cities tended to remain integrated throughout the decade. For example, such cities as Moreno Valley, CA; and Clarkesville, TN for African Americans were integrated in 2000 and remained so in 2010. The same held true during this time period for Hispanics in West Covina and Irvine, CA as well as Norwalk, CT and Ann Arbor, MI.

In the figures on the next page, most cities cluster along the diagonal line, depicting consistent levels of residential segregation. Only a handful of cities deviated from this norm. Figure 3, for example, reveals that African Americans residing in Joliet, IL, and Warren, MI experienced decreased segregation over the decade. Likewise, figure 4 reveals that there was reduced segregation of Hispanic residents in North Las Vegas, NV and Joliet, IL over the decade in question.

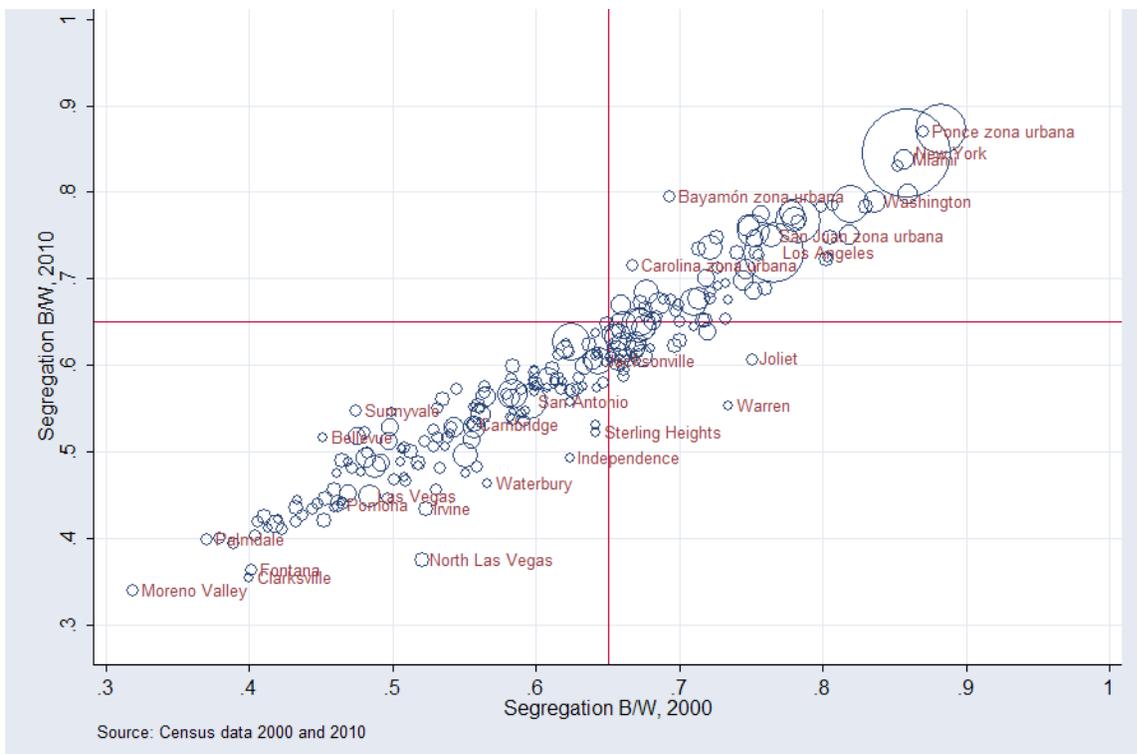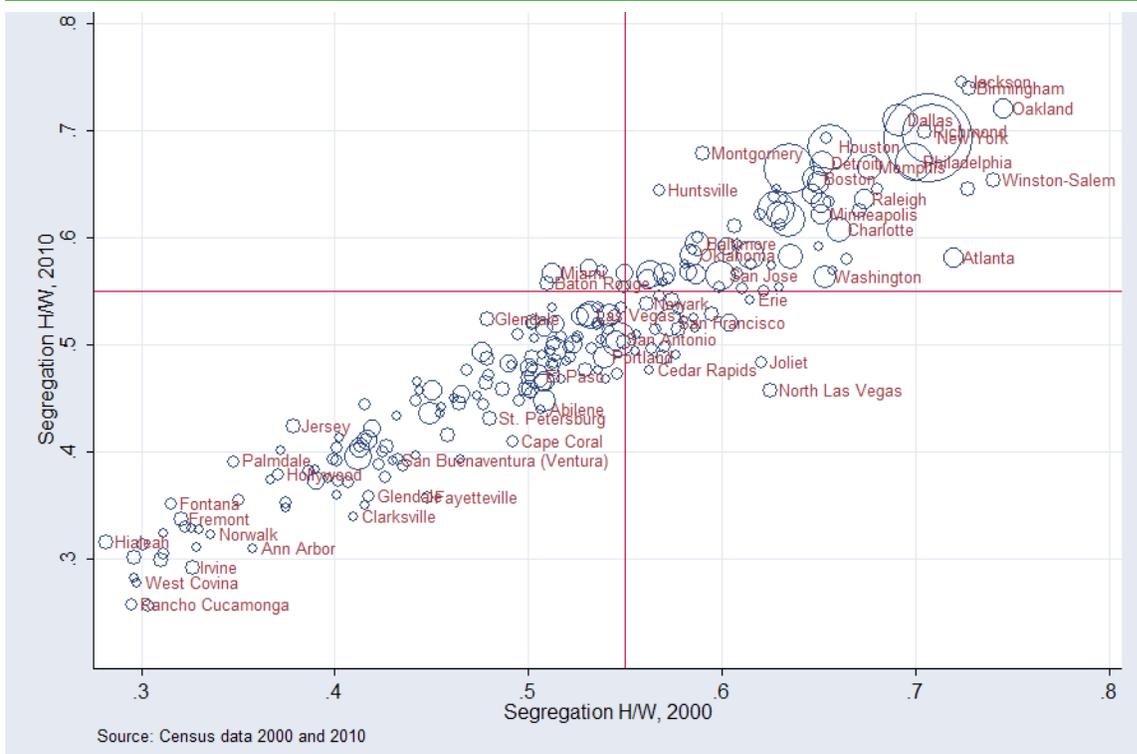## Figure 3. Changes in Black/White Segregation, 2000, 2010

Source: Census data 2000 and 2010

Figure 4. Changes in Hispanic/White Segregation, 2000, 2010

Source: Census data 2000 and 2010

The relationship between segregation and infant mortality disparities – In focusing on the relationship between segregation and disparities in infant mortality within U.S. cities, separate analyses compared black-white segregation in 2000 and 2010 (Table 2), as well as comparison of Hispanic-white segregation (Table 3). In Table 2, Model 1 depicts the relationship between black-white segregation and the black-white infant mortality disparity. In Model 2 of Table 2 below, that same relationship is revealed, after adjusting for such city-wide characteristics as per capita medical expenditures, outstanding debt, crime rate, and land area as measured in kilometers. In Table 2 below, additional measures of socio-economic disparities are included in Model 3. More specifically, Model 3 includes the black-white disparities in household incomes and high school graduation rates.

