Race, Property, and Population Health: Examining Policy-Driven Patterns of Whiteness, Anti-Blackness and Health Inequity in Metropolitan Detroit

by

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Dedication

This dissertation is dedicated to the people behind the study populations.
Quantitative research can be dehumanizing, but you were humans; each of your lives precious.
Mothers, grandfathers, aunts, brothers, neighbors, teachers, activists, artists, babies.
Lives and legacies lost. Tragically, needlessly, wrongfully.
A pandemic did not take your lives. But a sick society did.
I do not know your names, what your smiles looked like;
I don't know who or what you left behind.
I do know that your lives mattered, that you had more to offer this world;
your work was unfinished, your loss left a hole.
The past two years I've felt your presence, with me in the data;
the weight of your worth has felt heavy at times, too much responsibility for me to bear.
I dedicate not just this dissertation to you, but my life's work –
towards a world where all human lives are valued equally;
where Black people are free; to feel stable, to grow old, to pass down their homes and wealth;
where White people can accept loving responsibility for our harms;
a world where we can all heal.

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Abstract

Trenchant health inequities between Black and White Americans persist in metropolitan areas in the Midwest and Northeast characterized by high levels of residential segregation and municipal fragmentation. The recalcitrance of these racial and spatial relations more than a half-century after the 1968 Fair Housing Act underscores the need to investigate the contemporary institutions and laws that reproduce White supremacy and its embodied consequences in US metropolitan areas. This three-paper quantitative dissertation draws on critical race theory and methods from the fields of demography, social geography, and legal epidemiology to examine policy-driven patterns of Whiteness, anti-Blackness, and health inequity in metropolitan Detroit. This project seeks to better understand how structural racialization operates through municipal institutions, fiscal inequities, and property tax foreclosure law to uphold a racialized metropolitan hierarchy of population health.

Chapter 2 (paper 1) examines the relationship between geographical Whiteness and excess mortality across municipalities (cities and townships) in the tri-county Detroit Metropolitan Area (DMA) in 2010 using data from the Michigan Department of Community Health and the US Census. This study found that stark inter-municipal disparities in excess death between White and Black populations in the DMA could be partly attributed to a protective relationship between suburban Whiteness and mortality that preponderantly benefitted White residents. Conceptualized within a relational framework of spatial White supremacy, this study problematizes the undue health benefits of suburban Whiteness within a racialized metropolitan health hierarchy where Black populations suffer disproportionately from excess death.

Integrating data from the Michigan Department of Treasury and the American Community Survey (ACS), Chapter 3 (paper 2) builds on Chapter 2 by exploring whether the protective health status of suburban Whiteness could be explained by systemic fiscal advantages that benefit the health of predominantly White suburbs at the expense of Black populations. Findings revealed steep fiscal gradients in mortality among White and Black municipal populations; while the most staggering rates of excess death were documented among a cluster of fiscally poor majority-Black

cities, the largest health benefits accrued to a minority of affluent and overwhelmingly White suburbs that held a disproportionate share of the region's fiscal resources. This study is the first to employ a measure of municipal fiscal health to examine intra-metropolitan health inequities, shedding new light on how racialized patterns of fiscal accumulation and deprivation may structure persistent disparities in health.

Chapter 4 (paper 3) assessed evidence for structural racialization in the spatial distribution of occupied property tax foreclosures and urban health equity across census tracts in Wayne county using the ACS, foreclosure records from the Wayne County Treasurer, and data from several public sources. The findings show that tax foreclosure law perpetuated racialized spatial patterns of housing dispossession that intersected with preexisting inequities in health; between 2014 and 2015, tax foreclosures dispossessed about 50,000 Wayne county residents, and occupied foreclosure burdens were principally concentrated in Black neighborhoods characterized by shorter life expectancies and higher rates of disability. As the first study to operationalize disparate impact for housing and health research, this research generates knowledge on how structural racialization works through colorblind laws and policies to reify racialized hierarchies of housing and health in segregated areas.

Chapter 1. Introduction

The relationship between race-based residential segregation (hereafter, segregation) and racial health inequity in the United States (US) is one of the most well documented in the housing and health literature. Evidence indicates that mortality differentials between non-Latinx Black and non-Latinx White Americans (hereafter, Black and White[1]) are most trenchant in metropolitan areas[2] in the Midwest and Northeast characterized by high levels of Black-White segregation and fragmented structures of local governance.[3] The recalcitrance of these racial and spatial relations more than a half century after the passage of the Fair Housing Act underscores the need for research to investigate the underlying institutions and laws that reproduce White supremacy and its embodied consequences in US metropolitan areas.

This three-paper quantitative dissertation draws on critical race theory and methods from the fields of demography, social geography, and legal epidemiology to conceptualize and measure policy-driven patterns of Whiteness, anti-Blackness, and health inequity in metropolitan Detroit after the 2007-09 economic recession. Specifically, this project seeks to better understand how structural racialization operates through municipal institutions, fiscal inequities, and property tax foreclosure law to uphold racialized metropolitan hierarchies in population health.

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[1] Consistent with a lineage of Black scholarship and press, I capitalize 'Black' to refer to people of African ancestry and signify the collective history, identity and contributions of Black people (Crenshaw, 1988; Appiah, 2020). Though people racialized as White in the US lack shared history or culture, in capitalizing the term "White" I adopt the policy of the Center for the Study of Social Policy, which argues: "it is important to call attention to White as a race as a way to understand and give voice to how Whiteness functions in our social and political institutions and our communities. Moreover, the detachment of 'White' as a proper noun allows White people to sit out of conversations about race and removes accountability from White people's and White institutions' involvement in racism" (Nguyễn & Pendleton, 2020).

[2] Metropolitan area refers to "a core area containing a large population nucleus, together with adjacent communities that have a high degree of economic and social integration with that core" (US Census Bureau, 1994). The US Office of Management and Budget (OMB) delineates Metropolitan Statistical Areas (MSAs), which consist of the county or counties associated with at least one core (urbanized area with a population of at least 50,000) plus adjacent counties that meet criteria for social and economic integration based on commuting patterns.

[3] Fragmented governance structures (also municipal, political, or metropolitan fragmentation) denote the division of metropolitan areas into many discrete local governmental units, each with independent powers and responsibilities (e.g., taxation, regulation, police powers). Legal government boundaries provide geographic formality and political autonomy, but also perform many economic and social functions (e.g., population sorting, dispersion of fiscal responsibility) (Weiher, 1991; Hendrick & Shi, 2015). There is no consensus on how to operationalize metropolitan fragmentation, but it is usually measured as a count of government units (i.e., local municipalities, special service districts, school districts) within the area (Hutson et al., 2012; Yeung, 2009). I focus on municipalities due to their broad functions, responsibilities, and powers.

The introduction to this dissertation proceeds as follows. First, I provide an overview of the dire state of Black-White[4] health inequities in the US, which I conceptualize as the unjust embodiment of a system of White supremacy maintained through the process of structural racialization. I then explain why the enduring regime of metropolitan segregation is integral to the maintenance of White supremacy and the reification of racial health differences in the contemporary era. After outlining three prominent gaps in the existing housing and health literature, I conclude with an outline of each dissertation chapter.

The state of Black-White health inequities in the United States

> "Of all the forms of inequality, injustice in health is the most shocking and the most inhuman because it often results in physical death" (Associated Press, 1966).
>
> –Rev. Dr. Martin Luther King Jr.

More than a half century after Dr. Martin Luther King Jr. made this statement at the Convention of the Medical Committee for Human Rights in 1966, health disparity gaps between Black and White Americans remain severe, persistent, and for several outcomes, have worsened over time. While overall death rates for Black and White populations declined by more than 40% between 1960 and 2010, no progress was made in reducing the relative difference between the two groups; the age-adjusted all-cause mortality rate for Black people was 20.3% higher than that of Whites in 1960, compared to 21.1% in 2010 (NCHS, 2017: 121). In fact, Black-White ratios of mortality from major causes of death including heart disease, stroke, cancer, and diabetes were *larger* in 2010 than in 1960 (NCHS, 2017: 121). Whereas in 1960 a Black baby was 1.9 times more likely than a White baby to die during infancy, in 2010 that likelihood was 2.2 (NCHS, 2017).

These striking inequities amount to the egregious and unjust loss of Black lives in the US: according to 2010 mortality profiles, at least 64,000 Black people die each year that would not

[4] A weakness of this dissertation is its reliance on the Black-White binary paradigm of US race relations. I assert this paradigm explicitly, in my focus White-on-Black oppression, and implicitly, in recognizing the presence of Indigenous and other people of color in metropolitan Detroit without careful inquiry into the racialized histories of these groups (Perea, 1997). This binary oversimplifies the reality of differential racialization, which maintains that "each disfavored group in this country has been racialized in its own individual way and according to the needs of the majority group at particular times in its history" (Delgado & Stefancic, 2017: 10). This binary is problematic in that it can: uphold the concept of Black exceptionalism; overlook the roles of religion, language, color, immigration status (etc.) in American race-making; contribute to anti-Indigenous erasure; marginalize non-black groups as invisible or "un-American"; and undermine solidarity among minoritized groups (Moreton-Robinson, 2016; Chang, 1993; Carbado, 1998, 2001; Delgado 2000; Husain, 2019). Still, the Black-White binary is an important tradition of Black scholarship which acknowledges that US racism is not singularly anti-Black, while recognizing that the consequences of enslavement and its aftermath on the enduring US racial hierarchy demands individualized attention (Brooks & Widner, 2010; Bell, 1992a). Two manifestations of this racial order relevant to this dissertation–residential segregation and health disparities between Black and White population–remain uniquely pronounced in the DMA and the US broadly (Cunningham et al., 2017; Logan & Stults, 2011).

otherwise die if Black populations had death rates similar to those of Whites (NCHS, 2017; Murphy et al., 2013).[5] These unconscionable disparities do not yet account for staggering inequities in the death toll wrought by the COVID-19 pandemic. As of late 2020, the estimated reduction in life expectancy at birth for Black Americans (2.26 years) was 3.1 times higher than that among White Americans (0.73 years), erasing modest declines in the Black-White life expectancy gap observed since 2006 (Andrasfay & Goldman, 2021; Harper et al., 2012).

Structural racialization as a fundamental cause of racial health inequities

There is now broad acceptance in public health that Black-White health inequities are the embodied consequence of a racialized social structure, whereby a set of social relations and inter-institutional arrangements systematically maintain racial hierarchy by serving the social, economic, and political interests of the dominant race through the oppression of racially minoritized groups (APHA, 2001; Krieger, 2016; Bonilla-Silva, 1997; Gee & Ford, 2011; Bailey et al., 2017). As a fundamental cause of health inequity, structural racism is historically contingent, cumulative, and adapts across socio-spatial contexts to reify racial boundaries and the social power ascribed to them (Hicken et al., 2018). Here, I adopt john a. powell's preference for the term "structural racialization" to connote the constant, dynamic processes through which the races are constructed, contested, and institutionalized in relation to each other, becoming "socially real and causally effective" for health (powell, 2008, 2013b; Omi & Winant, 2014; Mills, 2003a: 185).

For reasons I elaborate on in Chapter 2, I take up Mill's (2003a, 2003b, 2009: 274) call for critical scholars to embrace traditions of Black radical thought by adopting a conceptual framework of "White supremacy" to characterize the "crucial reality of white domination" in the US.[6] As Leonardo (2004: 137) explains, analysis of White supremacy should focus less on unearned advantages ("the state of being dominant") and more on the "direct processes that secure domination and the privileges associated with it." I further draw on Mullings' (2005) perspective "linking racism to structures of power that emerge through processes of accumulation and

[5] The number of excess deaths for the Black population is calculated by applying the age-specific mortality rate of the White population in 2010 to the Black population of the same age (NCHS, 2017), then taking the difference between that value and the actual number of deaths (Murphy et al., 2013).

[6] Mills writes that while "white supremacy should be the overarching category for critical race theory…this does not foreclose theoretical options" (Mills, 2003a: 174). In the US, racial and economic structures developed concurrently through histories of settler colonialism and slavery–forging land and labor markets that necessitated the dispossession and dehumanization of African and Indigenous peoples to benefit a newly constructed class of "White" elites (Malat et al., 2018). Thus, White supremacy cannot be understood outside the modern world system racial capitalism, or the idea that racialized exploitation and capital accumulation are mutually constitutive (Laster Pirtle, 2020; Robinson C. J., 2000).

dispossession" (668) to emphasize the relational aspect of racism and clarify that "all dispossession is inextricably connected to accumulation and that structured disadvantage is the inevitable foundation for privilege" (680).[7] In examining "policy-driven" patterns of White supremacy I focus on the role of the state institutions and the legal system in affirming, legitimating, and protecting what Harris (1993: 1731) identifies as a "property interest in whiteness that reproduces Black subordination."[8] Gilmore's (2002a: 261) definition of racism as "the state-sanctioned or extralegal production and exploitation of group-differentiated vulnerability to premature death, in distinct yet densely interconnected political geographies" is especially useful for conceptualizing spatially constructed health inequities not just as a consequence of White supremacy, but integral to its ongoing maintenance.

For decades, anti-racist researchers have found direction in critical race theory (CRT), a broad theoretical framework grown out of a decentralized movement of scholars and activists– primarily progressive intellectuals of color–whose work seeks to understand and challenge the contemporary ways that racialization functions in society (Delgado & Stefancic, 2017; Bell, 1995). CRT emerged out of American legal studies in the 1980s to confront the centrality of race to law and policy, but its vocabulary and political commitments have since been embraced across social science disciplines (Obasogie, 2015; Crenshaw, 2010). Through a tenet of race-consciousness, CRT refutes the prevailing White liberal ideology of "colorblindness" which ignores the role of racialization and characterizes the exercise of racial domination as intentional and aberrational rather than systemic and ingrained (Crenshaw et al., 1995).[9] A subset of CRT, critical White studies, aims to reveal the structures that uphold White supremacy by focusing on the historical, juridical, and political process of White racialization; analyzing Whiteness as investment, property, or "invisible" privilege; or otherwise "problematizing whiteness as a corrective to the

[7] Mullings (2005) discusses how "traditional forms of accumulation by dispossession—of land, labor, resources, and rights" (675) continue, but also conceptualizes modes of dispossession to include "subordination, stigmatization, exploitation, exclusion, various forms of physical violence, and sometimes genocide" (684).

[8] As Cheryl Harris (1993) outlines in her seminal work, "Whiteness as Property," the origins of property rights in the US are rooted in the racial and economic subordination of Black and Indigenous peoples. As a system of property, chattel slavery was contingent upon racial identity; while Whiteness functioned to privilege and protect (a "property of free human beings") its absence meant being the object of property (Harris, 1993: 1721). Following the abolition of slavery, the legal property interest in Whiteness was maintained as White identity became the basis for racialized privilege, a type of "status property" permitting access to a host of public and private benefits and legal entitlements (Harris, 1993: 1734). After legalized segregation was overturned, Harris contends that Whiteness as property reemerged in a more subtle form through the law's ratification of White privilege and Black subordination as a legitimate and normative, but unacknowledged, baseline.

[9] Among its many substantive themes, CRT rejects the notion of a "racially neutral" state as obscuring its active and deeply politicized role in sustaining unjust hierarchies of racial power.

traditional focus on the racialized 'other'" (Applebaum, 2016: 1; Delgado & Stefanic, 1997).

A growing number of scholars use CRT-derived empirical frameworks to engage in disciplinary self-critique and draw on experiential knowledge informed by their social locations to study how racialized constructs and mechanisms influence health inequities (Ford & Airhihenbuwa, 2010a, 2010b, 2018; Graham et al., 2011). This dissertation is guided by CRT in its examination of structural racialization, policy, and health inequity and in its race-conscious critique of housing and health research; it is necessarily informed by the ongoing exploration of my own racism and the locally and historically contingent system of White supremacy which I have benefited from as a Jewish White woman born and raised in an affluent suburb of metropolitan Detroit.

The enduring structure of metropolitan segregation and racial health inequity

As segregation is "both cause and product in the processes that shape the construction of race in America," it is considered a fundamental cause of racial health inequity (Williams & Collins, 2001; Schulz et al., 2002; Mahoney, 1995: 1659). As Jim Crow laws and overt racial violence formed the basis of White hegemony in the postbellum south, northern institutions relied on more covert, rhetorically neutral, and distinctly territorial ways of enshrining Whiteness as a form of property that accumulates capital and is protected by law (Harris, 1993; powell, 2007). As millions of Black Americans migrated north during the first half of the 20th century, they encountered different but no less exacting rules around race and space (Logan et al., 2015). These rules governed largely through the differential distribution of housing opportunities, including diverse modes of exclusion and extraction designed to restrict property ownership and spatial mobility for Black people as the state's creation and expansion of the suburbs provided the "necessary space and boundaries for whiteness to continue to flourish" (powell, 2005: 29).