Table 2. OLS coefficients of the effect of B/W segregation on differences B/W IMR. (Cities pop > 100,000)

	Model 1			Model 2			Model 3		
	Coef.	Std.err	N	Coef.	Std.err	N	Coef.	Std.err	N
2000									
Segregation Black-White	4.23**	(2.07)	230	4.31*	(2.27)	230	3.052	(2.31)	230
Per-capita medical expenditure				-1.06	(2.25)		-1.62	(2.08)	
General outstanding debt				0.35	(0.49)		-0.26	(0.40)	
Total crimes				-0.57	(0.40)		0.45	(045)	
Land				-32.87	(111.63)		-65.50	(100.28)	
Diff BW, household income							5.35	(4.38)	
Diff BW, percent 25yrs completed high school							11.30**	(4.94)	
Constant	3.63***	(1.30)		3.55**	(1.36)		5.44***	(1.50)	
R-square			0.02			0.03			0.06
2010									
Segregation Black-White	8.36***	(1.58)	266	7.40***	(1.80)	266	4.89**	(1.76)	266
Per-capita medical expenditure				-0.09	(0.42)		-0.24*	(0.36)	
General outstanding debt				1.03***	(0.28)		-0.64	(0.28)	
Total crimes				2.32*	(1.24)		1.01	(1.14)	
Land				-18.84	(54.00)		-10.75	(50.94)	
Diff BW, household income							1.25	(1.41)	
Diff BW, percent 25yrs completed high school							14.30***	(2.37)	
Constant	2.20**	(0.86)		2.51**	(0.92)		4.68***	(0.93)	
R-square			0.09			0.12			0.22

Note: (***) $p<0.01$; (**) $p<0.05$; (*) $p<0.10$

a. Robust standard errors reported in parenthesis
b. Region dummies are included in Model 2 and Model 3

Accordingly, cities with higher rates of residential segregation between blacks and whites have a wider racial gap in infant mortality rates. Comparisons of the results across the three models indicate that the relationship between residential segregation and health inequalities is robust. Even after adjusting for a range of city characteristics, segregation remained a significant correlate of disparities in rates of infant mortality.

Table 3. OLS coefficients of the effect of H/W segregation on differences H/W IMR. (Cities pop > 100,000)

	Model 1			Model 2			Model 3		
	Coef.	Std.err	N	Coef.	Std.err	N	Coef.	Std.err	N
2000									
Segregation Hispanic-White	3.61***	(1.17)	230	3.67***	(1.17)	230	2.34***	(1.24)	230
Per-capita medical expenditure				2.80***	(1.45)		2.84*	(1.44)	
General outstanding debt				-0.95	(0.39)		-0.84	(0.23)	
Total crimes				-0.01	(0.08)		0.03	(0.09)	
Land				-16.64	(44.45)		-22.36	(44.84)	
Diff HW, household income							-2.87	(1.99)	
Diff HW, percent 25yrs completed high school							-5.33**	(2.53)	
Constant	-0.053	(0.59)		-0.070	(0.58)		-0.48	(0.60)	
R-square			0.05			0.12			0.15
2010									
Segregation Hispanic-White	1.65**	(0.98)	266	2.93**	(1.23)	266	2.72**	(1.23)	266
Per-capita medical expenditure				0.68**	(0.71)		0.75***	(0.69)	
General outstanding debt				0.39	(0.16)		0.42	(0.16)	
Total crimes				-1.70**	(0.75)		-1.65**	(0.78)	
Land				2.10	(50.24)		-7.56	(49.20)	
Diff HW, household income							2.74*	(1.56)	
Diff HW, percent 25yrs completed high school							-3.95	(2.42)	
Constant	0.06	(0.41)		-0.43	(0.49)		-0.32	(0.45)	
R-square			0.01			0.03			0.05

Note: (***) $p<0.01$; (**) $p<0.05$; (*) $p<0.10$

a. Robust standard errors reported in parenthesis
b. Region dummies are included in Model 2 and Model 3

In addition, these analyses indicate that the effects of segregation on infant mortality disparities intensified between 2000 and 2010. The relationship between segregation and the black-white infant mortality disparity is represented by the coefficient 3.052 for the 2000 census and 4.89 for the 2010 census. This means that in 2000, the gap between black and white infant mortality rates within a city characterized by a 10 percent level of residential segregation, in comparison with a city with a 50 percent level of segregation was approximately 1.22 additional infant deaths for every 1000 live births. In 2010, however, a comparison of the same cities resulted in a difference of nearly 1.95 infant deaths for every live birth. Thus, the health disadvantages resulting from racial segregation appear to have intensified even as levels of segregation declined.

Table 4. Segregation and Predicted Black-White and Hispanic-White Infant Mortality Rate Difference, 2010

Level of Segregation	Level of Black-White IMR Disparity	Level of Hispanic-White IMR Difference
0	4.68	-0.32
25%	5.90	0.36
34%	6.34	0.60
50%	7.12	1.04
67%	7.96	1.50
75%	8.35	1.72
100%	9.57	2.40

Source: Census data, 2000 and 2010 for Segregation; National Vital Statisics System, 2000 and 2007 for IMR Cities pop > 100,000

Table 4 depicts what black-white and Hispanic-white infant mortality disparities would be for differing levels of segregation (using adjustments to Model 3 of Tables 2 and 3). Such modeling simulates how much of the race/ethnic infant mortality disparity would be reduced in accordance with varying levels of segregation in US cities. If there were zero segregation, the black-white infant mortality disparity would fall to 4.68 infant deaths per 1000 live births. This is two fewer infant deaths (2.31) compared to the actual average black-white infant mortality disparity for all cities in the study, which is 6.99. At 100 percent levels of segregation, the predicted black-white disparity would jump to 9.57 infant deaths. This amounts to 2.58 more infant deaths for every 1000 births. For Hispanics, zero segregation would result in a lower Hispanic infant mortality rate than that for whites. Total segregation would result in a disparity of 2.4 more Hispanic infant deaths for every 1000 births.

Findings – In examining the relationship between segregation and disparities in infant mortality rates**,** this study used data from U.S. cities with respective populations of 100,000 residents or higher. Three primary findings from this study are as follows:

1. *For both blacks and Hispanics, residential segregation declined slightly between 2000 and 2010. However, the United States remains a highly segregated country;*

2. *Segregation continues to be a predictor of health disparities between blacks and whites and between Hispanics and whites, as measured by infant mortality rates*; and

3. *Although segregation is declining, the relationship between segregation and infant mortality disparities appears to have intensified*.

Racial/ethnic segregation has been previously documented to predict of health disparities. Segregated communities in the U.S. tend to be environments that produce poor health outcomes. The research literature documents that "*places*" that are racially segregated with high concentrations of black or Hispanic residents tend to be *places* characterized by a lack of investment in social and economic development with resulting limited opportunities and deteriorating infrastructure. Such disadvantaged communities tend to produce bad health outcomes. Therefore, racial health inequalities may be mainly the result of *place*. In other words, race influences *place*, and in turn, *place* influences health.

STUDY 2: DESCRIPTION, ANALYSIS AND FINDINGS

Numerous studies have explored the relationship between residential segregation and racial and ethnic health disparities.   Some scholars ascribe segregation as a fundamental cause of health disparities (Williams et al. 2001; Acevedo-Garcia 2000; 2001; Morello-Frosch & Jesdale 2006). Prior research has found associations between residential segregation and infant mortality, adult mortality, poor health status, smoking during pregnancy, poor birth outcomes, tuberculosis (TB) and other infectious diseases, as well as exposure to cancer-causing air toxins (Morello-Frosch & Jesdale 2006; Yankauer 1950; LaVeist 1989; 1993; 2003; Polednak 1991; 1996a; 1996b; Bell Zimmerman & Mayer 2007; Osypuk & Acevedo-Garcia 2008).   Researchers have found a positive association between the degree of residential segregation at the metropolitan statistical area (MSA) level and health disparities between whites and blacks.   In MSAs with high degrees of segregation, health disparities were greater compared to those found in more integrated MSAs. The analysis presented Study 1 confirms this finding for infant mortality disparities.

We are interested in whether relationship between segregation and health are due to the racial composition of neighborhoods and concentration of poverty. Wilson advances the thesis that inner city communities are disadvantaged primarily because of high levels of poverty and lack of resources, employment and educational opportunities for their residents (Wilson 1987). This study explores whether the concentration of minorities and poverty influence health disparities.

Methods – This study examined data from the 2006 Medical Expenditure Panel Study (MEPS) alongside zip code level data from the 2000 U.S. Census () to investigate the associations between segregation, concentrated poverty and racial and ethnic health inequalities.   MEPS is a longitudinal survey of the U.S. civilian   population, which does not include people who are institutionalized. The Agency for Healthcare Research and Quality (AHRQ) fields the MEPS based on the sampling frame of the National Health Interview Survey.   The MEPS is a rich source of information about individual and household health status, health behaviors, medical care use, health spending, health insurance, demographics, socioeconomic status, and employment.

The sample in Study 2 consisted of 17,751 adults aged 18 and over, who were non-Hispanic whites, non-Hispanic blacks, or HispanicsIndicators used to measure health status include:

- Self-reported general health status

- Mental health status, as measured by the Kessler Index.

- The presence of diabetes, hypertension, and stroke was ascertained by asking respondents if a "doctor or healthcare professional" had informed them they had the condition.

In turn, these measures were adjusted to serve as five dichotomous variables, which indicated whether the respondent was in fair or poor health, in poor mental health (as indicated by a Kessler index of greater than 12), had diabetes, had hypertension and had a stroke. Self-reported health status and the Kessler index are commonly used as overall measures of physical and mental health status. The Kessler index of non-specific psychological distress is a six-item scale that measures whether a person felt nervous, hopeless, restless, sad, worthless, and that everything was an effort during the past 30 days. Persons were considered to be in poor mental health if their score was equivalent to answering 'some of the time' for six items. Diabetes, hypertension, and stroke were selected because race disparities in these conditions are well documented and environmental factors influence risks. In addition to race and ethnicity, we also looked at poverty status and educational attainment. Individuals were assigned

to one of five poverty status classifications: poor (below 100% of the federal poverty level (FPL)), near poor (between 100% and 124% of FPL), low income (between 125% and 199% of FPL), middle income (between 200% and 399% of FPL) and high income (400% of FPL and above). High income persons were used as a reference group.   Educational attainment had six categories: grade school, some high school, high school graduate or GED, some college, 4 year college degree, and graduate school education. High school graduates were the reference group. Other control variables were age, gender, urban-rural location and region of country.

Using the Census data, we classified zip codes according to their racial composition and poverty rate to the MEPS data.   Predominantly minority zip codes were those that were: (1) predominantly Black, predominantly Hispanic, or racially integrated. We defined predominantly Black zip codes as those were at least 50 percent Black and less than 35 percent White. We defined predominantly Hispanic zip codes as those that were at least 50 percent Hispanic and less than 35 percent White. We defined racially integrated areas where at least two groups were at least 35 percent of the population. Preliminary analysis suggested we could combine these three zip codes groups to form a predominantly minority classification. We defined high poverty zip codes as those with a poverty rate of 20 percent or greater.

We estimated two sets of logistic regression models to determine whether there is an association between place and health status after adjusting for individual race/ethnicity and socioeconomic status. First, we estimated a base model that contained only individual factors. Second, we augmented the base model with our place measures of zip code racial and ethnic composition and poverty concentration. The base model rendered the usual estimates of race and socioeconomic disparities in health. The place models indicated whether the neighborhood racial composition and socioeconomic status matters. If so, we assessed whether the negative associate between individual race/ethnicity, socioeconomic status and health diminished when the influence of place is considered.   Our analysis was conducted using the survey estimation procedures in Stata 11 because MEPS has a complex sampling design.

Findings

Tables 1 and 2 display the results of the logistic regression analysis. In summary, we found that place matters for 3 of the 5 health measures: general health, mental health and diabetes. However, it is poverty concentration rather than racial composition of the zip code that increases the risk of negative health status. We found that when poverty concentration matters it reduces size of race and ethnic disparities. In other words, the base model overstates the race disparity. This is best observed in the model for risk of being in fair or poor health. In the base model, the odds of a black adult saying he/she was in fair or poor health was 30.4 percent higher than a white adult. This difference was statistically significant. In the place model, when we control for high neighborhood poverty, the race difference declines to 14 percent and is no longer statistically significant. However, odds of adults living in high poverty zip codes saying they were in fair or poor health were 38.6 percent higher than those living in zip codes with lower poverty rates.

Neighborhood poverty concentration also confounds the Hispanic-white disparity. In the base model, we estimated the odds of a Hispanic adult saying they were in fair or poor health was 13 percent less than a white adult, but this difference was not statistically significant. In the place model the ethnic disparity is statistically significant, we estimated that the odds of a Hispanic adult being in fair or poor health was 20.8 percent lower than a white adult.

We observe a similar pattern for poor mental health and diabetes. Comparing the base and place model for each measure, the odds ratios for blacks and Hispanics in relative to whites diminished in magnitude when high poverty concentration was included in the model. Compared to adults living in zip codes with lower poverty rates, the odds of adults living in high poverty zip codes being in fair or poor mental health were 30.7 percent greater and having diabetes was 20.2 percent greater. The poverty concentration disparities for diabetes is borderline significant ($p = 0.08$), however, when we excluded the racial composition of the zip code from the place model this disparity between high poverty zip codes and non-high poverty zip codes becomes statistically significant (OR = 1.23 $p = 0.027$). The odds of an adults living in a high poverty zip code having diabetes were 23 percent higher compared to an adult residing in a non-high poverty zip code.

As expected, individual poverty and low educational attainment had a negative effect on health. In comparison to high income adults, for all five health measures poor and near poor adults were more likely to have poor health and all the health measures except stroke, and low income adults were more likely to be in poor general and mental health. Similarly, compared to high school graduates, adults with a grade school education or some high school were more likely to be in fair or poor health, poor mental health or have diabetes.

To illustrate the impact of high poverty concentration on the risk of having poor health, we displayed the predicted percentage of each condition in Table 3 by individual race and ethnicity and zip code poverty level. We found that blacks in impoverished zip codes were at greatest risk followed by whites in impoverish zip codes. The Hispanic paradox withstanding, Hispanics in high poverty zip codes were also at greatest risk. We also observed that blacks living in the non-impoverish zip codes were in poorer health (with the exception of mental health) than their white and Hispanic counterparts. The diabetes rates for black in non-impoverish zip codes were higher than the rate of whites in impoverish zip codes.