Early mechanisms of segregation were not only legal but instituted and enforced by the laws and housing policies of federal, state, and local governments; many, under the evolving guise of race neutrality, proved entirely robust to civil rights reforms (powell & Cardwell, 2014; Rothstein, 2017). In the mid 20th century government-backed, low-interest loans and subsidies financed sprawl and White flight, while race-based federal underwriting criteria systematically undervalued racially integrated central-city neighborhoods and made access to suburban homeownership virtually unattainable for Black people (Wiley & powell, 2006). Localist politics proliferated, as newly classified "White" homeowners and their elected officials–empowered by

judicial rulings, federal guidelines, and state constitutions–used the tools of municipal incorporation and exclusionary zoning to "protect" White property values by codifying the color line (Freund, 2007). Abetted by an array of other extra-legal and state-sanctioned policies and tactics, reinforcing processes of segregation and municipal fragmentation promoted racially separate and unequal distributions of public and private capital and political power, determining not just access to homes and wealth, but also advantages across the domains of education, healthcare, neighborhood quality, and public services (Weiher, 1991; Williams & Collins, 2004).

More than half-century after the Fair Housing Act of 1968 made housing discrimination unlawful, the state remains complicit in the maintenance of metropolitan apartheid conditions. High and distinctive levels of Black-White metropolitan segregation (across all levels of household income) declined little between 1970 and 2010 and remain especially pervasive in the 21 "hypersegregated" areas where one-third of all Black metropolitan residents live (Intrator et al., 2016; Massey & Tannen, 2015). Rather than remaining stagnant, the social and geographic structure of segregation has "changed bases" over the past 40 years as municipalities have replaced neighborhoods as the central organizing units of metropolitan segregation and the continued sprawl of affluent Whites to the outer suburban ring has led class segregation to become further entrenched (Massey et al., 2009). In fact, Black-White segregation levels between municipalities have increased, even as integration across neighborhoods and trends toward Black suburbanization indicated racial progress (Fischer et al., 2004; Lichter, 2013).

Because race–and corresponding health inequities–are phenomena in constant formation, it is necessary for public health scholars to consider segregation not as the passive result of previous racism, but as an active set of relationships and processes through which institutions, policies, and governance structures do the ongoing work of racialization (Smith, 1993; Lief & Goering, 1987). Since White dominance has been tacitly institutionalized, every aspect of the metropolitan structure is oriented to enable Whites and White institutions to accumulate wealth, power, and resources directly and indirectly through the devaluation, disempowerment, and deprivation of Black people, neighborhoods, and cities (Fullilove, 2001; powell, 2000a, 2005; Wiley & powell, 2006; Martin & Varner, 2017). While these and other structural forms of violence may not constitute discrimination in the eyes of the law, they are nonetheless perpetuated by a recalcitrant system of policy-driven White supremacy that denies Black Americans equal life chances, life opportunities, and life expectancies to Whites (Ansell, 2017).

Housing and health research gaps

Given the embeddedness of race, space, and property relations[10] in the US, the present-day relationship between housing and health is an area apt for investigation by public health scholars attentive and committed to racial health justice. My work draws on a long-standing body of research by demographers and public health geographers that links segregation, and the socio-spatial inequality it engenders, to racial health inequity (see reviews, Kramer & Hogue, 2009; White & Borrell, 2011). My work is also informed by a more recent body of social epidemiological research that relates health to indicators of housing instability and dispossession (e.g., foreclosures) (see reviews, Tsai, 2015; Downing, 2016). However formative, I argue that these domains of the housing and health literature remain largely disconnected and suffer from critical limitations that constrain the field's ability to understand or address contemporary forms of structural racism (i.e., structural racialization). I provide a fuller discussion of these limitations (and others) in the body of my dissertation, but here I identify three areas of study that remain conceptually and methodologically underdeveloped in the literature and describe my primary contributions to each.

Existing public health scholarship does not adequately contend with the social and material condition of Whiteness or how it is constructed, empowered, and embodied spatially in segregated metropolitan areas. Considering segregation the "spatial manifestation of institutionalized racism,"[11] a large body of research has focused on how segregation produces racial disparities in health by exposing Black Americans to myriad harms of concentrated poverty and environmental neglect while denying access to the material resources and political power necessary to promote health and avoid disease (Williams & Collins, 2001; Schulz et al., 2002). These contributions have done much to facilitate a paradigmatic shift in public health away from victim-blaming approaches that locate the cause of racial health inequities in biological and behavioral determinants, towards ones that position disparities within a social structure where racism persists "without racists" (Bonilla-Silva, 2003) and colorblind forms of anti-Black discrimination require neither intent nor action to influence health inequity (Hicken et al., 2018).

[10] Property is "something that can be possessed as well as a set of conditions defining the terms of that possession.… [it is] both material and figurative, simultaneously a means to accumulate wealth and a site of belonging and identity" (Bonds, 2019: 575-576)

[11] Perhaps the best-known definition of institutional racism in public health comes from Jones (2000: 1212), who defines it as: "[D]ifferential access to the goods, services, and opportunities of society by race. Institutionalized racism is normative, sometimes legalized, and often manifests as inherited disadvantage. It is structural, having been codified in our institutions of custom, practice, and law, so there need not be an identifiable perpetrator. Indeed, institutionalized racism is often evident as inaction in the face of need."

Still, in righteously emphasizing the consequences of structural violence on the health of Black and other oppressed communities, hegemonic conceptions of institutionalized racism may obfuscate the mechanisms of domination and privilege which make that discrimination possible, powerful, and efficient (Wildman & Davis, 1997; Mahoney, 1995). As discussed, the system of anti-Black policies that manufactured segregation necessarily (re)constructed Whiteness and gave Whites a collective stake in maintaining a system where "practically every circumstance of bias and discrimination against blacks has produced a circumstance and opportunity of positive gain for whites" (Oliver & Shapiro, 1995: 51; Lipsitz, 1998). Greater empirical attention to Whiteness may help reveal structures and mechanisms of resource hoarding that foster urban inequality (Seamster, 2015), the extent to which undue health advantages contribute to racial health disparities (Daniels & Schulz, 2006), and the manner by which White supremacy harms the health of all people (Malat et al., 2018). In Chapter 2 I argue that the study of health inequities, particularly as they are suffered by Black Americans in segregated urban areas, can be complemented by a critical analysis of White supremacy that examines not just the social and material condition of Whiteness–including the unearned privileges and health benefits that accompany it–but also the institutions, geographies, and histories through which Whiteness takes on a political reality with causal implications for metropolitan health equity.

Current research overlooks the structure and function of municipal institutions in upholding racialized metropolitan hierarchies in public life and population health. Research has documented a consistent association between segregation and Black-White mortality differentials across US metropolitan areas, and an intriguing body of evidence indicates that fragmented local governance patterns may structure this enduring relationship (Hutson et al., 2012; Hart et al., 1998). Yet studies examining the relationship between segregation and mortality at lower levels of analysis *within* metropolitan areas have been rare and primarily focused on patterns at the neighborhood level (often measured as census tracts or zip codes). Despite substantial scholarly attention to the role of socioeconomic factors in mediating the relationship between segregation and health, the discipline has yet to investigate how the underlying structures of government that balkanize regions by race and class also produce inequalities in the cost, quality, and availability of local goods and services that have significant bearing on public life and population health (Hill, 1974). Chapter 3 focuses on how historic inequities in income and wealth endemic to segregation

might stratify the distribution of fiscal needs and resources between municipal geographies to institutionalize racialized hierarchies in fiscal and population health.

Dominant epidemiological frameworks are ill equipped to investigate policy-driven patterns of racialized dispossession. Using a population health perspective, scholars have worked to identify a set of housing and urban policies that have privileged the material interests of Whites while contributing to the repeated and multi-scalar extraction of social, economic, and human assets–including health–from Black communities (New York Academy of Medicine working group on serial displacement, 2009; Saegert et al., 2011; Fullilove & Wallace, 2011). This uninterrupted cycle of "serial displacements" is thought to have negative implications for the health of individuals, groups, and places within and across generations, contributing to cumulative disparities in housing and health vulnerability over time (Saegert et al., 2011; Saegert & Evans, 2003). It is thus critical for public health scholars to have the conceptual and methodological tools to identify emergent forms and racialized patterns of policy-induced dispossession, particularly in segregated urban areas where prior policies have led Black populations to suffer jointly from structured disadvantage in the housing market and disproportionate burdens of poor health.

Despite growing acknowledgement of the importance of housing policy and displacement for contemporary health inequities, the social epidemiological literature linking housing dispossession to health has paid insufficient attention to upstream social factors (e.g., policies, segregated housing markets) driving the relationships of interest. While prior studies have been effective in identifying housing dispossession as an important social determinant of health, most conform to a "dominant epidemiological paradigm" that regards the relationship between housing and health as one of individualized "risk factors" and "outcomes," rather than the systemic expression of group-based power differentials (Brown et al., 2001). This approach obscures the role of racialization in structuring the relationship between housing and health, overlooks the spatial and historical context of health inequities, and limits the policy relevance of study findings. In Chapter 4, I suggest that the relationship between housing dispossession and health be assessed in a manner that moves away from the dominant epidemiological paradigm, towards a more contextualized, spatial, and race-critical approach that is designed to identify the legal mechanisms through which structural racialization perpetuates inequities in housing and health.

Dissertation outline

Many questions remain about the specific institutions and laws through which segregation reconstructs race and racialized differences in power, resources, and health at the population level. These questions are timely given a renewed commitment in public health to deepen the field's understanding of race and structural racism to advance racial health equity. In light of persistent health inequities in segregated metropolitan areas made more severe by the COVID-19 pandemic, it is critical that public health researchers move beyond dominant theoretical and methodological paradigms and draw upon the strengths of multiple disciplines to study the contemporary ways that structural racialization functions to maintain White supremacy and its embodied consequences in US metropolitan areas. This dissertation contributes to a rich body of research linking housing and health, applying critical race theory and methods from the fields of demography, social geography, and legal epidemiology to conceptualize and measure policy-driven patterns of Whiteness, anti-Blackness, and health inequity in metropolitan Detroit.[12] The specific inquiries presented in Chapters 2-4 are outlined below:

Chapter 2 provides new insight on the enduring connection between metropolitan segregation and racial health inequities by examining the ecological relationship between relative measures of Whiteness and excess mortality across municipalities (cities and townships) in the tri-county Detroit Metropolitan Area (DMA) in 2010.[13] Using data from the Michigan Department of Community Health and the US Census, I use the indirect method of standardization to estimate all-cause mortality ratios for persons under age 65 to describe the state of inter-municipal excess morality disparities in the DMA. I assess the hypothesis that populations living in predominantly White municipalities experience a mortality advantage and that this advantage is stronger among White populations than Black populations and benefits a far larger share of the White population. Grounded in a analytic framework of spatial White supremacy, Chapter 2 leverages the socio-political construct of Whiteness not just to *measure* the extent to which the condition of suburban

[12] Here, "metropolitan Detroit" refers generally to the city of Detroit its surrounding suburbs. Operationally, this differs from the Detroit-Warren-Livonia MSA, which consists of six counties: Lapeer, Livingston, Macomb, Oakland, St. Clair, and Wayne. The geographic study area for Chapters 2 and 3 is the tri-county Detroit Metropolitan Area (DMA) (which includes the MSA's central counties of Macomb, Oakland, and Wayne) and Chapter 4 focuses on the central county of Wayne, home to the MSA's largest and most historic principal city, Detroit.

[13] In contrast to the "outlying" counties of Lapeer, Livingston, and Monroe (which were added to the Detroit MSA in 1980), these larger and more densely populated "central" counties comprise the most substantial portion of the core urban area (Mackun & Wilson, 2011). Historically, the political, economic, and demographic processes which took place within and between suburban Wayne, Oakland, and Macomb counties and the city of Detroit have been the most influential in shaping the region's contemporary geography of inequality (Darden et al., 1987; Freund, 2007).

Whiteness brings undue and outsized benefits to the health of White DMA residents, but also to *problematize* this embodied manifestation of dominance within the context of a stark metropolitan health hierarchy where Black residents suffer disproportionately from excess death. By examining the relationship between race and mortality at the level of the municipal geography–that is, among political units with interconnected histories, demographic patterns, and fiscal relations–Chapter 2 informs new hypotheses regarding the role of local governance in structuring intra-metropolitan racial mortality disparities suggested in past research (Hart et al., 1998; Hutson et al., 2012).

Building on findings from Chapter 2, Chapter 3 assesses whether spatial patterns of White supremacy evident in the accumulation and deprivation of fiscal resources may contribute to inter-municipal health inequities in the DMA. Incorporating additional data from the Michigan Department of Treasury and the American Community Survey (ACS), I construct a relative measure of fiscal health to explore the expectation that inequities in the distribution of social needs and taxable resources across municipalities favor Whites in predominantly White suburbs at the expense of Black municipal populations. I estimate the Slope Index of Inequality to quantify gaps in excess death associated with municipalities' relative fiscal health and compare how the strength of these gradients differed between White and Black municipal populations. I then explore interdependent relationships between Whiteness, fiscal health, and race-specific variation in excess mortality to assess whether systemic fiscal advantages mediate the health-relevant power of suburban Whiteness. To my knowledge, this study is the first to employ a measure of municipal fiscal health to examine intra-metropolitan health inequities, shedding light on how institutionalized racial inequities in income and property wealth can shape patterns of population health in segregated and politically divided regions.

In drawing attention to the historical, institutional, and political factors that uphold Whiteness and the embodied violence of White supremacy at the municipal level–including a racialized system of property and taxation that maps onto persistent disparities in health–Chapters 2 and 3 provide important context for Chapter 4 to study the downstream health geographies of anti-Blackness. Despite growing evidence for the racially discriminatory impact of tax foreclosure proceedings and an emergent body of research linking foreclosure and health, the health equity implications of tax foreclosure policy remain understudied (Atuahene, 2018; Tsai, 2015, Downing, 2016). Chapter 4 adds to our understanding on this topic by quantifying the extent to which Michigan's tax foreclosure policy operated as a legal instrument of racialized dispossession in

Wayne county (the DMA's central county), then assessing whether racialized spatial patterns of housing dispossession intersected with preexisting inequities across neighborhoods–affecting Black neighborhoods where excess burdens of death and disability were already severe–to potentially exacerbate persistent racial disparities health.

To do so, Chapter 4 leverages the legal concept of disparate impact to assess evidence for structural racialization in the spatial distribution of occupied tax foreclosures and urban health equity across census tracts in Wayne county. Using data from the ACS and several public sources, I adapt a community-informed measure of urban health equity to describe the severity of racialized health inequity in the sample. I examine novel data from the Wayne County Treasurer's office on the occupancy status of tax-foreclosed properties to expand evidence for the racially disparate impact of tax foreclosure administration in Wayne county, quantifying the extent to which rates of housing dispossession were higher in neighborhoods where Black households were overrepresented relative to the county as a whole and relative to predominantly White neighborhoods. I then explore associations between occupied foreclosure burdens and population health, attentive to the expectation that structural racialization shapes concurrent inequities in both domains. As the first study to operationalize disparate impact for housing and health research, this study generates new knowledge on how structural racialization operates through housing laws and policies to reify racialized hierarchies of housing and health.

In Chapter 5 I summarize major findings from Chapters 2-4 and discuss their broader contributions to the field of housing and health research. I conclude the dissertation with a discussion of what this research means for future research and policy necessary for the transformation of our social and metropolitan structures.

Chapter 2. Spatial White Supremacy and the Racial Health Hierarchy in Metropolitan Detroit – Part I: The Municipal Geography of Whiteness and Excess Mortality

Introduction

Despite substantial improvements in US life expectancy, disparities in the leading causes of death between Black and White Americans remain wide across the lifespan, with Black all-cause mortality rates exceeding those of Whites in all age groups younger than 65 years (Cunningham et al., 2017). The most trenchant racial disparities in excess mortality persist in highly segregated metropolitan areas (Popescu et al., 2018; Cooper et al., 2001). A wide body of public health literature has been successful in documenting spatial patterns of early and unjust death among Black populations compared to White populations and conceptualizing such inequities as the embodiment of an oppressive and disempowering metropolitan structure (White & Borrell, 2011; Williams & Collins, 2001). Largely absent from this research are explicit attempts to investigate the socio-spatial construct of Whiteness or consider its attendant health benefits within a relational framework of institutionalized White supremacy (Daniels & Schulz, 2006; Malat et al., 2018). This analytic oversight is reinforced by the field's reliance on routine geographic levels of analysis, which tend to overlook the "fatal couplings of power and difference" that exist between legally bounded, racially identified local political geographies within US metropolitan areas (Gilmore, 2002b; Ford, 1994).