Policy Implications

According to both studies and the above-cited analyses, *place matters* for certain health conditions and outcomes. High poverty concentration has negative effects on health. When it is not controlled for, we observe greater race disparities in health. Also, we found that the minority composition of neighborhoods does not have as negative an association with health status when neighborhood poverty is considered.

Policies to address health disparities need to consider community-level factors in addition to such individual factors as race/ethnicity, poverty and low educational attainment. Persons residing in poor neighborhoods are at greater risk for poor health, regardless of individual level risk factors. To address disparities, we need to develop, support, and implement policies designed to make poorer neighborhoods healthy communities.

An example of such a policy is the Racial and Ethnic Approaches to Community Health (REACH) program of the Centers for Disease Control and Prevention. REACH, established in 1999, funds 40 community-based programs across the country. These programs address minority health problems for conditions such as asthma, breast and cervical cancer, diabetes, heart disease, adult immunization, and infant mortality. Through REACH, the CDC harnesses and enhances the power and influence of local organizations to promote and facilitate healthy behaviors and to create healthy environment in at-risk communities. For example, REACH supports the Community Health Councils, Inc. (CHC) in South Los Angeles County. One of CHC projects is trying to transform South LA from a food desert to

an oasis by creating the regulatory and business environment to attract full service grocery stores and improve access to affordable healthy foods in their community.

Another example is the Southeastern African American Center of Excellence in the Elimination of Disparities in Diabetes (SEA-CEED). SEA-CEED represents collaboration between the Medical University of South Carolina and several community-based organizations, including community coalitions, faith-based organizations, professional nurse organizations, and diabetes advocacy groups. SEA-CEED attempts to improve diabetes management and to reduce complications associated with diabetes by changing community norms. SEA-CEED works with health plans, providers, and patients to promote evidence-based and culturally competent diabetes care, based on the Chronic Care Model.

Other examples include the Obama Administration's Healthy Food Financing Initiative and First Lady Michelle Obama's "Let's Move! Campaign." These programs are efforts to address the problems of diet-related diseases which go beyond counseling people to eat healthier foods and exercise. The Healthy Food Initiative is a collaborative effort of the Departments of Treasury, Agriculture, and Health and Human Services. It provides financial incentives for food producers to provide healthy food options in distressed urban and rural communities. Also, the "Let's Move! Campaign" encourages churches and community organizations to promote healthy eating and physical activities through events and programs such as community gardens, congregational/community cookbooks, community sports, and adoption of healthier menus for events.

The National Institute on Minority Health and Health Disparities (NIMHD) has the Community Based Participatory Research (CBPR) Initiative. This initiative funds CBPR projects, whichaccelerate the translation of knowledge and innovation to underserved minority communities to reduce health disparities. One of these projects is the Consortium of Health Education, Economic Empowerment and Research (CHEER) sponsored by the University of Tennessee Health Science Center, LeMoyne Owen College, the Memphis and Shelby County Health Department, the Memphis Housing Authority, First Baptist Church Lauderdale and Mustard Seed, Inc. CHEER uses community health workers, church health ministries and public housing health promotion programs to address health problems among residents of the impoverished zip code in Memphis.

Findings – We determined whether race and ethnic disparities in five selected health status measures were associated with the racial composition and poverty level of neighborhoods. The significanty findings from this research are as follows 4. The studye found that *place matters* for 3 out of the 5 health measures, namely: (a) general health, (b) mental health and (c) diabetes. 5. Community-level poverty proved to be aa more important determinant of health status than racial composition. To the extent that neighborhood factors influenced the health of residents of minority communities, it is due to concentrated poverty. 6. To eliminate racial and ethnic health disparities,n policy makers should therefore address the causes of and remedies forh concentrated poverty.

Table 1. Association between Selected Health Status Measures and Zip Code Characteristics, Race, Ethnicity, Poverty and Educational Status

	Poor or Fair General Health Status		High Kessler	
	Base	Place	Base	Place
Predominantly Minority	NA	1.058 (0.896, 1.250)	NA	0.948 (0.712, 1.264)
High Poverty	NA	1.386c (1.194, 1.608)	NA	1.307a (1.003, 1.703)
Black	1.304b (1.111, 1.530)	1.140 (0.939, 1.383)	0.866 (0.691, 1.085)	0.816 (0.625, 1.065)
Hispanic	0.870 (0.724, 1.044)	0.792a (0.652, 0.962)	0.909 (0.701, 1.180)	0.879 (0.659, 1.174)
Poor	4.211c (3.447, 5.144)	4.008c (3.270, 4.911)	4.713c (3.577, 6.211)	4.558c (3.478, 5.981)
Near Poor	3.454c (2.698, 4.422)	3.326c (2.591, 4.269)	3.232c (2.156, 4.845)	3.161c (2.117, 4.718)
Low Income	2.454c (2.027, 2.971)	2.386c (1.967, 2.894)	2.537c (1.921, 3.350)	2.493c (1.889, 3.289)
Grade School	1.626c (1.307, 2.023)	1.586c (1.272, 1.977)	1.318a (1.011, 1.718)	1.300 (0.994, 1.700)
Some High School	1.459c (1.246, 1.708)	1.439c (1.228, 1.686)	1.379b (1.080, 1.761)	1.367a (1.070, 1.746)

Source: Table 1 calculations are based upon the 2006 MEP Expenditure Panel Survey and 2000 US Census Data. Other covariates in the models include age, gender, region, and urban-rural location. The reference group for poverty status is 'greater than 400% of FPL'. The reference group for education is high school.

Table 2. Association between Selected Health Conditions and Zip Code Characteristics, Race, Ethnicity, Poverty and Educational Status

	Diabetes		Hypertension		Stroke	
	Base	Place	Base	Place	Base	Place
Predominantly Minority	NA	1.052 (0.849, 1.304)	NA	0.958 (0.836, 1.097)	NA	0.852 (0.617, 1.178)
High Poverty	NA	1.202 (0.974, 1.485)	NA	1.047 (0.895, 1.226)	NA	1.175 (0.809, 1.706)
Black	1.722c (1.446, 2.049)	1.581c (1.287, 1.941)	1.994c (1.759, 2.260)	2.013c (1.758, 2.306)	1.383a (1.007, 1.900)	1.430 (0.997, 2.051)
Hispanic	1.587c (1.274, 1.978)	1.493b (1.158, 1.926)	0.970 (0.832, 1.130)	0.980 (0.825, 1.163)	0.708 (0.455, 1.102)	0.735 (0.457, 1.181)
Poor	1.404b (1.135, 1.738)	1.360b (1.095, 1.688)	1.219a (1.019, 1.460)	1.215a (1.012, 1.460)	1.601a (1.099, 2.332)	1.590a (1.086, 2.328)
Near Poor	1.513a (1.098, 2.083)	1.474a (1.067, 2.030)	1.253a (1.005, 1.562)	1.250a (1.001, 1.560)	1.276 (0.783, 2.055)	1.267 (0.789, 2.035)
Low Income	1.273 (0.990, 1.637)	1.248 (0.968, 1.609)	1.050 (0.900, 1.225)	1.048 (.898, 1.224)	1.045 (0.682, 1.602)	1.040 (0.680, 1.590)
Grade School	1.326a (1.069, 1.645)	1.302a (1.049, 1.617)	0.952 (0.792, 1.143)	0.951 (0.793, 1.141)	0.913 (0.584, 1.428)	0.911 (0.579, 1.433)
Some High School	1.362b (1.104, 1.679)	1.354b (1.097, 1.672)	1.113 (0.931, 1.331)	1.112 (0.929, 1.331)	1.383 (0.958, 1.997)	1.379 (0.955, 1.990)

Source: Table 2 calculations are based on the 2006 MEP Expenditure Panel Survey and 2000 US Census Data. Other covariates in the models include age, gender, region, and urban-rural location. The reference group for poverty status is 'greater than 400% of FPL'. The reference group for education is high school.

Table 3. Adjusted Predicted Percentages of Having Selected Health Conditions, by Individual Race/Ethnicity and Neighborhood Poverty Concentration

	Fair or Poor General Health	Poor Mental Health	Diabetes	Hypertension	Stroke
White in Non High Poverty Zip Code	8.90	3.88	3.16	16.95	0.82
	(0.42)	(0.26)	(0.24)	(0.64)	(0.14)
Black in Non High Poverty Zip Code	10.03	3.23	4.88	29.10	1.17
	(0.74)	(0.42)	(0.47)	(1.24)	(0.22)
Hispanic in Non High Poverty Zip Code	7.18	3.40	4.67	16.72	0.60
	(0.56)	(0.42)	(0.54)	(1.06)	(0.14)
Whites in High Poverty Zip Code	11.92	4.97	3.77	17.63	0.96
	(0.93)	(0.61)	(0.46)	(1.27)	(0.21)
Blacks in High Poverty Zip Code	13.37	4.14	5.81	30.04	1.37
	(1.11)	(0.61)	(0.63)	(1.82)	(0.32)
Hispanics in High Poverty Zip Code	9.67	4.37	5.56	17.39	0.71
	(0.90)	(0.64)	(0.81)	(1.35)	(0.17)

Source: Table 3 calculations are based upon the 2006 MEP Expenditure Panel Survey and 2000 US Census Data. Predicted probabilities are calculated by evaluating all the other variables at their respective means and solely varying race/ethnicity and high poverty concentration. Other covariates in the models include age, gender, region, and urban-rural location.

COMMENTS FROM THE AUTHORS

Our analysis has a few limitations. First, we combined health measures from 2006 with zip code data from 2000. Some zip codes may have changed during the six-year interval. This may produce some imprecision in our estimates and bias our findings toward statistical insignificance. However, this is the best data available given that Census level zip code data is only available every ten years.   Our health status measures are self-reported. This is particularly problematic for hypertension and diabetes, where issues of awareness and uncontrolled disease are more important than having been diagnosed by a healthcare professional. This also would bias our finding towards statistical insignificance. Finally, we cannot determine causality between place characteristics and health because our analysis is cross-sectional.   However, if zip code characteristics are relatively stable over time and MEPS respondents tend to live in the same zip code, then our *place* measures have a longitudinal quality that lends itself to a causal interpretation.

Our analysis suggests that *place matters* for minority communities not because they are predominantly black or Hispanic but rather because they are impoverished. Even persons with middle and relatively higher incomes are at greater risks whenever higher numbers of their neighbors are poor. Impoverished communities are characterized by an overall lack of community-level resources, from grocery stores, parks and recreation facilities, quality schools, and public transportation options to public safety alternatives, resilient local businesses, employment opportunities and healthcare providers. (Wilson 1987; Massey & Denton 1993; Charles 2003; Perloff et al. 1997; Massey, Condran & Denton 1987; Alba, Logan & Bellair 1994). Poor communities are also at greater risk of environmental toxins that negatively impact health. In addition, poor communities lack the political and economic power to improve these conditions. It is the responsibilities of local, state, and the federal governments to recognize the disadvantages created by concentrated poverty, especially for minority communities. Policymakers should work with local leaders to adopt and implement policies and programs to address community- level factors.

APPENDIX—STUDYMETHODS

A. Dependent variables:

Infant Mortality Rate (IMR)

The infant mortality rate (IMR) equals the number of children dying under one year of age divided by the number of live births. Infant mortality rates were computed for whites, African Americans and Hispanics. Differences in rates between groups were also computed.

Source: For year 2000 we used Infant Death Records (less than 1 yr) for 1999-2002[1] and for 2010 infant death 2002 – 2009, as reported by the CDC.

B. Independent variables:

Segregation

We considered the index of dissimilarity as a measure of residential segregation. We computed the index using Census data from 2000 and 2010.

The formula for computing the Index of Dissimilarity is as follows:

$$D = \frac{1}{2}\sum_{i=1}^{n} |\frac{P_{1i}}{P_1} - \frac{P_{2i}}{P_2}|$$

Where

P_1 = city-wide population of Group 1

P_2 = city-wide population of Group 2

P_{1i} = census track i population of Group1

P_{2i} = census track i population of Group2

.n = number of census track in city

C. Control variables:

Household income

This is total household income during last 12 months. For 2000, it is the household income in 1999 reported by census 2000[2] and for 2010 it is the mean household income based on ACS 5 years end to 2009[3]. We computed differences by groups.

Source: Census data 2000; 2010:ACS2009_5yr

---

1   . Source: Centers for Disease Control and Prevention;, Infant Death Records 1999-2002 on CDC WONDER On-line Database. (Accessed at http://wonder.cdc.gov/lbd-v2002.html on July 10, 2011)

2   . Source: Census 2000 (Summary file)

3   . Source: American Community Survey, ACS2009_5yr (http://www2.census.gov/acs2009_5yr)

Percentage of 25 year-olds completing high school

It is the percentage of 25 year-olds who completed high school, which is considered as educational attainment. We calculated differences by groups.

Source: census 2000 in "summary file" reported this variables and the ACS2009 5-year average reported for 2010.

Per Capita Medical Expenditures

We add total health and hospital expenditures and divide the total by population.

Source: For this variable in 2000, we use 2002 data from the census of governments, as provided by the U.S. Census Bureau.

For 2010, we used data from the 2006 census of governments, provided by the U.S. Census Bureau and published in City Book 2010. "Finance of municipal and township Governments: 2002." The debt and health expenditures in this report are based on 2001 figures. As you know, the Census of Government Report is published in 1992, 1997, 2002 and 2007. The 1997 report used the data for 1996-1997, leading us to use 2001-2002.

General outstanding debt

This is total outstanding debt at the end of each fiscal year on the city-level.

Source: For this variable, 2000 data is drawn from the 2002 census of governments, as provided by U.S. Census Bureau.

For 2010 data, we used the 2006 census of governments, as provided by the U.S. Census Bureau and published in City Book 2010.

Total crimes

This refers to total crimes known by the police, which are divided into: total violent crimes and total property crimes. We added it and used total crimes[4].

Source: For 2000, we used the total crimes known by the police, as reported by the disaster center. For 2010, we used the total crimes known by the police, as reported by the disaster center in 2005. (Most recent data is 2005).

Region

Census region - A grouping of States and the District of Columbia, established by the U.S. Census. We consider four regions: Northeast, Midwest, South and West.

Source: U.S. Census Bureau

Land area

Land area is measured in square kilometers.

Source: U.S. Census Bureau 2000 and 2010

---

4 . http://www.disastercenter.com/crime/ (United States: Uniform Crime Report -- State Statistics from 1960 – 2009)

REFERENCES

Acevedo-Garcia D. "Residential Segregation and the Epidemiology of Infectious Diseases." Social Science & Medicine 2000; 51(8): pp. 1143-1161.