Amidst the racialized suburbanization, governmental fragmentation, and economic de-centralization of US metropolitan areas, the legal and political functions of municipalities proved integral to processes of race and class exclusion designed to privilege the private property interests of Whites and enable elite White suburbs to accumulate disproportionate shares of the region's capital (Tyson, 2014). This has contributed not just to stark and persistent patterns of racial segregation between municipal jurisdictions (Weiher, 1991; Massey et al., 2009; Farrell, 2008), but also wide inter-local disparities in the concentration of poverty and fiscal resources between central cities and their suburbs and among older and newer suburbs (Hill, 1974; Orfield & Dawes, 2005; Hendrick, 2004). Thus, municipalities are social institutions of key importance to the

mediation of racial power and the material enactment of White supremacy in US metropolitan areas (Seamster, 2015). To the extent separate and unequal municipal conditions permit White suburban residents to accrue health and fiscal advantages while inflicting corporal harms upon Black and other non-White racialized groups and spaces, municipalities may serve not just as settings for racial health inequities, but structural staging grounds for their reproduction.

The present ecological study provides new insight on the connection between metropolitan segregation and racial health inequities by examining the relationship between geographical Whiteness and excess mortality across municipalities (cities and townships) in the tri-county Detroit Metropolitan Area (DMA) in 2010. To situate this study in the current literature, the first section of this paper deliberates on how a framework of White supremacy can enlighten the connection between metropolitan segregation and racial health inequities. After describing past research linking segregation, political fragmentation, and excess mortality, I suggest how the field may benefit from an analytic approach that leverages the construct of spatial Whiteness to illuminate institutionalized power relationships and embodied manifestations of domination at the municipal level that have been largely overlooked in prior studies.

Subsequent sections describe the design, methods, and results of my analysis. First, I estimate indirectly standardized all-cause mortality ratios for persons under age 65 to describe the state of inter-municipal excess morality disparities in the DMA. I expect that White populations will experience lower average excess mortality burdens than the metropolitan area as a whole and Black populations will experience higher average burdens of excess death. I then examine whether excess mortality varies in relation to a measure of relative spatial Whiteness and assess the extent to which this relationship differs between White and Black municipal populations. Empirically, I assess the hypothesis that populations living in predominantly White municipalities will experience a mortality advantage and that this advantage will accrue disproportionately to the health-benefit of Whites; in other words, I expect the protective effect of Whiteness to be stronger among White populations than Black populations and benefit a far larger share of the White population. Conceptually, I employ a framework of spatial White supremacy to problematize the undue health privileges of suburban Whiteness within the context of a racialized metropolitan health hierarchy where Black populations suffer disproportionately from excess death.

This paper concludes with a summary and discussion of key findings, a review of study limitations, and ideas for how this research can inform hypotheses on the everyday geographies,

institutional relations, and political processes that sustain the health-relevant power of suburban Whiteness in segregated and politically fragmented regions. This leads to Part II (Chapter 3) of this paper series, which considers whether spatial patterns of White supremacy evident in the accumulation and deprivation of fiscal resources may contribute to racialized metropolitan hierarchies in health.

Background

White supremacy as an analytic frame for segregation and health research

As bell hooks (1989: 112) has explained, "the word racism ceased to be the term which best expressed for me exploitation of black people and the other people of color in this society…when I began to understand that the most useful term was white supremacy." While mainstream discussions of White supremacy tend to narrowly apply the term to the extreme ideologies and affairs of White separatist hate groups (Newkirk, 2017), critical race scholars have long advocated for a more global framing that offers an "overarching holistic reconceptualization of the polity as a system of group domination" (Mills, 2003b, 2003c: 271; Crenshaw et al., 1995; Delgado & Stefancic, 1997). Illustratively, Ansley (1989: 1024) theorized White supremacy as: "a political, economic, and cultural system in which whites overwhelmingly control power and material resources, conscious and unconscious ideas of white superiority and entitlement are widespread, and relations of white dominance and non-white subordination are daily reenacted across a broad array of institutions and social settings." Such a framework is germane to the study of segregation and racial health inequity for several reasons described below.

The explicit coupling of White domination with non-White subordination reinforces a relational understanding of racism in which race operates "not as a quality of people of color, but as an unequal relationship involving both accumulation and dispossession" (Mullings, 2005: 685). This not only facilitates awareness that races are constantly being constructed and ascribed meaning in relation to each other (Bonilla-Silva, 1997, 2001), but by rendering Whiteness and the racialized structures that empower it more visible, White supremacy frames force attention to the mechanisms through which Whiteness takes on a material reality with causal implications not just for the health of Whites, but all people (Malat et al., 2018; Mills, 2003a; Roediger, 1994). Whiteness is constitutively anti-Black, sustaining value as a construct so long as it functions to serve the social, economic, and political interests of White people and White institutions through the dispossession of land, labor, resources, and rights from Black people and other minoritized

groups (Mullings, 2005; powell, 2000b; Leonardo, 2004; Mills, 2003c; D. W. Sue, 2006). Critical to discussions of racial health inequity is recognition that racism does not happen *to* particular groups or places, but *between* them (Gilmore, 2002a), and when privileges are afforded to Whites, the burden of paying for those privileges falls upon people of color (King, 2010).

Applied spatially, a framework of White supremacy emphasizes the function of geography both as a site for constructing White racial identity and as a resource for (re)producing the social and material inequalities that are embodied as health disparities (Pulido, 2000, 2015; Ford, 1994; Delaney, 2002; Neely & Samura, 2011). Critical race scholars have long theorized space as an "enabling technolog[y]" of race (Ford, 1992: 123), and boundaries "not simply [as] markers between equal spaces...[but] put in place for the benefit of one group in opposition to another" (powell, 2005: 16). Critical to the relationship between race and space is property and the way it is protected law; property is understood not just as an entity (land, housing) but a "set of relations that are discursively and materially constituted through everyday power relations" (Bonds, 2020). As I describe in the next section, a racialized structure of federal housing policies, state constitutions, land-use laws, and municipal finance systems fragmented US metropolitan areas racially, politically, and economically, granting Whites their historically and geographically specific seat of power in the metropolitan racial hierarchy. In determining who is entitled to the host benefits vested in the status of suburban Whiteness–and who is excluded, exploited, and made vulnerable by them–municipal boundaries function to institutionalize and recreate daily the material conditions of White supremacy (Hill, 1974; Tyson, 2014; Ford, 1994).

Further, in shifting the focus of critical analysis "from the racial object to the racial subject" (Morrison, 1992: 90), a deliberate framing of White supremacy can also negate the myth of "White innocence" that allows White people to accept the undue benefits of Whiteness but deny responsibility for how their complacency inflicts material and bodily harms upon Black people and other oppressed groups (D. W. Sue, 2006; Baldwin, 1965; powell, 2000b). Without this framing, passive discussions of institutionalized racism and White privilege can contrive "images of domination happening behind the backs of whites, rather than on the backs of people of color" (Leonardo, 2004: 138). While racial health injustices are historic and cumulative, White people and White institutions remain active agents in perpetuating health inequities because they accrue opportunities, resources, and rewards under a status quo predicated on racial oppression (Harris, 1993; Lipsitz, 1998). Yet within the context of a colorblind racial discourse, people racialized as

White may allege not to experience their Whiteness (Lewis, 2004), nor is such acknowledgement of one's Whiteness necessary to profit from it or seek to protect it (Lipsitz, 2002; Seamster, 2015). By connecting the causal link between spaces of privilege and longevity to those of suffering and early death, a framing of White supremacy in segregation and health research names and acknowledges that "the starting position is not neutrality but complicity" (Lee, 2020), and can thereby promote a politics of White accountability (Dwyer & Jones, 2000; Brown, 2021).

Residential segregation as spatial White supremacy

> "What white Americans have never fully understood–and what the Negro can never forget–is that white society is deeply implicated in the ghetto. White institutions created it, white institutions maintain it, and white society condones it."
>
> –Kerner Commission, 1968

Present-day patterns of residential segregation are a spatial manifestation of White supremacy (Bonds & Inwood, 2016; powell, 2005). The segregation of Whites within suburbia afforded them (relative to Black people and other groups) privileged access to an array of benefits, not limited to quality education, living-wage job opportunities, safe neighborhoods free from pollution, and home equity (Ellen et al., 2016). Whites acquired these benefits by way of their state-sanctioned and extra-legal preeminence within a discriminatory housing market (Freund, 2007; Sugrue, 1996; Rothstein, 2017), and the advantages gained, particularly with respect to wealth generation through home ownership and value appreciation, accumulated generationally and concentrated spatially (powell, 2005; Pfeffer & Killewald, 2018). These same privileges were not only denied to people of color–they occurred at their expense (Squires & Kubrin, 2005). Patterns of disinvestment, concentrated poverty, and tax base erosion in predominantly non-White central cities and inner-ring suburban communities are inextricably linked to the prosperity of their elite White suburbs (Phelan & Schneider, 1996; powell, 2000a; Yang & Jargowsky, 2006).

Throughout the 20th century, racialized processes of suburbanization and political fragmentation built the edifice of segregation and functioned to institutionalize Whiteness as a precondition for economic prosperity (Lipsitz, 1998). In the early and mid 20th century, a growing number of states adopted statutory "home rule" provisions, which empowered localities to incorporate as politically autonomous municipal jurisdictions with authority to pass laws, collect taxes, and provide public services (Mott, 1949; Krane et al., 2001). At approximately the same time, New Deal and post-WWII federal interventions in the home mortgage market fueled decentralized patterns of metropolitan settlement, economic development, and governance by

subsidizing the construction and ownership of single-family homes in the suburbs, secured almost exclusively for Whites (Rothstein, 2017). Founded on the racialist market logic that non-White occupancy undermined property values and economic investments, national appraisal and lending policies codified new mechanisms for enacting and rationalizing segregation as means for preserving Whites' exclusive access to wealth–while municipal boundary law worked to inscribe these privileges into the metropolitan political landscape (Freund, 2007).

As municipal incorporation proliferated in the postwar era, suburban governments increasingly employed exclusionary land-use policies meant to maintain racial homogeneity and economic exclusivity while also strengthening their tax bases, which are largely determined by the value of property within their borders (Burns, 1994). Homeowners' "possessive investment" in the social mobility and economic benefits that accompanied suburban residence fostered unity amongst an ethnically diverse population of European immigrants and their descendants who became newly classified as "White" (Lipsitz, 1998; Brodkin, 1998). To defend the color line, White property owners and neighborhood associations wrote race-restrictions into their deeds, elected local officials who professed segregationist politics, mobilized to oppose the development of rental and low-income housing projects, and engaged in organized violence against Black "pioneers" that sought access to White neighborhoods (Sugrue, 1996). As explicitly race-based tools like restrictive covenants and redlining policies became less legally viable, localities were driven to establish municipal status in order to exercise its associated zoning powers, which permitted land-use laws to regulate in "race-neutral" terms the kind of housing that was built in suburban communities, and thus the types of people that could live there (Freund, 2007).

Long after the civil rights movement dismantled discrimination in public accommodations and private housing, municipalities' racially coded minimum lot-size and maximum-density requirements continue to restrict Black in-migration by limiting the development of affordable rental units and modestly priced homes (Themba-Nixon, et al. 2001; Rothwell & Massey, 2009). Because the property tax is the principal source of independent revenue for local governments, competition for the metropolitan tax base incentivizes local governments to preferentially zone for developments that attract wealthy and predominantly White new residents and high-end firms that drive up land values and contribute more in tax revenues than they demand in local services, and conversely, to exclude low-income residents and regionally necessary, but locally undesirable land-uses which may dilute their per-capita wealth (Briffault, 1996). Importantly, racialized

municipal boundaries and zoning laws continue to allow affluent White suburbs to hoard wealth and amass public service benefits by allowing them to evade responsibility for the region's fiscal needs by preventing the redistribution of their local tax revenues to other localities (Tyson, 2014).

The same processes which ensured the conditions of growth and asset accumulation for spaces made to be defined by their Whiteness guaranteed the conditions of decline, impoverishment, and disempowerment for those that came to be defined by their Blackness. The spatial chasm between affordable housing, well-paying jobs, and adequately funded school systems fostered by racially uneven development and jurisdictional partitioning leads segregation to parallel and perpetuate socioeconomic stratification by income and wealth (powell, 2008; Massey, 2016; Darden et al., 1992). Segregation of White people from Black people (compared to other racial/ethnic minority groups) remains distinctive in the US and particularly pronounced in a subset of mature, populous metropolitan areas in the Midwest and Northeast that have historically maintained some of the nation's largest urban Black communities (Intrator et al., 2016; Massey & Tannen, 2015). Although Black demographic dominance fostered opportunities for building Black political power and advancing Black freedom struggles in cities abandoned by Whites, economic marginalization wrought by tax base withdrawal, deindustrialization, and the neoliberal restructuring of urban governance exacerbated geographic inequality and racialized forms of austerity (Spence, 2015; Phinney, 2018). While the decentralization of firms, capital, and primarily White residents took the highest toll on central cities in these regions, many older, inner suburbs with large working-class and Black populations have endured disinvestment, population loss, growing poverty, and fiscal distress as higher-income Whites fled further out to suburbs spatially and socially insulated from these harms (powell, 2000a; Harshbarger & Perry, 2019; Puentes & Orfield, 2002). As Black residents continue to expatriate the inner city, they are more likely than Whites of equal income to find themselves in class- and race-segregated enclaves that lack equal access to taxable resources, public services, and socioeconomic well-being (Reardon et al., 2015; Schneider & Phelan, 1993; Phelan & Schneider, 1996; Wiggins, 2002; Darden et al., 2019).

Prior evidence linking segregation, fragmentation, and excess mortality

A large body of empirical evidence indicates that Black-White mortality differentials vary substantially across US metropolitan areas, driven in large part by the racialized maldistribution of material resources and living conditions imposed by segregation (Kramer & Hogue, 2009; White & Borrell, 2011; Waitzman & Smith, 1998; Landrine & Corral, 2009). Examining trends

between metropolitan areas, research has consistently found positive associations between levels of Black-White segregation and Black infant, adult, and all-cause mortality, but only weak or null associations with White mortality (Polednak, 1991, 1993, 1996; Hart et al., 1998; Cooper et al., 2001; Eitle, 2009; Popescu et al., 2018), leading to larger racial mortality gaps in more segregated metropolitan regions (Potter, 1991; Polednak, 1991, 1993; Popescu et al., 2018). Studies that have examined the relationship between Black-White segregation and mortality across large cities and counties reveal similar trends (Collins & Williams, 1999; Peterson & Krivo, 1993; Gabreab & Diez Roux, 2012; Yang & Matthews, 2015). While there is some evidence among large and mid-size central cities that higher levels of Black-White segregation are *negatively* associated with rates of White infant mortality (LaVeist, 1989, 1992), such results may be subject to selection bias because they do not account for relationships between central cities and their surrounding suburbs (White & Borrell, 2011). Although socioeconomic inequalities widen with levels of racial segregation (Cooper et al., 2001), studies have found that race-specific measures of poverty, income, education, and employment attenuate but do not eliminate the relationship between metropolitan segregation and mortality disparities (Popescu et al., 2018).

Although this body of evidence evokes important questions about the more immediate contexts and local dynamics that drive macro-level trends observed in cross-metropolitan analyses, studies examining the relationship between segregation and mortality at lower levels of analysis *within* metropolitan areas are remarkably rare (Greer et al., 2011; Mehdipanah et al., 2017), while within-city analyses have been somewhat more common (Fang et al., 1998; Inagami et al., 2006; Guest et al., 1998; Zhou et al., 2017). Scholars who have adopted this place-based approach have found that Black mortality rates tend to exceed those of Whites overall, but that these rates differ substantially across residential areas with varying levels of Black and White racial homogeneity. Focusing almost exclusively on patterns of Black segregation at the neighborhood level (e.g., zip codes or census tracts), these studies generally show that spatial concentrations of Black residents are positively associated with overall and race-specific mortality rates for working-age Blacks and Whites (Mehdipanah et al., 2017; Greer, et al., 2011; Guest et al., 1998), even after accounting for individual and area-level socioeconomic factors (Jackson et al., 2000; LeClere et al., 1997; Greer et al., 2011; Guest et al., 1998).

However, there is evidence that the mortality effects of Black racial homogeneity can vary by place, social context, and age group. Some studies have found an inverse relationship between

Black neighborhood segregation and mortality for Black residents over age 65 (Fang et al., 1998; Inagami et al., 2006), although these findings may be influenced by "survival bias," a hypothesis which assumes that "residents who survived the adverse health effects of poverty and discrimination during their working years [are] less susceptible as a group to the health effects of racial residential segregation than…their younger counterparts" (Greer et al., 2011: 441). Hutchinson et al. (2009) found in Philadelphia that age-adjusted all-cause Black mortality was lowest in neighborhoods with high proportions of Black residents and high levels of social capital (i.e., trust, reciprocity, civic engagement), independent of neighborhood covariates. Outside mortality research, Bell et al. (2006) found that while Black residential isolation (the extent to which Black people are exposed only to Black neighbors) is associated with worse perinatal health among Black infants, higher levels of Black residential clustering (the extent to which Black people live in contiguous neighborhoods) is associated with more optimal outcomes, suggesting that the hypothesized pathways (e.g., political empowerment, community cohesion) linking Black demographic dominance to health may transcend neighborhood boundaries.