Acevedo-Garcia D. "Zip Code-level Risk Factors for Tuberculosis: Neighborhood Environment and Residential Segregation in New Jersey, 1985-1992." American Journal of Public Health. 2001; 91(5): pp. 734-741.

Alba R.D., Logan J.R., Bellair P.E. "Living in Crime: Implications of Racial/ethnic Differences in Suburban Location." Social Forces 1994; 73(2): pp. 395-434.

Allamani A., Voller F., Decarli A., Casotto V., Pantzer K., Anderson P., Gual A., Matrai S., Elekes Z., Eisenbach-Stangl I., Schmied G., Knibbe R.A., Nordlund S., Skjælaaen O., Olsson B., Cisneros Örnberg J., Osterberg E., Karlsson T., Plant M., Plant M., Miller P., Coghill N., Swiątkiewicz G., Wieczorek L., Annaheim B., Gmel G. "Contextual Determinants of Alcohol Consumption Changes and Preventive Alcohol Policies: A 12-Country European Study in Progress." Substance Use & Misuse. 2011 Jun 21. (Epub ahead of print)

Amick B.C., Levine S., Tarlov A.R., Walsh D.C. "Introduction." In Amick, Levine, Tarlov, and Walsh (eds.) Society and Health 1995. New York: Oxford University Press.

Auchincloss A.H., Van Nostrand J.F., Ronsaville D. "Access to Health Care for Older Persons in the United States: Personal, Structural, and Neighborhood Characteristics." Journal of Aging and Health. 2001 Aug; 13(3): pp. 329-354.

Balbach E.D., Gasior R.J., Barbeau E.M. "R.J. Reynolds' Targeting of African Americans: 1988-2000." American Journal of Public Health 2003 May; 93(5): pp. 822-827.

Bell J.F., Zimmerman F.J., Mayer J.D. "Associations Between Residential Segregation and Smoking During Pregnancy among African-American Women." Journal of Urban Health 2007; 84(3): pp. 372-388.

Bleich S.N., Thorpe R.J. Jr., Sharif-Harris H., Fesahazion R., Laveist T.A. "Social Context Explains Race Disparities in Obesity among Women" Journal of Epidemiology & Community Health. 2010 May; 64(5): pp. 465-469.

Brenner A.B., Bauermeister J.A., Zimmerman M.A. "Neighborhood Variation in Adolescent Alcohol Use: Examination of Socioecological and Social Disorganization Theories." Journal of Studies on Alcohol and Drugs 2011 Jul; 72(4): pp. 651-9.

Brown P. "Race, Class and Environmental Health: A Review and Systematization of the Literature." Environmental Research 1995; 69(1): pp.15-20

Bullard R.D. Dumping in Dixie: Race, Class and Environmental Quality. Westview Press (3rd ed.) 2000

Burgess, D.J., Ding, Y., Hargreaves, M., van Ryn, M., & Phelan, S. (2008). "The Association Between Perceived Discrimination and Underutilization of Needed Medical and Mental Health Care in a Multi-ethnic Community Sample." Journal of Health Care for the Poor and Underserved 19(3): pp. 894-911.

Casagrande, S.S., Gary, T.L., LaVeist, T.A., Gaskin, D.J., & Cooper, L.A. (2007). "Perceived Discrimination and Adherence to Medical Care in a Racially Integrated Community." Journal of General Internal Medicine, 22(3): pp. 389-395.

Chakraborty J., Zandbergen P.A. "Children at Risk: Measuring Racial/ethnic Disparities in Potential Exposure to Air Pollution at School and Home." Journal of Epidemiology & Community Health 2007 Dec; 61(12): pp. 1074-1079.

Charles C. "The Dynamics of Racial Residential Segregation." Annual Review of Sociology 2003; 29: pp. 167-207.

Chavis B.E. & Lee C. *Toxic Wastes and Race in the United States: A National Report on the Racial and Socio-Economic Characteristics of Communities with Hazardous Waste Sites.* Commission for Racial Justice, The United Church of Christ, 1987.

Collins T.W., Grineski S.E., Chakraborty J., McDonald Y.J. "Understanding Environmental Health Inequalities through Comparative Intracategorical Analysis: Racial/ethnic Disparities in Cancer Risks from Air Toxics in El Paso County, Texas." Health Place 2010 Dec 3.

Cooper H.L., Bossak B.H., Tempalski B., Friedman S.R., Des Jarlais D.C. "Temporal Trends in Spatial Access to Pharmacies that Sell Over-the-counter Syringes in New York City Health Districts: Relationship to Local Racial/ethnic Composition and nNeed." Journal of Urban Health 2009 Nov; 86(6): pp. 929-945.

Cornwell, E.Y., & Cornwell, B. (2008). "Access to Expertise as a Form of Social Capital: An Examination of race- and Class-based Disparities in Network Ties to Experts." Sociological Perspectives 51(4); pp. 853-876.

Crowder K., Downey L. "Interneighborhood Migration, Race, and Environmental Hazards: Modeling Microlevel Processes of Environmental Inequality." American Journal of Sociology 2010 Jan; 115(4): pp. 1110-1149.

Cutts D.B., Meyers A.F., Black M.M., Casey P.H., Chilton M., Cook J.T., Geppert J., Ettinger de Cuba S., Heeren T., Coleman S., Rose-Jacobs R., Frank D.A. "U.S. Housing Insecurity and the Health of Very Young Children." American Journal of Public Health 2011 Aug; 101(8): pp. 1508-14. (Epub 2011 Jun 16).

General Accounting Office. *Siting of Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities.* Washington, DC: U.S. General Accounting Office, 1983

Gaskin D.J., Price A., Brandon D.T., Laveist T.A. "Segregation and Disparities in Health Services Use." Medical Care Research and Review 2009 Oct; 66(5):578-89. (Epub 2009 May 21).

Gaskin D.J., Spencer C.S., Richard P., Anderson G.F., Powe N.R., Laveist T.A. "Do Hospitals Provide Lower-quality Care to Minorities than to Whites?" Health Affairs (Millwood) 2008 Mar-Apr; 27(2): pp. 518-527.

Goodman A.H. "Genes Don't Count (for Racial Differences in Health)." American Journal of Public Health (2000), 90, no. 11: pp. 1699-1702.

Gordon C., Purciel-Hill M., Ghai N.R., Kaufman L., Graham R., Van Wye G. "Measuring Food Deserts in New York City's Low-income Neighborhoods." Health Place 2011 Mar; 17(2): pp. 696-700. (Epub 2011 Jan 6.)

Guagliardo M.F., Ronzio C.R., Cheung I., Chacko E., Joseph J.G. "Physician Accessibility: An Urban Case Study of Pediatric Providers." Health Place 2004 Sep; 10(3): pp. 273-283.

Hackbarth D.P., Schnopp-Wyatt D., Katz D., Williams J., Silvestri B., Pfleger M. "Collaborative Research and Action to Control the Geographic Placement of Outdoor Advertising of Alcohol and Tobacco Products in Chicago." Public Health Reports 2001 Nov-Dec; 116(6): pp. 558-567.

Hackbarth D.P., Silvestri B., Cosper W. "Tobacco and Alcohol Billboards in 50 Chicago Neighborhoods: Market Segmentation to Sell Dangerous Products to the Poor." Journal of Public Health Policy 1995; 16(2): pp. 213-230.