While these studies imply (largely through their absence) that spatial Whiteness and its attendant privileges (both measured and unmeasured by traditional socioeconomic indicators) are health protective, relatively few studies have examined this relationship explicitly, and some suggest that the communal health benefits conferred to Whites by their spatial dominance are not equally conferred to Black residents (Inagami et al., 2006). Examining census tracts in the Atlanta metropolitan area, Greer et al. (2011) found that rates of stroke mortality were significantly lower among Black and White adults aged 35 to 64 who lived in predominantly White neighborhoods compared with those who lived in racially mixed and predominantly Black ones, even after adjusting for education and poverty. Examining all-cause and cardiovascular disease mortality rates across zip codes in New York City between 1988 and 1994, Fang et al. (1998) found that White people living in predominantly (>75%) White areas had lower mortality rates than White people living in predominantly Black areas; the reverse was true for Black populations, for whom mortality rates were higher among Black people living in White areas compared to those living in Black areas and the city as a whole. After accounting for neighborhood poverty, education, and employment, the inverse relationship between White predominance and mortality held for White people of all ages, but middle-aged Black people experienced similar mortality outcomes regardless of whether they lived in Black or White neighborhoods (Inagami et al. (2006) replicated

these findings a decade later). While these findings suggest that White populations living in predominantly White areas tend to experience a marked mortality advantage, the extent to which the benefits of spatial Whiteness extend to the Black population remain in question.

A sparse but intriguing body of public health evidence indicates that fragmented local governance patterns may structure the enduring relationship between metropolitan segregation and Black-White mortality differentials. Hart et al. (1998) examined the relationship between segregation, local governance structure, and mortality across 114 Metropolitan Statistical Areas (MSAs) with principal cities. Using Rusk's (1993) scale, the authors measured the degree to which an MSA had a "metropolitanized" local government by the extent to which the MSA's central city expanded through annexation between 1950 and 1990 to capture metropolitan growth within its political boundaries, thereby limiting suburban fragmentation and White out-migration. This study found that greater metropolitanization was negatively associated with Black-White segregation, and that Black mortality rates were lower in MSAs with more metropolitanized local governments and lower segregation, independent of race-specific measures of poverty and education. Later, Hutson et al. (2012) found a positive link between political fragmentation (defined by the number of local municipalities, special service districts, and school districts) and Black-White mortality disparities across the 171 largest MSAs; fragmentation was associated with higher mortality rates for Black populations, but not White populations, and this relationship persisted after accounting for Black-White poverty ratios. Kim and Bruckner (2016) found causal historical evidence for this relationship, finding that between 1972 and 1988, increasing political fragmentation in large urban counties corresponded with widening Black-White mortality gaps over time.

Addressing the limitations of past research

Prior research provides strong evidence that the mutually constitutive processes of metropolitan segregation and political fragmentation foster the separate and unequal material conditions that engender racialized metropolitan health hierarchies, but little is known about how patterns of race and death are structured geographically within segregated US metropolitan areas. Notably, existing studies linking segregation to racial mortality disparities contain two interrelated limitations that lead to an incomplete understanding of the institutionalized power relationships and spatial manifestations of White supremacy that may perpetuate this relationship.

First, existing public health scholarship does not adequately contend with the social and material condition of Whiteness or how it is constructed, empowered, and wielded spatially within

segregated metropolitan areas. To date, most scholarship on intrametropolitan patterns of segregation and mortality has focused on documenting spatial relationships between Blackness, exposure to urban stressors, and excess death among Black Americans (Greer et al., 2011). When considered, Whiteness enters in as a referent category (in health outcomes), constitutes the majority of the space not occupied by Blackness (in segregation measures), or is acknowledged as a passive historical factor (in background discussions of White flight). Even when scholars conceptualize these relationships within a context of institutional racism, such an approach is problematic in that it leaves homogenous suburban Whiteness and its associated privileges largely unnamed, unmarked, and unmeasured–and thus beyond either scrutiny or reproach. As Whiteness is historically located and contingent, it requires constant reinforcement and maintenance; lest scholars are explicit in our empirical attention to Whiteness, we allow the mechanisms that empower Whiteness to remain invisible, which is itself a perpetuation of privilege (Mahoney, 1995, 1997). Indeed, Whiteness remains invisible and unchallenged in urban regimes "not because it is unimportant but because it is dominant" (Seamster, 2015: 1056). So long as a critical analysis of the social and spatial condition of suburban Whiteness remains absent from segregation and health research, so too will the field continue to normalize and ignore the violent processes and structures that make this construct impactful for health (powell, 2000b; Malat et al., 2018).

Second, the tendency for prior research to neither scrutinize nor problematize the spatial construct of Whiteness–especially the historical product of *suburban* Whiteness–can in part be attributed to the field's reliance on routine geographic levels of analysis. As previously discussed, municipalities possess distinct historical, political, and racialized identities that make them particularly useful for elucidating patterns of institutionalized White supremacy. Yet the small number of studies that have examined intrametropolitan patterns of racial segregation and mortality have relied solely on census tracts and zip codes as units of analysis. While the importance of racialized differences in neighborhood conditions for health inequity is well documented (Diez Roux & Mair, 2010; Landrine & Corral, 2009; Darden et al., 2010), many health-relevant aspects of neighborhood life (e.g., housing and environmental quality, retail and recreational opportunities, violence) are affected by municipal institutions and services (e.g., code enforcement and zoning laws, tax incentives for development, parks and public safety departments). Hence, an advantage of using municipalities as units of analysis in mortality research is that they are political structures of governance with tangible influence over the "health, safety,

[and]…general welfare" of their citizens (US Department of Commerce, 1926). Further, evidence indicates that municipalities have replaced neighborhoods as the central organizing units of metropolitan segregation over the past several decades (Massey et al., 2009), and that the uneven distribution of racial groups across metropolitan neighborhoods is shaped largely by racial distinctions between the municipalities in which neighborhoods are situated (Fischer et al., 2004; Lichter et al., 2015; Farrell, 2008). Given the functional importance of municipalities in shaping patterns of race, capital, and quality of life in metropolitan areas, an overreliance on neighborhoods as the unit of analysis in segregation and health research may obscure upstream legal, political, and economic processes that underlie health disparities (Osypuk & Acevedo-Garcia, 2010).

To address these limitations, this paper leverages the construct of spatial Whiteness at the scale of the municipality, a social geography of historical, legal, and political relevance to the metropolitan construction of White supremacy. The goal of this approach is to make visible the extent to which White people and predominantly White suburban institutions are able to accrue unequal health advantages within the context of a racialized metropolitan health hierarchy where Black populations suffer disproportionately from excess death.

Methods

Study setting

The tri-county DMA (including the counties of Oakland, Macomb, and Wayne, which contains the central city of Detroit) in Southeast Michigan provides a compelling context for this study. For decades the DMA has ranked among the most highly segregated metropolitan areas in the US (Massey & Tannen, 2015). It is also politically fragmented; in 2010, the DMA fully contained 127 general purpose municipalities, including 73 incorporated cities, 41 townships (24 charter, 17 general law), and 13 villages (US Census Bureau, 2010a, State of Michigan, 2019).[14] Using the last Census available, the DMA population in 2010 was 3,863,924 persons, of whom 65.0% were non-Latinx White, 25.0% were non-Latinx Black, and 10.0% were Indigenous and other people of color (IPOC), including Latinx populations and all other single- and mixed-race groups (**Table 2.1**) (US Census Bureau, 2010b). Racial divisions were stark between Detroit and its suburbs, with 97.5% of all DMA Whites living in a suburban municipality. Still, nearly 40% of the DMA's Black residents lived outside the city of Detroit in 2010, 69.7% of whom resided in an

[14] Two cities (Memphis and Richmond) with populations split between Macomb and an exterior county are excluded.

inner-ring suburb.[15] DMA municipalities were noticeably segregated by race (**Figure 2.1**), with Whites being demonstrably more isolated than Black people; in 2010, the average White person lived in a municipality that was 80.1% White, compared to the average Black person who lived in a municipality that was 63.1% Black (US Census Bureau, 2010b).[16] In 2010, 72.0% of either White or Black residents would have needed to move to a different jurisdiction for there to be an even racial distribution across DMA municipalities.[17]

Table 2.1 *DMA and sample population characteristics, 2010*

Metropolitan component	Total pop.	Land area (sq. mi.)	Pct. of DMA	Pop. density	Non-Latinx White		Non-Latinx Black		IPOC	
					Pop.	Pct.	Pop.	Pct.	Pop.	Pct.
DMA	3,863,924	1,959	-	1,972	2,511,271	65.0	967,157	25.0	385,496	10.0
Detroit	713,777	139	18.5	5,144	55,604	7.8	586,573	82.2	71,600	10.0
Suburbs	3,143,591	1,817	81.4	1,730	2,449,572	77.9	380,524	12.1	313,495	10.0
Inner	1,380,322	380	35.7	3,629	987,960	71.6	265,252	19.2	127,110	9.2
Outer	1,763,269	1,437	45.6	1,227	1,461,612	82.9	115,272	6.5	186,385	10.6
Full sample	3,849,532	1,951	99.6	1,974	2,500,297	65.0	964,624	25.1	384,611	10.0
Excl. Detroit	3,135,755	1,812	81.5	1,731	2,444,693	78.0	378,051	12.1	313,011	10.0
City sample	2,706,853	773	70.1	3,502	1,536,676	56.8	885,057	32.7	285,120	10.5
Excl. Detroit	1,993,076	634	51.8	3,142	1,481,072	74.3	298,484	15.0	213,520	10.7

Note: The DMA refers to Wayne, Oakland, and Macomb counties. The suburbs include 113 municipalities fully contained within the DMA outside the city of Detroit (village populations are excluded because they are contained within townships). The full sample consists of 69 cities and 39 townships (including 23 charter townships) within the DMA that contained more than 2,500 people in 2010. The city sample includes only incorporated home rule cities. 'Excl. Detroit' samples exclude the city of Detroit. IPOC=Indigenous and other people of color (i.e., neither non-Latinx White nor non-Latinx Black).

Race and racism fundamentally shaped the spatial, economic, and political development of Detroit's metropolitan region. Detroit's automotive and wartime industries drew a large influx of Black Americans throughout the Great Migration (Sugrue, 1996). Postwar federal housing and transportation policies abetted massive suburbanization of the city's White population and firms, which accompanied a flurry of incorporation activity: 50 suburbs formed between 1940 and 1980, but Black people comprised less than 1% of newly incorporated places (Darden et al., 1987: 80). These changes dramatically restructured the distribution of race and capital in the region, setting forth spatial trajectories of growth and decline that would divide the region for decades. From 1960 to 1980, the DMA's suburban population grew by more than a third and would continue to increase

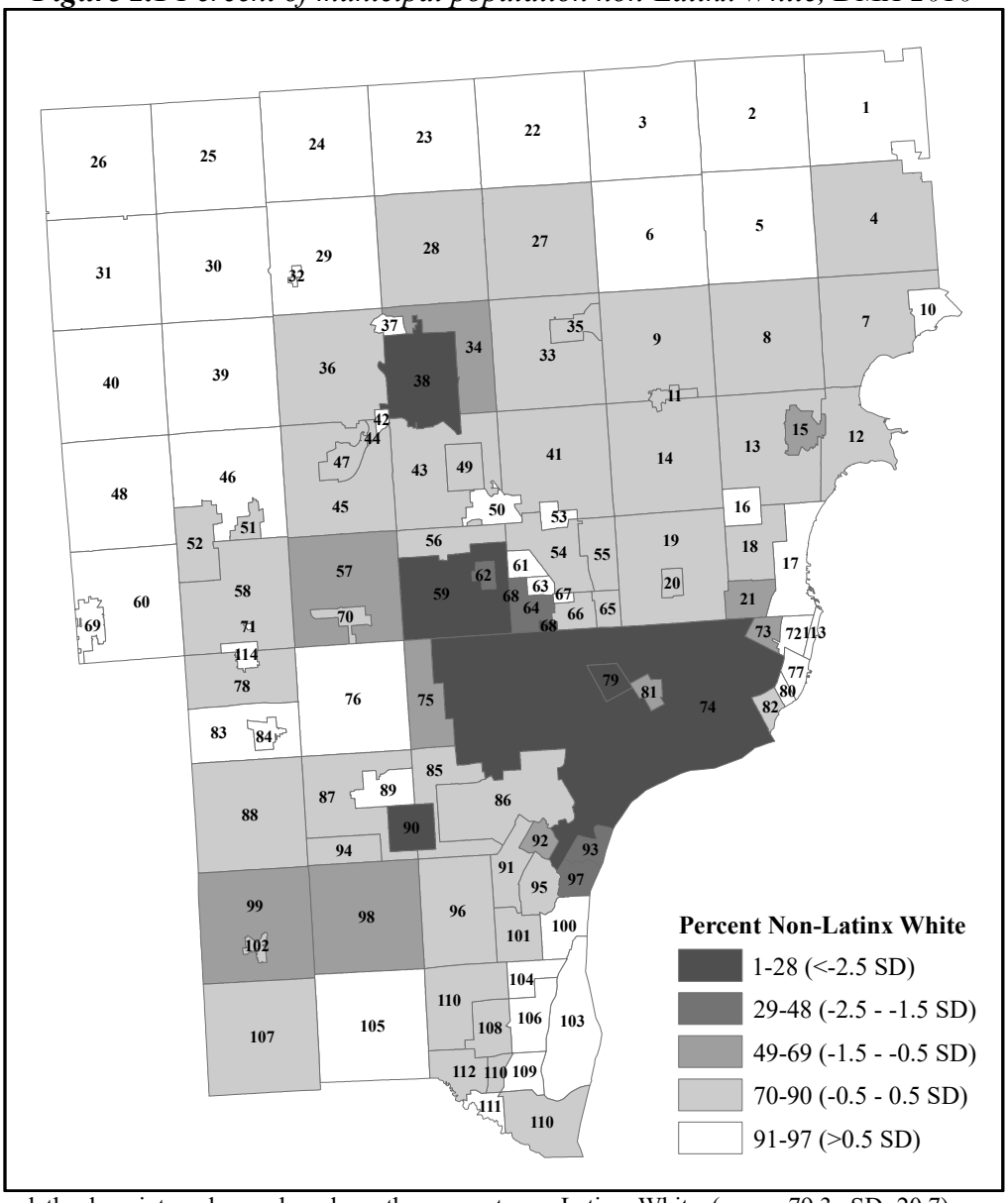
[15] Following the criteria of Hanlon and Vicino (2007), inner-ring suburbs are defined as those municipalities which either 1) share a boundary with Detroit; or 2) share a boundary with a unit adjacent to Detroit and have a majority of the housing stock built prior to 1970 (circa 2000). Here, Pontiac (an older industrial city in Oakland county) as well as Hamtramck and Highland Park (both entirely contained by Detroit) are also counted as inner suburbs. Outer-ring suburbs include all other units contained within the Detroit tri-county area.

[16] Based on White and Black isolation indices calculated for 108 DMA municipalities >2,500 in 2010.

[17] Based on the White-Black dissimilarity index calculated for 108 DMA municipalities >2,500 in 2010.

(US Census Bureau, 1960, 1980). While the city of Detroit contained 44.4% of the tri-county region's population and held half (51.6%) of its property wealth in 1960, these shares shrunk to 29.8% and 16.9% respectively by 1980, as the city's population shifted from 28.9% to 63.0% Black (Darden et al., 1987: 21; Gibson & Jung, 2005). Ultimately over 1.1 million White residents left the city between 1960 and 2010, mostly migrating to the suburbs, which by 2010 contained 81.5% of the tri-county population and a disproportionate 91.9% of its wealth (Gibson & Jung, 2005; US Census Bureau 2010c; Michigan Department of Treasury State Tax Commission, 2010).

Figure 2.1 *Percent of municipal population non-Latinx White, DMA 2010*



Note: Choropleth class intervals are based on the percent non-Latinx White (mean=79.3, SD=20.7) among the 114 incorporated cities and townships fully contained in the tri-county DMA. Intervals are rounded to the nearest whole number for simplicity.

1. Richmond township	39. White Lake charter township	77. Grosse Pointe Farms city
2. Armada township	40. Highland charter township	78. Northville township
3. Bruce township	41. Troy city	79. Highland Park city
4. Lenox township	42. Sylvan Lake city	80. Grosse Pointe city
5. Ray township	43. Bloomfield charter township	81. Hamtramck city
6. Washington township	44. Keego Harbor city	82. Grosse Pointe Park city
7. Chesterfield township	45. West Bloomfield charter township	83. Plymouth charter township
8. Macomb township	46. Commerce charter township	84. Plymouth city
9. Shelby charter township	47. Orchard Lake Village city	85. Dearborn Heights city
10. New Baltimore city	48. Milford charter township	86. Dearborn city
11. Utica city	49. Bloomfield Hills city	87. Westland city
12. Harrison charter township	50. Birmingham city	88. Canton charter township
13. Clinton charter township	51. Walled Lake city	89. Garden City city
14. Sterling Heights city	52. Wixom city	90. Inkster city
15. Mount Clemens city	53. Clawson city	91. Allen Park city
16. Fraser city	54. Royal Oak city	92. Melvindale city
17. St. Clair Shores city	55. Madison Heights city	93. River Rouge city
18. Roseville city	56. Southfield township	94. Wayne city
19. Warren city	57. Farmington Hills city	95. Lincoln Park city
20. Center Line city	58. Novi city	96. Taylor city
21. Eastpointe city	59. Southfield city	97. Ecorse city
22. Addison township	60. Lyon charter township	98. Romulus city
23. Oxford charter township	61. Berkley city	99. Van Buren charter township
24. Brandon charter township	62. Lathrup Village city	100. Wyandotte city
25. Groveland township	63. Huntington Woods city	101. Southgate city
26. Holly township	64. Oak Park city	102. Belleville city
27. Oakland charter township	65. Hazel Park city	103. Grosse Ile township
28. Orion charter township	66. Ferndale city	104. Riverview city
29. Independence charter township	67. Pleasant Ridge city	105. Huron charter township
30. Springfield charter township	68. Royal Oak charter township	106. Trenton city
31. Rose township	69. South Lyon city	107. Sumpter township
32. Village of Clarkston city	70. Farmington city	108. Woodhaven city
33. Rochester Hills city	71. Novi township	109. Gibraltar city
34. Auburn Hills city	72. Grosse Pointe Woods city	110. Brownstown charter township
35. Rochester city	73. Harper Woods city	111. Rockwood city
36. Waterford charter township	74. Detroit city	112. Flat Rock city
37. Lake Angelus city	75. Redford charter township	113. Village of Grosse Pointe Shores city
38. Pontiac city	76. Livonia city	114. Northville city

Municipal boundaries played a key role in structuring metropolitan segregation, which first occurred primarily along racial lines between the city and its suburbs, but over time became interwoven with growing class distinctions amongst the suburbs. The near ubiquitous use of zoning ordinances in the DMA generally gave preference to large-lot, single-family homes and codified racialized notions of "incompatible" land-uses, institutionalizing barriers to racial integration (Freund, 2007). Yet the politics of exclusion in Detroit's suburbs varied. Some working-class suburbs neighboring Detroit (e.g., Warren, Dearborn) became known for their hostility towards Black occupancy by electing outspoken segregationist local officials; blocking the construction of "Negro housing;" organizing violent mobs to intimidate Black families who dared to cross the "Mason-Dixon line" between Detroit and its suburbs; and forgoing millions of dollars in federal funding to avoid "forced integration" (Freund, 2007: 286, 395; Darden et al., 1987: 143, 32). Despite these racist tactics, segregated suburban enclaves offered many White-ethnic blue-collar

residents access to quality public services, low tax rates, and a false security over their home investments–privileges too great for even liberal Whites to jeopardize in the name of racial progress. By the passage of the Fair Housing Act of 1968 dozens of Detroit suburbs had few or no Black homeowners, and in 1975 the Detroit NAACP charged that evidence of "systemic racism" in the housing plans of 26 suburbs should disqualify them from federal block grants (Darden et al., 1987). Still other suburbs (e.g., Southfield, Oak Park) demonstrated racial tolerance, embraced fair housing policies, implemented practices to combat panic-selling and White flight, and thus saw their Black populations grow significantly (Darden et al., 1987: Darden & Thomas, 2013).

Racial and economic reordering has characterized the region since the 1970s. Industrial restructuring not only fueled the flight of households and jobs from Detroit, but also its older, working-class suburbs. As disinvestment took its toll on these communities, reorganization of the region's economic base concentrated growth and commercial activity in a subset of newer, predominantly White and mostly professional-class suburbs that developed regional shopping malls, office parks, technology centers, and health care facilities (Darden et al., 1987; Detroit Regional Chamber, 2006). Removal of US immigration quotas in 1965 led the DMA's Mexican, Arab, and Asian immigrant populations to increase substantially over the next several decades, particularly in the suburbs, where settlement patterns varied by group and class status (Katz et al., 2010; Booza, 2004). While substantial middle-class Black suburbanization took place in a small number of racially integrated suburbs (e.g., Southfield, Oak Park, Farmington Hills), much of the DMA's suburban Black population remained in older, poorer, and declining inner-ring suburbs, several with majority-Black populations (e.g., Pontiac, Inkster, Highland Park, River Rouge, Ecorse) as of 2010 (Logan et al., 2014). Detroit and the DMA's most marginalized suburbs also suffered disproportionately from home foreclosures, population and employment losses, rising vacancy, and fiscal stress precipitated by 2008 subprime mortgage crisis and ensuing recession (Farley, 2015). In 2010, 74% of Black-White segregation in the DMA was attributable to segregation between politically defined places (Lichter et al., 2015) and suburban Blacks of equal class-status to Whites remained more segregated than Black people in the city (Darden & Thomas, 2013). Whereas 66.7% and 61.9% of DMA Whites lived in a municipality with incomes and home values (respectively) above the tri-county median between 2008-2012, these shares were just

12.6% and 11.6% for Black residents (US Census Bureau, 2010b, 2012a, 2012b).[18]

Study design and sample

This is a cross-sectional ecological study of secondary data sources. The sample included sub-county general purpose municipalities located fully within the DMA that had a population greater than 2,500 in 2010 (N=108; 69 cities, 23 charter townships, 16 townships). Inclusion of both cities and townships in the sample warrants a brief explanation of the fiscal and administrative distinctions between these units, as they have implications for distributions of race, capital, and quality of life that are of interest to this two-part study series.

All Michigan residents who do not reside in a city reside in a township.[19] Townships are a product of Michigan's pre-history whereby the Northwest Ordinance provided for the surveying of land into a grid system of 36 square-mile units which, in a two-tiered network with counties, became the organizational basis for local governance (Michigan Legislature, 2018). In 1909 the Home Rule City Act provided localities the constitutional authority to withdraw from their townships and incorporate as autonomous jurisdictions with the power to adopt charters, enact ordinances, provide services, and levy taxes according to local concerns (PA 279 of 1909). Although home rule cities undoubtedly possess the highest degree of local autonomy in Michigan,[20] state expansion of townships' powers and service duties over time has granted them wide influence over local quality of life–as well as who can access it. These powers include the authority to regulate land use (MCL 125.271 et seq.), to "adopt ordinances and regulations to secure the public health, safety and general welfare" of residents (MCL 41.181 et seq.), and the option to incorporate as charter townships (MCL 42.1 et seq.), a status which offers enhanced protection from annexation and expanded taxing authority, typically in exchange for higher service levels (60% of DMA townships are chartered).[21] While the service functions of townships vary, they tend to be more limited than cities due to statutory limitations with respect to their ability to

[18] DMA median income and home values between 2008-2012 were $51,136 and $130,607, respectively (US Census Bureau, 2012a, 2012b).

[19] Villages are not legally separated from the township(s) in which they are located (Michigan Legislature, 2018).

[20] While all municipalities are inherently creatures of the state, townships are statutory units of government which have only those powers expressly granted or fairly implied by state law (Article VII § 34). Mandated functions include property tax assessment, elections administration, and tax collection, but townships are authorized to provide an array of local services (Michigan Townships Association, n.d.).

[21] These "urbanized" townships look and feel much like cities but have more direct citizen control and state oversight (Michigan Townships Association, 2005).

tax,[22] borrow, and receive state aid; yet these restrictions also make townships especially reliant on their local tax base, which can lead to more exclusionary fiscal zoning policies.

Township inclusion also permitted a more comprehensive analysis of the metropolitan health hierarchy. As shown in **Table 2.1**, the full sample included 99.6% of the DMA population, compared to 70.1% in the sample restricted to cities. The full sample also included several predominantly White, outer-ring suburbs with moderate (10-12%) levels of Black suburbanization, allowing insight on how such patterns may relate to mortality.[23] Still, to assess the threat of systematic bias from township inclusion, I generated and compared descriptive and inferential statistics for both the full and restricted (city-only) samples. Further, to assess the possibility that associations observed for the central city of Detroit may differ widely from its suburbs, I re-ran all analyses excluding Detroit from the full and restricted samples. Due to qualitatively similar findings, I report only results for the full sample including Detroit in this paper.[24]

Data sources and measures

Vital statistics and population data (years 2009-2011) used to construct the outcome variable of interest (excess mortality) came from the Michigan Department of Community Health (MDCH). Data for the independent variable (relative spatial Whiteness) and covariates came from the 2010 US Census. One covariate measure came from 2008-2012 American Community Survey (ACS). I describe these variables in further detail below.

Excess mortality was operationalized as indirectly standardized mortality ratios based on all-cause mortality for persons aged younger than 65, stratified by sex and race (all races, White, Black). MDCH provided death data geocoded and aggregated at the Minor Civil Division (MCD) level by year, sex, and race. To reduce the impact of random fluctuations across years, death counts were averaged for three years (2009, 2010, and 2011). Race-specific counts from MDCH were undifferentiated by ethnicity and estimated using the National Center for Health Statistics (NCHS) bridged-race methodology, which statistically bridges multiple-race group population counts into four single-race categories (White, Black, American Indian or Alaska Native, and Asian or Pacific

[22] The state constitution restricts the amount of property tax millage that townships can levy for general operations (Article IX § 6).

[23] This includes West Bloomfield, Clinton, and Canton charter townships. The full sample also permits analysis of Van Burden charter township, an outer suburb with Black (28.7%) and White (64.6%) population proportions similar to those observed in the DMA as a whole.

[24] For reference, **Appendix A.3 and Appendix A.4** provide side-by-side comparisons of descriptive statistics and correlation matrices of main study variables for the full and city samples.

Islander) (NCHS, 2011). This means that the 'White' and 'Black' racial categories used here included Hispanic/Latinx, Middle Eastern, and mixed-race populations, among others (see **Appendix A.1**).[25] To ensure comparability between numerators and denominators, 2010 MDCH population estimates by age, sex, and bridged race provided the base for mortality calculations.

The indirect method of standardization was used to compare mortality rates across municipalities with varying age structures and reduce the problem of small-area rate-instability (Newell, 1990). The 2010 DMA population (all races combined) served as the standard population. A Standardized Mortality Ratio (SMR) was calculated by dividing the number of observed deaths before age 65 (by race/sex) in a municipality by the number of deaths before age 65 that would be expected based on the age- and sex-specific rates in the DMA and the population size of the municipality in the same age/race/sex groups. From the SMR I calculated a standardized death rate (SDR) (per 100,000 members of the race and/or sex-specific population) for persons aged younger than 65 by multiplying the SMR by the corresponding under-65 sex-specific crude death rate in the standard population (shaded in **Table 2.2**).

A brief description of the standard DMA population and the counties that comprise it is warranted. For reference, **Table 2.2** shows population counts and three-year average crude death rates (per 100,000) for persons under age 65 living in the DMA, stratified by race, sex, and county. In 2010 approximately half of DMA residents under age 65 lived in Wayne county; whereas Whites were somewhat evenly distributed across the tri-county area, Wayne county was home to 74.7% of Black DMA residents. As shown in **Figure 2.2**, sex-specific under-65 crude death rates observed for the DMA masked significant disparities by county and race. Among all races combined, Wayne county residents experienced higher than average death rates, whereas Oakland county, and to a lesser extent Macomb county, had lower than average rates. County-level differentials were largely driven by racial inequities. Among Whites, all three county populations experienced lower than average death rates, including the White population in Wayne county (albeit to a lesser extent than Macomb or Oakland). Among the Black population, Wayne county residents experienced high levels of under-65 mortality, while Black residents of Oakland and Macomb counties experienced near-average death rates that varied somewhat by sex. For

[25] **Appendix A.1** compares 2010 DMA population and sample data by race from MDCH and the US Census to provide some insight on the extent to which the MDCH data misspecifies ethnic minorities and mixed-race persons as single-race White and Black.

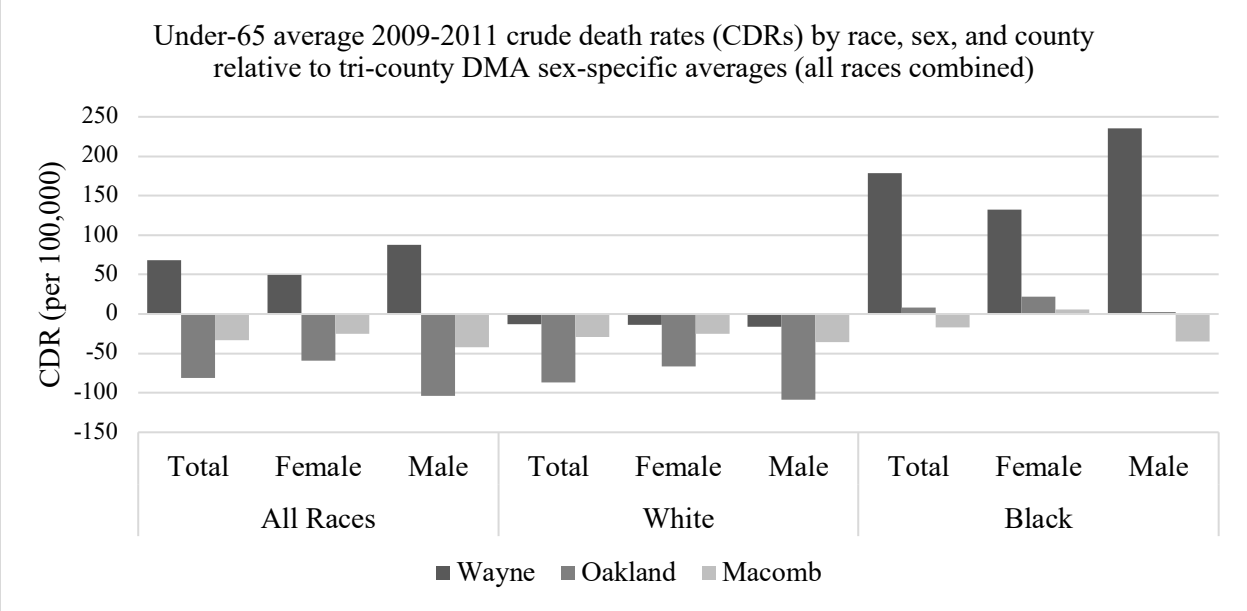
additional reference, **Figure 2.3** illustrates how county-level racial disparities in excess death (sex-combined totals) were distributed by age relative to the crude rate in the standard population.

Table 2.2 *2010 DMA population under age 65 and 2009-2011 average under-65 crude death rates (CDR) by race, sex, and county*

Under 65		Wayne		Oakland		Macomb		Tri-county DMA	
		Population	CDR	Population	CDR	Population	CDR	Population	CDR
All Races	Total	1,584,763	376.29	1,042,856	227.04	720,668	274.98	3,348,287	308.00
	Female	806,464	288.09	527,552	179.32	361,629	212.83	1,695,645	238.20
	Male	778,299	467.56	515,304	275.89	359,039	337.57	1,652,642	379.55
White	Total	848,701	294.84	813,726	221.12	617,610	278.71	2,280,037	264.16
	Female	419,667	224.86	405,664	171.32	307,139	213.15	1,132,470	202.51
	Male	429,034	363.22	408,062	270.63	310,471	343.56	1,147,567	324.98
Black	Total	677,156	486.30	156,016	315.78	73,520	290.62	906,692	441.09
	Female	356,730	370.59	84,956	260.13	39,280	243.55	480,966	340.70
	Male	320,426	614.91	71,060	382.31	34,240	344.63	425,726	554.35

Note: Data is from the Michigan Department of Community Health (MDCH). 'White' and 'Black' refer to bridged race categories from MDCH.