Hayanga A.J., Kaiser H.E., Sinha R., Berenholtz S.M., Makary M., Chang D. "Residential Segregation and Access to Surgical Care by Minority Populations in U.S. Counties." Journal of the American College of Surgeons 2009 Jun; 208(6): pp. 1017-1022. (Epub 2009 Apr 17)

Hausmann, L.R., Kressin, N.R., Hanusa, B.H., & Ibrahim, S.A. (2010). "Perceived Racial Discrimination in Health Care and Its Association with Patients' Healthcare Experiences: Does the Measure Matter?" Ethnicity & Disease 20(1):pp. 40-47.

Holland A.C., Kennedy M.C., Hwang S.W. "The Assessment of Food Security in Homeless Individuals: A Comparison of the Food Security Survey Module and the Household Food Insecurity Access Scale." Public Health Nutrition 2011 Jul 11: pp. 1-6.

Jackson J.S., Knight K.M., Rafferty J.A. "Race and Unhealthy Behaviors: Chronic Stress, the HPA Axis, and Physical and Mental Health Disparities Over the Life Course." American Journal of Public Health 2010 May; 100(5): pp. 933-939. (Epub 2009 Oct 21.)

Jha A.K., Orav E.J., Zheng J., Epstein A.M. The Characteristics and Performance of Hospitals that Care for Elderly Hispanic Americans. Health Affairs (Millwood). 2008 Mar-Apr; 27(2): pp. 528-537.

Johnson, R.L., Saha, S., Arbelaez, J.J., Beach, M.C., & Cooper, L.A. (2004). "Racial and Ethnic Differences in Patient Perceptions of Bias and Cultural Competence in Health Care." Journal of General Internal Medicine. 19(2): pp. 101-110.

Julia C., Valleron A.J. "Louis-Rene Villerme (1782-1863), A Pioneer in Social Epidemiology: Re-analysis of His Data on Comparative Mortality in Paris in the Early 19th Century." Journal of Epidemiology & Community Health. 2011; 65: pp. 666-670

Kim T.H., Samson L.F., Lu N. "Racial/ethnic Disparities in the Utilization of High-technology Hospitals." Journal of the National Medical Association 2010 Sep; 102(9): pp. 803-810.

Lacaille L.J., Dauner K.N., Krambeer R.J., Pedersen J. "Psychosocial and Environmental Determinants of Eating Behaviors, Physical Activity, and Weight Change among College Students: a Qualitative Analysis." Journal of American College Health. 2011 Jun; 59(6): pp. 531-538.

Larsen K., Gilliland J. "A Farmers' Market in a Food Desert: Evaluating Impacts on the Price and Availability of Healthy Food." Health Place 2009 Dec; 15(4):1158-62. (Epub 2009 Jul 1).

LaVeist, Thomas A. (1989) "Linking Residential Segregation and the Infant Mortality Race Disparity." Sociology and Social Research, Vol. 73, no. 2, pp. 90-94

LaVeist, Thomas A. (1993) "Separation, Poverty and Empowerment: Health Consequences for African Americans." Milbank Quarterly Vol. 73 (1): pp. 41-64.

LaVeist T.A., Thorpe R.J. Jr., Galarraga J.E., Bower K.M., Gary-Webb T.L. "Environmental and Socio-economic Factors as Contributors to Racial Disparities in Diabetes Prevalence." Journal of General Internal Medicine 2009 Oct; 24(10): pp. 1144-1148.

LaVeist, Thomas A. and John Wallace. (2000) "Health Risk and Inequitable Distribution of Liquor Stores in African American Neighborhoods."Social Science and Medicine Vol. 51, pp. 613-617.

LaVeist, T. A., Nickerson, K. J., & Bowie, J. V. (2000). "Attitudes about Racism, Medical Mistrust, and Satisfaction with Care among African American and White Cardiac Patients." Medical Care Research and Review. 57(Suppl 1): pp. 146-161.

LaVeist, T.A., Rolley, N.C., & Diala, C. (2003). "Prevalence and Patterns of Discrimination among U.S. Health Care Consumers." International Journal of Health Services 33(2), pp. 331-344.

LaVeist T.A. "Racial Segregation and Longevity among African Americans: An Individual-level Analysis." Health Services Research Journal. 2003; 38(6 part 2): pp. 1719-34.

Lillie-Blanton M., Anthony J.C., Schuster C.R. "Probing the Meaning of Racial/ethnic Group Comparisons in Crack Cocaine Smoking." Journal of the American Medical Association 1993 Feb 24; 269(8): pp. 993-997.

Luke D., Esmundo E., Bloom Y. (2000) "Smoke Signs: Patterns of Tobacco Billboard Advertising in a Metropolitan Region." Tobacco Control 2000 Mar; 9(1): pp. 16-23.

Massey D.S .and Denton N.A. *American Apartheid.* 1993. Boston, MA: Harvard University Press.

Massey D.S., Condran G.A., Denton N.A. "The Effect of Residential Segregation on Black Social and Economic Well-being." Social Forces 1987; 66(1): pp. 29-56.

Mohai P., Lantz P.M., Morenoff J., House J.S., Mero R.P. "Racial and Socioeconomic Disparities in Residential Proximity to Polluting Industrial Facilities: Evidence from the Americans' Changing Lives Study." American Journal of Public Health. 2009 Nov; 99 Suppl 3: pp. S649-56.

Morello-Frosch R., Jesdale B.M. "Separate and Unequal: Residential Segregation and Estimated Cancer Risks Associated with Ambient Air Toxics in U.S. Metropolitan Areas." Environmental Health Perspectives 2006 Mar; 114(3): pp. 386-93.

Morland K., Wing S., Diez Roux A., Poole C. "Neighborhood Characteristics Associated with the Location of Food Stores and food Service Places." American Journal of Preventive Medicine 2002 Jan; 22(1): pp. 23-29.

Morland K., Filomena S. "Disparities in the Availability of Fruits and Vegetables Between Racially Segregated Urban Neighbourhoods." Public Health Nutrition 2007 Dec; 10 (12): pp. 1481-1489.

Morrison R.S., Wallenstein S., Natale D.K., Senzel R.S., Huang L.L. "We Don't Carry That"-- Failure of Pharmacies in Predominantly Nonwhite Neighborhoods to Stock Opioid Analgesics. New England Journal of Medicine 2000 Apr 6; 342(14): pp. 1023-1026.

National Research Council. "Public Health, The Hazardous Wastes." Environmental Epidemiology: Vol. 1. Washington, DC: National Academies Press

Norton J.M., Wing S., Lipscomb H.J., Kaufman J.S., Marshall S.W., Cravey A.J. "Race, Wealth, and Solid Waste Facilities in North Carolina." Environmental Health Perspectives 2007 Sep; 115(9): pp. 1344-50.

Nugent N.R., Tyrka A.R., Carpenter L.L., Price L.H. "Gene-environment Interactions: Early Life Stress and Risk for Depressive and Anxiety Disorders." Psychopharmacology (Berl). 2011 Mar; 214(1): pp. 175-96. (Epub 2011 Jan 12).

Osypuk T.L., Acevedo-Garcia D. "Are Racial Disparities in Preterm Birth Larger in Hypersegregated Areas?" American Journal of Epidemiology 2008; 167(11): pp. 1295-1304.