Figure 2.2 *Under-65 average 2009-2011 crude death rates (CDR) by race, sex, and county relative to tri-county DMA sex-specific averages (all races combined)*

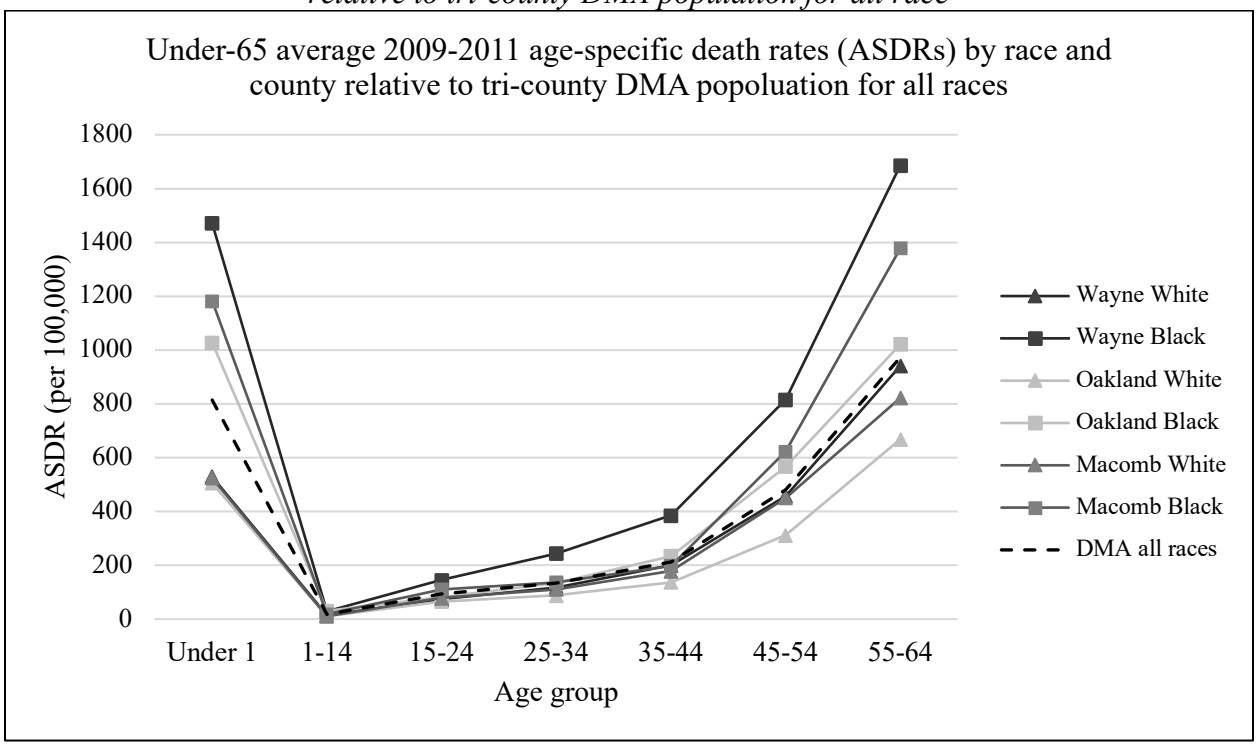


SMRs and SDRs permit interpretation of excess municipal death rates in relation to the standard population, while controlling for differences in the age and sex structures across municipalities in the sample. An SMR equal to 1.0 indicates that the number of deaths before age 65 in a municipal population of interest was equivalent to that which would be expected based on the municipality's population structure and the age- and sex-specific death rates that were observed in the DMA as a whole. An SMR greater than 1.0 indicates a mortality disadvantage, while an

SMR lower than 1.0 reveals a mortality advantage. Sex-specific SMRs are interpreted in relation to their corresponding sex-specific DMA population (sex-combined total, female, male). Race-specific SMRs are interpreted in relation to DMA residents of all races combined.

An average death count of 10 or more is required to calculate reliable SMRs (Bains, 2009). **Table 2.3** shows the full sample and nine sub-samples for which there were sufficient race- and sex-specific death counts to analyze mortality outcomes. The first row indicates that sample sizes varied considerably across the sub-samples based on this inclusion criteria. High segregation means that there were far fewer municipalities with Black mortality events sufficient for analysis, especially when stratified by sex. For this reason, I focus most analyses on comparisons and trends observed in the all race and race-specific *total* (sex-combined) sub-samples (shaded in **Table 2.3**).

Figure 2.3 *Under-65 average 2009-2011 age-specific death rates (ASDR) by race and county relative to tri-county DMA population for all race*



Note: Data is from the Michigan Department of Community Health (MDCH). 'White' and 'Black' refer to bridged race categories from MDCH.

Relative spatial Whiteness is conceptualized as a social and material condition representing a state of dominance in the metropolitan power structure and the collection of unearned privileges, benefits, and legal entitlements conferred by White racial power (Harris, 1993; powell, 2005). Though operationalized cross-sectionally for the purpose of this study, the construct of Whiteness is intended to proxy a dynamic set of socio-spatial relationships, processes, institutions, and

historical foundations that work to reproduce the structural domination of White people through the subordination of Black and other non-White racialized people (Leonardo, 2004; powell, 2005; Bonds & Inwood, 2016). While the goal of this paper is simply to establish the empirical relationship between relative spatial Whiteness and excess mortality at the municipal level, the second paper of this series will assess some of the unequal material conditions that give this construct relational meaning and contingent health-relevancy (Malat et al., 2018).

Municipalities' relative spatial Whiteness was operationalized by the Location Quotient (LQ), a measure of local area segregation used in previous mortality studies (Zhou et al., 2017; Pruitt et al., 2015). The LQ index provides a ratio that quantifies the relative racial homogeneity of each municipality in the DMA (Sudano et al., 2013). The equation for the LQ is as follows:

$$LQ_{im} = (x_{im}/\, x_i)/(X_m/\, X)$$

Where LQ_{im} is the value for the i^{th} municipality for racial group m (non-Hispanic/Latinx White); x_{im} is the number of White residents living in the i^{th} municipality; x_i is the total number of residents in the i^{th} municipality; X_m is the total number of White residents in the DMA; and X is the total number of DMA residents. The LQ is therefore a ratio of two proportions in which the numerator is the proportion of White residents in the municipality and the denominator is the proportion of White residents in the DMA (65.0%). Thus, an LQ less than 1.0 indicates a higher degree of relative spatial Whiteness (i.e., predominantly White); an LQ equal to 1.0 indicates Whiteness on par with the DMA as a whole; and an LQ greater than 1.0 indicates less homogenous Whiteness (i.e., predominantly non-White). In 2010, the population residing in 'predominantly non-White' sample municipalities (n=16) was disproportionately (69.4%) Black, and on average such municipalities were 49.6% Black (compared to 25.0% in the DMA), 39.2% White, and 11.1% IPOC. When reported, 'majority-Black' municipalities refer to those where the Black population represented the largest racial/ethnic group.[26]

Covariates included spatial and demographic variables that may vary systematically with municipal distributions of mortality and spatial Whiteness. Variables from the US Census included land area, population size (logged), municipality type (city or township), race-specific age (percentage of the racial group that is middle aged, 45-64), and the proportion of the population IPOC (neither non Latinx-White nor non-Latinx Black).

[26] These included 9 municipalities (in order of greatest to least proportion Black): Highland Park city, Detroit city, Inkster city, Southfield city, Lathrup Village city, Oak Park city, Pontiac city, River Rouge city, and Ecorse city.

Further, the DMA is home to some of the most concentrated Arab and Chaldean populations in the US (ACCESS, 2020).[27] Though the US Office of Management and Budget (OMB) and the Census Bureau regard populations with Middle Eastern heritage as White (OMB, 1997), Arabs are stigmatized group that do not fully benefit from Whiteness, White privilege, or the health advantages typically associated with White racialization (Abboud et al., 2019; El-Sayeed & Galea, 2009; Lauderdale, 2006).[28] Research from Michigan has shown that Arab Americans tend to have higher age-adjusted mortality than non-Arab and non-Hispanic Whites (El-Sayed et al., 2011). To account for a potentially divergent relationship between Whiteness and health in municipalities with large Arab populations, the proportion of the population with Arab ancestry from the 2008-2012 ACS was considered in the sensitivity analysis.[29]

Analysis

Descriptive statistics compared the full sample and the nine sub-samples in terms of their racial composition and representativeness of the DMA population, as well as characteristics of the all race and race-specific total (sex-combined) sub-samples (and excluded municipalities).

To describe the state of inter-municipal excess morality disparities in the DMA and determine the extent to which disparities were marked between White and Black municipal populations, one sample t-tests assessed whether the mean SMR for each race/sex group was significantly different than 1.0 at the 90% confidence level. Frequency distributions were used to illustrate the extent to which disparities existed among all race, White, and Black municipal populations in the all race, White, and Black sex-combined sub-samples, respectively.

To assess whether populations in predominantly White municipalities experienced a mortality advantage, and examine the extent to which this advantage varied across race/sex groups, two-sample Welch's unequal variance t-tests were used to determine whether mean SMRs (by race/sex) differed between municipalities grouped as having Whiteness LQ indices less than or greater than 1.0 (no municipalities had an LQ Index equal to 1.0). All tests were confirmed using

[27] Chaldeans are a Catholic religious group within Arab countries who originated from northern Iraq, though many do not ethnically identify as Arab (Samari et al., 2009).

[28] The US Census has found that those with Middle Eastern or North African (MENA) heritage predominantly report their race as White in absence of a MENA category (Matthews et al., 2017). Hence it is likely that most Arab and Chaldean populations are counted as White in this analysis.

[29] Ancestry data was not collected on the 2010 US Census. In the ACS, a person is included in the Arab ancestry category if they identify as Lebanese, Egyptian, Syrian, Palestinian, Jordanian, Moroccan, Iraqi, "Arab" or "Arabic," "North African," or "Middle Eastern."

log-transformed variables to assess their sensitivity to skew.

Bivariate relationships between the continuous measure of spatial Whiteness and SMRs in the all race, White, and Black sex-combined sub-samples were assessed using Pearson product-moment correlations and multiple linear regression. Model 1 tested for the association between SMRs and relative spatial Whiteness; Model 2 tested for this association adjusted for covariates. Regression standard errors were obtained using Huber-White sandwich estimators to account for heteroskedasticity in SMRs across municipalities of varying population sizes. Variable Inflation Factors (VIF) were used to detect multicollinearity in regression models.

To assess selection bias introduced by excluding municipalities with fewer than 10 deaths, a sensitivity analysis replicated the linear regression models using negative binomial regression models that could accommodate low counts and zeros in the outcome variable. In these models the sex-combined, race-specific observed death counts (the SMR numerator) served as the dependent variable and the corresponding sex-standardized expected death counts (the SMR denominator) served as the "exposure" variable; instead of restricting the sample to those municipalities with a minimum of 10 observed deaths, each model was rerun using the full sample (N=108). For the White sub-sample only, mean SMRs and bivariate/multivariate regression models were rerun excluding municipalities where at least 20% of the population reported Arab ancestry (n=3).[30]

Results

Description of sample

Table 2.3 describes the full sample and the nine sub-samples with sufficient race- and sex-specific death counts for analysis. Larger combined death counts in the total sample for all races (n=96) limited the number of municipalities that were excluded, making it the most representative of the full sample (and the DMA) as a whole. The sample was comprised mostly (61.4%) of cities. According to bridged-race data from the MDCH, this sample population was 68.8% White and 26.7% Black. Non-Hispanic/Latinx single-race categories from the US Census indicated that the average municipality was 78.5% Non-Latinx White and 12.4% Non-Latinx Black.

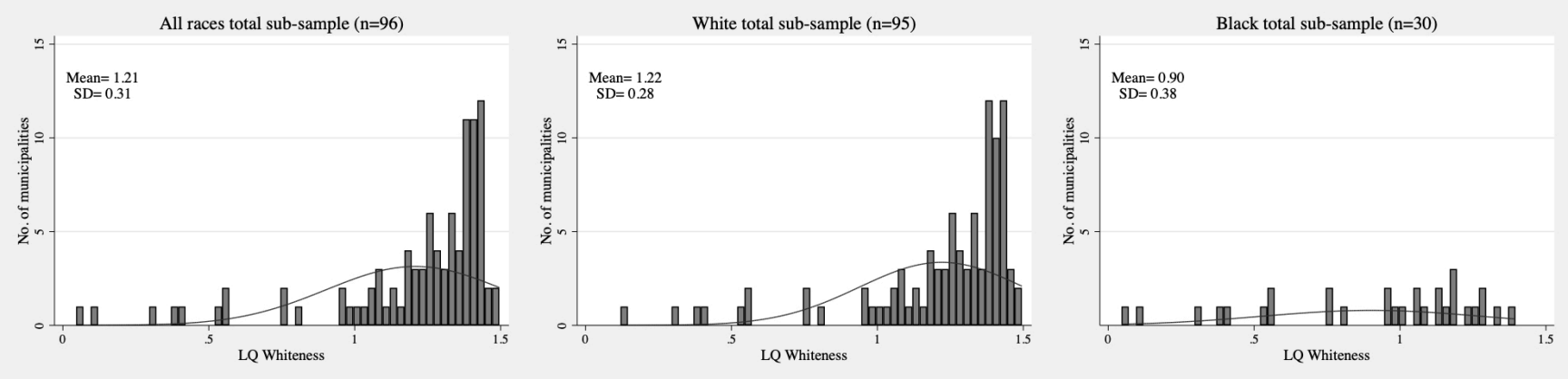
[30] These municipalities included: Dearborn city (38.7%); Hamtramck city (22.7%); Dearborn Heights city (20.5%).

Table 2.3 *Racial composition of full sample and race- and sex-specific sub-samples with sufficient death counts for mortality analysis*

	Full sample	**All races total**	**All races female**	**All races male**	**White total**	**White female**	**White male**	**Black total**	**Black female**	**Black male**
No. of municipalities	108	96	71	84	95	65	79	30	16	17
Townships	39	37	25	31	37	24	31	5	3	3
Cities	69	59	46	53	58	41	48	25	13	14
Pct. of full sample total pop. <65	-	98.6	91.9	96.1	98.3	90.0	94.4	58.1	39.6	40.5
Pct. of full sample White pop. <65	-	98.1	89.2	94.8	98.1	87.7	93.2	44.9	23.2	23.4
Pct. of full sample Black pop. <65	-	99.6	98.3	99.2	98.6	95.2	97.4	91.6	82.9	83.5
Total pct. White	69.1	68.8	67.2	68.2	69.0	67.5	68.2	54.0	41.3	40.7
Total pct. Black	26.4	26.7	28.3	27.3	26.5	28.0	27.3	41.8	55.8	55.3
Total pct. other races	4.4	4.5	4.6	4.5	4.5	4.6	4.5	4.2	2.9	4.0
Avg. pct. non-Lat. White	79.4	78.5	74.9	77.1	79.3	77.7	78.2	58.6	50.6	48.5
Avg. pct. non-Lat. Black	11.8	12.4	15.4	13.6	11.6	12.7	12.5	30.3	40.9	40.4
Avg. pct. IPOC	8.7	9.1	9.7	9.3	9.1	9.6	9.3	11.0	8.6	11.1
Avg. Whiteness LQ index	1.22	1.21	1.15	1.19	1.22	1.20	1.20	0.90	0.78	0.75
LQ <1.0	16	15	15	15	14	10	13	15	10	11
LQ >1.0	92	81	56	69	81	55	66	15	6	6

Note: 'White' and 'Black' refer to bridged race categories from MDCH. 'Other races' refers to bridge race groups other than White or Black. 'Non-Latinx White' and 'Non-Latinx Black' racial groups refer to those who identified as "White alone" or "Black or African American alone", without Hispanic or Latino heritage, respectively, from the 2010 US Census; 'Lat./other races' includes all other racial/ethnic groups.

Figure 2.4 *Distribution of Whiteness LQ index in the all-race, White, and Black total sub-samples*



The White and Black sub-samples differed systematically by size, municipality type, and racial composition. Compared to the White total sub-sample (n=95), the Black total sub-sample was substantially smaller (n=30) and comprised mostly of cities (n=25). Still, the Black total sub-sample included several large municipalities (including Detroit city), and thus encompassed most (58.1%) of the full sample population under age 65; this included 91.6% of the full sample's Black residents under age 65, but less than half (44.9%) of its White population under age 65.

The mean level of relative spatial Whiteness in the White total sub-sample was 1.22, compared to a mean of 0.90 in the Black total sub-sample. **Figure 2.4** shows that the distribution of Whiteness LQ index was negatively skewed in the White sub-sample, indicating that the mean does not fully capture the prominence of spatial Whiteness in this sample. While 81 (84.3%) of the 95 municipalities in the White total sub-sample were proportionally Whiter than the DMA, just half (n=15) of the 30 municipalities in the Black total sub-sample were predominantly White.