Perloff J.D., Kletke P.R., Fossett J.W., Banks S. "Medicaid Participation among Urban Primary Care Physicians." Medical Care 1997; 35(2): pp. 142-57.

Pilgrim A., Barker M., Jackson A., Ntani G., Crozier S., Inskip H., Godfrey K., Cooper C., Robinson S.; SWS Study Group. "Does Living in a Food Insecure Household Impact on the Diets and Body Composition of Young Children? Findings from the Southampton Women's Survey." Journal of Epidemiology & Community Health 2011 Jun 7.

Polednak A.P. "Black-white Differences in Infant Mortality in 38 Standard Metropolitan Statistical Areas." American Journal of Public Health 1991; 81(11): pp. 1480-1482.

Polednak A.P. "Segregation, Discrimination and Mortality in U.S. Blacks." Ethnicity & Disease 1996; 6(1-2):99-108.

Polednak A.P. "Trends in U.S. Urban Black Infant Mortality, by Degree of Residential Segregation." American Journal of Public Health. 1996; 86(5): pp. 723-726.

Powell L, Slater S., Mirtcheva D., Bao Y., Chaloupka F. "Food Store Availability and Neighborhood Characteristics in the United States." Preventive Medicine 2007; 44: pp. 189 –195.

Pucci LG, Joseph H.M. Jr., Siegel M. "Outdoor Tobacco Advertising in Six Boston Neighborhoods: Evaluating Youth Exposure." American Journal of Preventive Medicine 1998 Aug; 15(2): pp.155-159.

Rose D., Richards R. "Food Store Access and Household Fruit and Vegetable use Among Participants in the U.S. food Stamp Program." Public Health Nutrition 2004; 7: pp. 1081– 1088.

Sarrazin M.S., Campbell M.E., Richardson K.K., Rosenthal G.E. "Racial Segregation and Disparities in Health Care Delivery: Conceptual Model and Empirical Assessment." Health Services Research 2009 Aug; 44(4): pp. 1424-1444.

Sarrazin M.V., Campbell M., Rosenthal G.E. "Racial Differences in Hospital use after Acute Myocardial Infarction: Does Residential Segregation Play a Role?" Health Affairs (Millwood) 2009 Mar-Apr; 28(2): pp. 368-378.

Small M.L., Jacobs E.M., Massengill R.P. "Why Organizational Ties Matter for Neighborhood Effects: Resource Access through Childcare Centers." Social Forces Volume 87, Number 1, September 2008: pp. 387-414

Small M.L. "Neighborhood Institutions as Resource Brokers: Childcare Centers, Inter-Organizational Ties, and Resource Access Among the Poor." Social Problems. 53(2): pp. 274-92, 2006

Song M., Lee K.M., Kang D. "Breast Cancer Prevention Based on Gene-environment Interaction." Molecular Carcinogenesis. 2011 Apr; 50(4): pp. 280-90. doi: 10.1002/mc.20639.

Stoddard J.L., Johnson C.A., Boley-Cruz T, Sussman S. "Targeted Tobacco Markets: Outdoor Advertising in Los Angeles Minority Neighborhoods." American Journal of Public Health 1997 Jul; 87(7): pp. 1232-3.

Thorpe R.J. Jr., Brandon D.T., LaVeist T.A. "Social Context as an Explanation for Race Disparities in Hypertension: Findings from the Exploring Health Disparities in Integrated Communities (EHDIC) Study." Social Science & Medicine 2008 Nov; 67(10): pp. 1604-11.

Whitfield K.E., Wiggins S.A., Brandon D.T. "Genetics and Health Disparities: Fears and Realities." Journal of the National Medical Association. 2003 Jul; 95(7): pp. 539-43.

Williams D.R. and Collins C. Racial Residential Segregation: a Fundamental Cause of Racial Disparities in Health. Public Health Reports 2001 Sep-Oct; 116(5): pp. 404–416.

Wing S., Horton R.A., Muhammad N., Grant G.R., Tajik M., Thu K. "Integrating Epidemiology, Education, and Organizing for Environmental Justice: Community Health Effects of Industrial Hog Operations." American Journal of Public Health 2008 Aug; 98(8): pp. 1390-7. (Epub 2008 Jun 12.)

Wilson, W. J. (1987). *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy*. Chicago: The University of Chicago Press.

Yankauer, A. 1950. "The Relationship of Fetal and Infant Mortality to Residential Segregation." American Sociological Review 15 (5): pp. 644–648.

Zanobetti A., Baccarelli A., Schwartz J. "Gene-air Pollution Interaction and Cardiovascular Disease: a Review." Progress in Cardiovascular Diseases 2011 Mar-Apr; 53(5): pp. 344-352.

ABOUT THE AUTHORS

Thomas A. LaVeist (tlaveist@jhsph.edu) is director of the Hopkins Center for Health Disparities Solutions and the William C. and Nancy F. Richardson Professor in Health Policy at the Johns Hopkins Bloomberg School of Public Health. He has been on the Johns Hopkins faculty since 1990. His research focuses on health inequalities and health policy. Dr. LaVeist is recipient of the "Knowledge Award" from the U.S. Department of Health and Human Services, Office of Minority Health. And, he was awarded the "Innovation Award" from the National Institute on Minority Health and Health Disparities of the National Institutes of Health. He received the Ph.D. in medical sociology from the University of Michigan in 1988.

Darrell J. Gaskin (dgaskin@jhsph.edu) is associate professor of health economics in the Department of Health Policy and Management and deputy director of the Hopkins Center for Health Disparities Solutions of the Johns Hopkins Bloomberg School of Public Health. His goal is to identify and understand barriers to care for vulnerable populations; to develop and promote policies and practices that will improve access to care for the poor, minority and other vulnerable populations; and to eliminate racial/ethnic and socioeconomic disparities in healthcare. Recently, he was appointed Vice Chairman of the Maryland Health Benefits Exchange Commission. Also, he is a member of the Institute of Medicine's Committee on Valuing Community-Based, Non-Clinical Prevention Programs. Dr. Gaskin returned to Hopkins in June 2010. He had been on the Hopkins faculty from 2002 to 2007. He earned his Ph.D. in health economics from Johns Hopkins University, and a M.S. degree in economics from the Massachusetts Institute of Technology.

Dr. Antonio J. Trujillo (atrujill@jhsph.edu) is assistant professor of economics and international health in the Department of International Health at Johns Hopkins University. Before coming to Hopkins, he was associate professor in the Health Professions Department at the University of Central Florida. Recently, Dr. Trujillo has focused his attention on studying the economics and health implications of chronic conditions, exploring the determinants of prevention and early diagnosis, and analyzing the role of incentives in an individual's decision to engage in self-management of chronic conditions. He has also published on race disparities in health in low- and middle- income countries. He received his Ph.D. in Public Policy Analysis and Health Economics from the University of North Carolina at Chapel Hill and M.P.P. from Columbia University.

ABOUT THE JOINT CENTER

The Joint Center for Political and Economic Studies is one of the nation's pre-eminent research and public policy institutions and the only one whose work focuses exclusively on issues of particular concern to African Americans and other people of color. For over four decades, our research and information programs have informed and influenced public opinion and national policy to benefit not only African Americans, but every American.