Table 2.4 *Characteristics of municipalities included and excluded from the all-race, White, and Black total sub-samples*

	Included					**Excluded**				
	Mean	SD	Median	Min.	Max.	Mean	SD	Median	Min.	Max.
	All races total (n=96)					**All races total (n=12)**				
<65 avg. deaths (AR)	106.1	327.9	51.8	10.0	3,214.3	6.9	2.4	7.0	2.0	9.7
<65 pop. size (AR)	34,324	66,361	18,937	3,181	631,852	3,896	1,659	3,347	2,136	7,818
Total pop. size	39,517	75,269	20,969	3,739	713,777	4,651	1,972	3,972	2,526	9,479
Pct. non-Lat. White	78.5	19.8	85.7	2.9	96.4	86.7	17.4	92.4	33.7	96.7
Pct. non-Lat. Black	12.4	18.6	4.5	0.4	93.0	7.1	17.0	1.8	0.3	60.9
Pct. IPOC	9.1	4.9	7.2	3.2	27.9	6.2	3.5	5.2	2.9	15.7
Whiteness LQ index	1.21	0.31	1.32	0.05	1.48	1.33	0.27	1.42	0.52	1.49
	White total (n=95)					**White total (n=13)**				
<65 avg. deaths (W)	62.3	62.9	42.0	10.0	351.0	5.8	2.4	6.0	2.0	9.3
<65 pop. size (W)	23,414	21,223	13,476	2,786	93,163	3,266	1,918	2,761	373	7,464
Total pop. size	39,809	75,614	21,412	3,739	713,777	5,199	2,733	4,075	2,526	11,776
Pct. non-Lat. White	79.3	18.3	86.2	7.8	96.4	80.3	28.6	92.1	2.9	96.7
Pct. non-Lat. Black	11.6	16.7	4.5	0.4	82.2	13.7	28.9	1.9	0.3	93.0
Pct. IPOC	9.1	4.9	7.3	3.2	27.9	6.0	3.4	5.0	2.9	15.7
Whiteness LQ index	1.22	0.28	1.33	0.12	1.48	1.24	0.44	1.42	0.05	1.49
	Black total (n=30)					**Black total (n=78)**				
<65 avg. deaths (B)	127.1	502.6	21.2	10.3	2,782.0	2.2	2.4	1.3	0.0	8.7
<65 pop. size (B)	27,954	95,637	8,944	2,512	532,178	992	1,105	511	18	4,794
Total pop. size	74,506	125,933	47,831	7,903	713,777	20,696	19,264	14,210	2,526	80,980
Pct. non-Lat. White	58.6	24.4	66.5	2.9	90.1	87.4	8.9	90.2	33.7	96.7
Pct. non-Lat. Black	30.3	25.0	18.6	3.4	93.0	4.7	7.3	3.0	0.3	60.9
Pct. IPOC	11.0	5.8	9.3	4.0	27.9	7.9	4.1	6.5	2.9	23.3
Whiteness LQ index	0.90	0.38	1.02	0.05	1.39	1.35	0.14	1.39	0.52	1.49

Note: Variables labeled (AR) indicate counts for all races. Variables labeled (W) and (B) indicate counts for White and Black populations, respectively

Table 2.4 compares descriptive statistics for municipalities included in and excluded from the study's all race, White, and Black total sub-samples. Municipalities excluded from the all race total sub-sample (n=12) were mostly cities (n=10), had small total population sizes (less than 5,000 persons on average), and tended to be predominantly White (with the exception of Lathrup Village city, which was 60.9% Black). The same municipalities were excluded from the White total sub-sample (i.e., the two samples were nearly identical), with the additional exclusion of Highland Park city where just 2.9% of residents were White. Municipalities excluded from the Black total sub-sample were home to relatively small Black populations under age 65 (on average less than 1,000) and were thus not representative of the spaces where most Black people lived.

Disparities in excess mortality

Table 2.5 describes the state of excess mortality disparities across municipalities in the DMA and between race- and sex-specific municipal populations in 2010. **Figure 2.5** visualizes the extent to which SMRs differed significantly from 1.0 (indicating disparity with the DMA standard population), revealing inequities between White and Black municipal populations. **Figure 2.6** shows frequency distributions for the all-race, White, and Black total sub-samples, revealing inter-municipal disparities within racial groups. For reference, SMR distributions in **Figure 2.6** are shaded light or dark according to whether municipalities had a Whiteness LQ index greater or less than 1.0 (indicating predominantly White or predominantly non-White).

Table 2.5 shows that among municipalities where there was sufficient data to study mortality for all races, mean SMRs for the sex-combined total (0.90) and male (0.92) sub-samples indicated an overall mortality advantage. Yet the skewed distribution shown in **Figure 2.6** reveals that the all-race, sex-combined total sub-sample was comprised of a high proportion of DMA municipalities with more advantaged mortality profiles (most were predominantly White) and a smaller proportion with SMRs ranging well over 1.0. Compared with males, females experienced a slightly higher proportion of excess deaths before age 5, but far fewer excess deaths overall (**Table 2.5**). The mean SMR for females did not differ significantly from the female standard. SMRs and frequency distributions in the all race sub-samples were notably similar to those among Whites in the White total sub-samples, reflecting the dominance of Whites in these sub-samples.

Table 2.5 *Standardized mortality outcomes for persons under age 65 for the race- and sex-specific sub-samples*

Race	Sex	n	Total 3-yr. deaths	2009-2011 avg. deaths		Percent of deaths <5		Standardized mortality ratio (SMR)						Standardized death rate		Excess death rate	
				Mean	SD	Mean	SD	Mean	SD	90% CI		Min.	Max.	Mean	SD	Mean	SD
All races	Total	96	30,560	106	328	3.34	2.09	0.90	0.40	[0.83	0.97]	0.33	2.10	277	122	-31	122
	Female	71	11,456	54	147	4.20	2.65	0.98	0.42	[0.90	1.07]	0.38	2.13	235	100	-4	100
	Male	84	18,306	73	213	3.16	2.42	0.92	0.40	[0.85	0.99]	0.30	2.34	350	152	-30	152
White	Total	95	17,754	62	63	2.66	2.10	0.87	0.38	[0.81	0.93]	0.31	2.19	268	116	-40	116
	Female	65	6,195	32	25	3.29	2.50	0.93	0.39	[0.85	1.01]	0.37	2.07	222	93	-16	93
	Male	79	10,619	45	41	2.47	2.22	0.90	0.37	[0.83	0.97]	0.39	2.47	343	142	-37	142
Black	Total	30	11,436	127	503	6.78	4.38	1.38	0.43	[1.25	1.51]	0.57	2.16	425	132	117	132
	Female	16	4,401	92	270	9.04	5.47	1.49	0.34	[1.34	1.64]	1.00	2.12	355	81	116	81
	Male	17	6,447	126	401	5.66	2.84	1.45	0.44	[1.26	1.64]	0.73	2.06	551	167	171	167

Note: The 'excess death rate' is calculated as the difference between the standardized death rate and the under-65 crude death rate in the same sex group (sex-combined total, male or female). CI= Confidence Interval.

Figure 2.5 *Under-65 average 2009-2011 standardized mortality ratios (SMR) for the race- and sex-specific sub-samples*

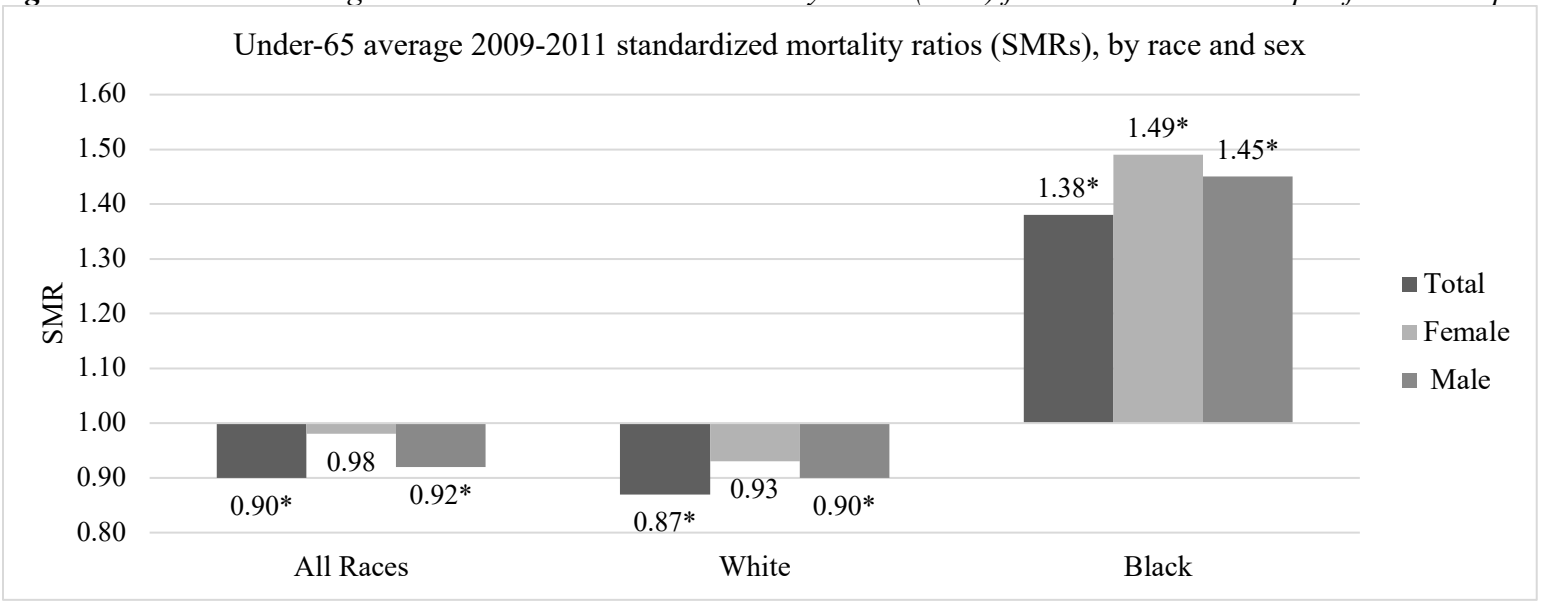


Figure 2.6 *Frequency distributions of SMRs for the all-race, White, and Black total sub-samples, shaded by Whiteness LQ index (less than or greater than 1.0)*

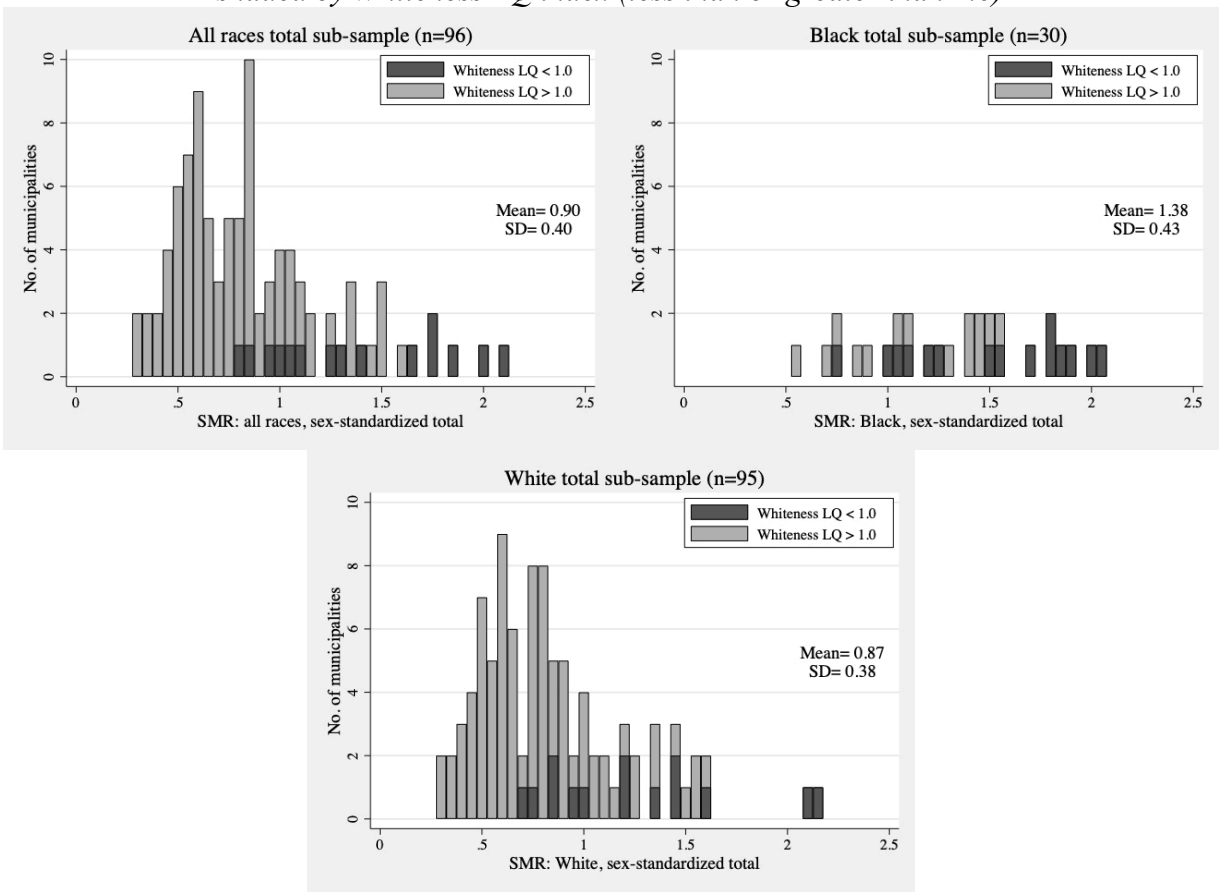


Table 2.5 further reveals stark racial inequity in excess death. Whites in the White total sub-sample experienced a significant mortality advantage relative to the standard, on average experiencing a number of excess deaths that was 13% lower than would be expected based on the mortality experience in the DMA as a whole.[31] This appears to be driven more so by low SMRs among males than females (the White female SMR indicates a mortality profile similar to DMA females). Positive skew evident in the SMR distribution for the White total sub-sample (**Figure 2.6**) suggests that the mean of 0.87 indeed underestimates the mortality advantage in this population. The distribution shows that the majority (n=68; 71.6%) of White municipal populations experienced favorable mortality outcomes; the vast majority of these advantaged municipalities (n=63; 92.7%) were predominantly White. Yet the distribution also reveals a subset

[31] When municipalities with large Arab populations were excluded, the mean SMR for the White total sub-sample was 0.86 (n=92).

of municipalities (n=13; 13.7%) where the number of excess White deaths were at least 35% higher than the DMA standard population;[32] 7 of these 13 municipalities were predominantly White.

In stark contrast, Black populations in the Black total, Black female, and Black male sub-samples experienced mortality outcomes that were markedly worse than what would be expected if these populations shared the same mortality profile as the DMA population as a whole. **Table 2.5** shows that on average, the number of excess deaths experienced by Black female and Black male municipal populations were 49% and 45% higher than females and males of all races in the DMA, respectively, translating to 116 female and 171 male Black deaths under age 65 (per 100,000) annually in excess of what would be expected if Black mortality experiences were equivalent to the DMA population. **Figure 2.6** reveals that more than half (n=16) of Black (sex-combined total) municipal populations suffered excess Black mortality at a level at least 35% higher than that expected based on the standard population (9 of these municipalities were predominantly non-White). Just 20% (n=6) of municipalities in the Black total sub-sample experienced a mortality advantage with respect to the DMA as a whole (5 were predominantly White).[33] Three additional municipalities had Black total SMRs above 1.0 but less than 1.10 (one was predominantly White).[34] The mean SMR for the Black total sub-sample was 58.6% higher than the mean SMR for the White total sub-sample, indicating severe racial disparity (Black-White differences were 60.2% and 61.1% for females and males, respectively).

There were 29 municipalities with sufficient data to calculate total (sex combined) SMRs for both White and Black populations (data not shown). While direct comparisons between SMRs can be biased (Schoenbach, 2003), this set of municipalities offered insight on mortality profiles of White and Black people living in the same spaces. Most municipalities (n=22; 75.9%) exhibited higher SMRs among Black residents compared to Whites (12 were predominantly White), yet one quarter (n=7) had White SMRs that exceeded Black total SMRs (3 were predominantly White). In just 9 of these 29 municipalities did White and Black SMRs differ by less than 0.2.

[32] These municipalities included: Belleville city (1.58), Center Line city (1.49), Detroit city (1.39), Ecorse city (2.19), Hazel Park city (1.56), Inkster city (2.10), Melvindale city (1.51), Mount Clemens city (1.62), Pontiac city (1.62), River Rouge city (1.47), Romulus city (1.49), Roseville city (1.37) and Wayne city (1.37).

[33] These municipalities include: Canton charter township (0.80), Dearborn city (0.94), Farmington Hills city (0.57), Sterling Heights city (0.75), Van Buren charter township (0.80), and West Bloomfield charter township (0.89).

[34] These municipalities include Southfield city (1.03), Clinton charter township (1.06) and Auburn Hills city (1.08).

Table 2.6 *Two-sample unequal variance t-tests comparing sex- and race-specific SMRs for municipalities grouped by Whiteness LQ index (less than or greater than 1.0)*

	All races total				**All races female**				**All races male**			
	n	SMR		Pop. <65	n	SMR		Pop. <65	n	SMR		Pop. <65
Whiteness		Mean	SD	Pct.		Mean	SD	Pct.		Mean	SD	Pct.
LQ<1.0	15	1.41	0.43	30.1	15	1.37	0.43	32.8	15	1.43	0.46	30.3
LQ>1.0	81	0.81	0.31	69.9	56	0.88	0.35	67.2	69	0.81	0.29	69.7
Total	96	0.90	0.40	100.0	71	0.98	0.42	100.0	84	0.92	0.40	100.0
	T-test	Diff	Std. err.	P sig.	T-test	Diff	Std. err.	P sig.	T-test	Diff	Std. err.	P sig.
		0.60	0.12	0.0001		0.49	0.12	0.0006		0.62	0.12	0.0001
	White total				**White female**				**White male**			
	n	SMR		Pop. <65	n	SMR		Pop. <65	n	SMR		Pop. <65
Whiteness		Mean	SD	Pct.		Mean	SD	Pct.		Mean	SD	Pct.
LQ<1.0	14	1.29	0.46	11.1	10	1.28	0.39	10.8	13	1.32	0.51	11.9
LQ>1.0	81	0.80	0.31	88.9	55	0.87	0.36	89.2	66	0.82	0.28	88.1
Total	95	0.87	0.38	100.0	65	0.93	0.39	100.0	79	0.90	0.37	100.0
	T-test	Diff	Std. err.	P sig.	T-test	Diff	Std. err.	P sig.	T-test	Diff	Std. err.	P sig.
		0.49	0.13	0.0015		0.41	0.13	0.0090		0.50	0.14	0.0040
	Black total				**Black female**				**Black male**			
	n	SMR		Pop. <65	n	SMR		Pop. <65	n	SMR		Pop. <65
Whiteness		Mean	SD	Pct.		Mean	SD	Pct.		Mean	SD	Pct.
LQ<1.0	15	1.52	0.41	85.2	10	1.55	0.39	90.4	11	1.63	0.39	90.8
LQ>1.0	15	1.23	0.41	14.8	6	1.38	0.23	9.6	6	1.13	0.35	9.2
Total	30	1.38	0.43	100.0	16	1.49	0.34	100.0	17	1.45	0.44	100.0
	T-test	Diff	Std. err.	P sig.	T-test	Diff	Std. err.	P sig.	T-test	Diff	Std. err.	P sig.
		0.29	0.15	0.0624		0.17	0.15	0.2955		0.50	0.19	0.0183

Excess mortality and relative spatial Whiteness

Table 2.6 reveals the extent to which SMRs by race/sex differed between municipalities grouped as having a relative spatial Whiteness index greater or less than 1.0. For all sex- and race-specific population subgroups, those living in predominantly White suburbs tended to experience substantially more favorable SMRs compared to their counterparts in predominantly non-White municipalities. Still, White populations tended to experience far more advantaged mortality profiles than Black populations regardless of where they lived. Differences tended to be larger among males compared with females for all racial groups. T-tests revealed that these differences were statistically meaningful ($p<0.10$) among all population subgroups with the exception of Black females, for whom high levels of excess death existed regardless of municipal racial structure.

While these results suggest that relative spatial Whiteness conferred a mortality advantage across White and Black municipal populations, it indicates that this advantage accrued unequally to the net benefit of Whites. A full 88.9% of White people under age 65 in the White total sub-sample lived in a predominantly White municipality, compared to just 14.8% of Black people under age 65 in the Black total sub-sample. Beyond this, spatial Whiteness tended to afford a stronger mortality advantage to White suburban populations than Black ones. Mean SMRs ranged from 0.80 to 0.87 for Whites in predominantly White places compared to mean SMRs ranging from 1.13 to 1.38 for Black people in predominantly White places. Further, the mortality advantage observed for White populations living in predominantly White suburbs compared to their White counterparts in non-White municipalities (diff=0.49, $p<0.01$) was substantially larger than that observed among Black populations (diff=0.29, $p<0.10$).

Pearson correlations (data not shown) between the continuous measure of relative spatial Whiteness and excess mortality in the all race (r=-0.67, $p<0.001$), White (r=-0.57, $p<0.001$), and Black (r=-0.47, $p<0.01$) total sub-samples were all moderately large and in the anticipated direction for all groups, though the association was stronger for the White populations compared to Black populations. Regression coefficients shown in **Table 2.7** indicate that these relationships maintained significance after accounting for spatial and demographic covariates. Coefficients for the Whiteness LQ can be interpreted as the change in SMR associated with a single unit increase in the LQ index. In hypothetical terms, this corresponded to the difference between a municipality with no White residents and one where the proportion of White residents was equivalent to the DMA as a whole (65.0%); in applied terms, the mortality difference was equivalent to that which

would be predicted between, for instance, a municipality that was 26% White (such as Pontiac city) and one that was 91% White (such as St. Claire Shores city), or between a municipality that was 20% White (such as Inkster city) and one that was 86% White (such as Walled Lake city).

Table 2.7 *Multivariate regression results assessing the relationship between municipal Whiteness for the all-race, White, and Black total sub-samples*

Dependent variable: Race-specific SMR		**All races**		**White**		**Black**	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Relative spatial Whiteness							
Whiteness LQ	Coef.	-0.869	-0.814	-0.762	-0.800	-0.539	-0.554
	P sig.	0.000	0.000	0.000	0.000	0.002	0.048
Covariates							
Land area (sq. miles)	Coef.		0.000		-0.002		-0.001
	P sig.		0.857		0.235		0.808
Population size (logged)	Coef.		-0.089		-0.077		-0.062
	P sig.		0.014		0.039		0.600
Pct. of <65 pop. age 45-64	Coef.		-0.020		-0.025		-0.017
(Race-specific)	P sig.		0.005		0.001		0.379
Type of municipality	Coef.		0.139		0.084		0.368
(Ref.=Twp.)	P sig.		0.016		0.155		0.028
Pct. of pop. IPOC	Coef.		-0.014		-0.012		0.011
	P sig.		0.071		0.121		0.387
Constant		1.949	3.476	1.799	3.579	1.865	2.565
Mean VIF			1.63		1.60		2.32
R^2		0.448	0.576	0.326	0.495	0.222	0.461
n		96	96	95	95	30	30

P sig. <0.10

The strong negative relationship between spatial Whiteness and excess mortality among White municipal populations (b=-0.800, p<0.001) was similar to that observed for all races combined (b=-0.814, p<0.001), indicating that municipal Whiteness conferred a rather substantial mortality advantage to these populations.[35] The somewhat larger R^2 values observed in the sample for all races may suggest that the relative Whiteness variable captured both the privileges inherent to living in a White body and living in a predominantly White space, and conversely, the health insults associated with Black identity at the individual level and Black experience at the municipal level. The association between Whiteness and mortality was notably weaker, but still sizable, for the Black sub-sample (b=-0.554, p<0.1).

A sensitivity analysis (**Appendix A.2**) using negative binomial models on the full sample

[35] When municipalities with large Arab populations were excluded from the White sub-sample, the adjusted Whiteness coefficient was mostly unchanged (b=-0.790, p<0.001).

for each sex-combined racial group regardless of the total death count confirmed the direction (Incident Rate Ratio (IRR) <1.0) and significance (p<0.001) of these associations, suggesting that the relationships between Whiteness and excess death were not artifacts of selection bias. Though the protective mortality effect (expressed as IRRs of an additional observed death, adjusting for expected deaths) of spatial Whiteness was similar for the all race and White municipal populations and stronger than for Black populations in Model 1, the magnitude of these associations were more comparable after inclusion of covariates in Model 2.

Discussion

Summary of findings

This ecological study examined the relationship between geographical Whiteness and excess mortality across municipalities in metropolitan Detroit in 2010. The results revealed a steep metropolitan hierarchy in excess death that was not only structured according to the racialized identities of residents, but also the racialized political geographies in which they lived. Whereas White residents experienced a mortality advantage relative to the DMA population, Black residents experienced patterns of excess death far exceeding what would be expected if they had the same mortality experience as the region as a whole. Wide inter-municipal disparities in excess mortality were also evident among White and Black populations. Consistent with the study hypothesis, severe inequities in excess death observed between and among White and Black municipal populations were in part attributable to a mortality privilege conferred to populations living in the DMA's predominantly White suburbs. While this advantage held for White and Black municipal populations, it accrued unequally to the benefit of White residents, both by virtue of their numeric predominance in the benefited population, as well as a stronger negative relationship between geographic Whiteness and White excess mortality than Black excess mortality.

Discussion of findings

Grounded in a analytic framework of spatial White supremacy, this study leveraged the socio-political construct of municipal Whiteness not just to *measure* the extent to which the condition of suburban Whiteness brings undue and outsized benefits to the health of White DMA residents, but also to *problematize* this embodied manifestation of dominance within the context of a stark metropolitan health hierarchy where Black residents suffer disproportionately from excess death. In doing so, this study moves beyond passive discussions of institutionalized racism

to consider what geographic patterns of race-related vulnerability to excess death can reveal about the underlying power relations and social formations that relationally reproduce material privileges for Whites while subordinating people of color in US metropolitan areas. By documenting these inequities at the municipal level–that is, between units of local governance that possess their own distinct histories, laws, fiscal resources, and public service structures–this study can inform the generation of new hypotheses regarding the everyday geographies, institutional arrangements, and political processes that sustain the material conditions of Whiteness and White supremacy in segregated and politically fragmented metropolitan regions.

This study is the first to examine the relationship between racial homogeneity and health inequity at the level of the municipal geography, lending new insight on the role of local jurisdictional boundaries in structuring intra-metropolitan racial mortality disparities suggested in past research (Hart et al., 1998; Hutson et al., 2012). The finding that White spatial dominance at the municipal level is protective of mortality for both White and Black metropolitan residents is similar to that of Greer et al. (2011) for stroke mortality across Atlanta neighborhoods. While this study found that the protective effect of spatial Whiteness was stronger among White residents than among Black residents, it did not replicate neighborhood-level findings from the City of Philadelphia (Hutchinson et al., 2009) or New York City (Inagami et al., 2006; Fang et al., 1998) where all-cause mortality was higher among Black residents who lived in predominantly White areas compared to predominantly Black ones before adjusting for socioeconomic factors.

These differences highlight the need for scholars to consider how the spatial scale (e.g., neighborhood, municipality) and scope (e.g., city vs. metropolitan area) of analyses influence the relationship between segregation and mortality, and how this relationship may vary across regions with different racialized histories and contemporary political economies. Findings also underscore the importance of conducting population-level analyses across politically defined units to complement analyses at lower levels and those that compare trends across regions, as such analyses can consider a more complete set of social, historical, institutional factors that affect mortality.

While results from the DMA indicate a wide Black-White mortality gap overall, this study revealed substantial local heterogeneity in excess death among White and Black municipal populations as well as within predominantly White and non-White suburbs that deserve further investigation. The observed relationship between spatial Whiteness and Whites' health at the population level suggests that the political advantages afforded to Whites via their privileged

municipal identity status extends health protections that give all Whites a collective stake in the metropolitan arrangement which upholds their domination at the cost of non-Whites. Yet despite the clear mortality privileges afforded to Whites generally, high levels of excess White death were documented in a subset of older, inner-ring suburbs and industrial satellite cities characterized by high and rising rates of poverty, low or heavily industrial tax bases, and chronic population decline.[36] While a subset of these suburban cities were home to substantial Black and Latinx populations, more than half were predominantly White, and in several such places White mortality levels exceeded those among Black residents. Such patterns suggest the selective out-migration of healthier, wealthier Whites from these localities, and perhaps reflect evidence of place stratification, whereby Black people are systematically less able than White people to translate socioeconomic gains into spatial mobility, positioning healthier middle-class Black residents in the municipal company of lower-class White residents (Darden, 2007; Darden et al., 2019).

These findings support the notion that the social power and material significance (and thus accompanying health benefit) of suburban Whiteness is historically and geographically contingent. Throughout the 20th century, the process of segregation functioned to generate social and spatial distance between White and Black Americans, categorizing and creating difference between racially identified spaces both "produced by, and productive of, hierarchical status" (Dwyer & Jones, 2000: 213). While the distance that has served to privilege, protect, and insulate Whiteness and subordinate Blackness is foundationally racial, the length and strength of this distance is also substantially determined by class. Poor and working-class Whites have always been less able than affluent Whites to secure their dominant social positioning through physical separation from racialized others, perhaps contributing to working-class suburbs' historical reliance on more militant segregationist tactics in Detroit and other northern metropolitan areas (Freund, 2007).

High rates of excess mortality among White residents in the DMA's older, declining suburbs suggests that these populations have in many ways been harmed by the metropolitan construction of spatial White supremacy, even as the system has favored them in a relative sense by offering greater access to education, jobs, and housing wealth by way of anti-Black exclusion

[36] 13 cities with White total SMRs exceeding 1.35 included Detroit, eight inner suburbs, two industrial satellite cities, and two outer suburbs with industrial histories. Among them, poverty levels averaged above 25% and increased on average 10% since 2000 (US Census Bureau 2000a, 2012c). 2010 per capita taxable values were below the DMA average with the exception of two cities (Romulus, River Rouge), where industry comprised a large share of the tax base (Michigan Department of Treasury State Tax Commission, 2010). All but two cities (Romulus, Belleville) experienced population loss between 1990-2010, where losses averaged 16% (US Census Bureau 1990a, 2010c).

(Mahoney, 1995). Processes of unfettered sprawl, fragmentation, and tax base competition that have served the (inherently racialized) class interests of newer, more affluent suburbs has led disinvestment to spread outward from the central city to the inner suburbs, many of which now contend with historically "inner-city" problems like economic isolation, infrastructural decay, inadequate public services, and growing fiscal stress (Puentes & Orfield, 2002). Yet withdrawal of suburban capital tends to be far less visible, as dominant discourse depicts poverty, property devaluation, and related challenges as the problems (and fault) of urban Black communities, masking the reality that racialized processes of economic and neoliberal restructuring have brought social and material harm to all poor and working-class people (Peck, 2002).

White poverty in the DMA and across the US is largely and increasingly a suburban phenomenon, with 92% of White residents in poverty living outside of Detroit, compared to just 29% among impoverished Black residents (US Census Bureau, 2012c). Such patterns may be especially damaging for the health of Whites not only because many suburbs tend to lack public and social service safety nets (Allard & Roth, 2010), but also because White suburban communities are less likely to nurture dense networks of collective reciprocity that mitigate the health consequences of poverty among enclaves of historically marginalized racial/ethnic groups (Geronimus, 2000, Geronimus et al., 2015, 2016). The large health inequity observed among Whites in this study highlights the need for more critical analyses that seek to understand how the health importance of overlapping White racial identities (e.g., individual, spatial) interact and vary across historical, geographical, and institutional contexts, rather than presuming the baseline health status of Whites as an acceptable benchmark for measuring health disparities (powell, 2013a).

By focusing its analytic lens on municipal Whiteness, this study offers new insight on the structures and geographies of anti-Blackness. Study results offer compelling evidence that "death by segregation" operates beyond the neighborhood and outside the central city to pattern intrametropolitan health inequities (Yang & Matthews, 2015). While the mortality experiences of Black municipal populations varied greatly, in very few places did suburbanized Black populations experience excess mortality in a manner that was similar or more advantaged than the DMA as a whole, or comparable to Whites in the same municipality. Places where excess Black mortality tended to be lower or on par with the DMA were mostly (though not ubiquitously) outer-ring

suburbs where Black median incomes were near or above the DMA median.[37] While most were predominantly White, this group included majority-Black Southfield city and several municipalities with ethnically diverse populations and spatial Whiteness indices near 1.0.[38] Indeed, the weaker association between spatial Whiteness and Black mortality may reflect the health benefits of historically inclusive suburbs that enable middle- and professional-class Blacks to "strategically assimilate"–accessing spatial benefits typically reserved for the White world while still maintaining Black culture and community (Lacy, 2018).

Still, in most of these places Black mortality notably exceeded White mortality, suggesting that the spatial privileges endemic of Whiter municipalities do not translate into equal health gains for Black residents (Pearson, 2008). In the DMA, a close link between suburban Whiteness and class status may nonetheless require that Black gains with respect to conventional material resources occur at the loss of health-promoting sociocultural frameworks, autonomous institutions, and co-ethnic social ties strengthened by historically Black communities (Airhihenbuwa et al., 2000; Geronimus & Thompson, 2004), while at the same time increasing exposure to health-harmful "othering" encounters with Whites and White institutions as well as incidents marked by race and class discrimination (Williams et al., 2003; Rollock et al., 2011). Aside from three outer-ring suburbs[39] where White and Black residents experienced similarly advantaged mortality profiles, places where Black and White residents had similar SMRs (absolute difference of less than 0.2) tended to be those where both groups experienced a mortality disadvantage. The finding that Black municipal populations experienced less within-group inequity (compared with Whites) between those who resided in predominantly White and predominantly non-White suburbs is not a sign of progress, but rather evidence that the violence of policy-driven White supremacy threatens survival in all Black communities regardless of their attained spatial or social mobility.

Limitations

This study described race-specific patterns of excess mortality in the DMA as they related to a measure of relative spatial Whiteness constructed at the municipal level in 2010. Readers should not conclude that the aggregate associations between Whiteness and mortality observed at

[37] Among nine municipalities with Black total SMRs less than 1.10, median income among Black households was $51,079. Median income for all races in the DMA between 2008-2012 was $51,136 (US Census Bureau, 2012a).

[38] This included Farmington Hills city, Canton charter Township, Van Buren charter township, Auburn Hills city.

[39] These suburbs included Farmington Hills city, Sterling Heights city, and Van Buren charter township.

the municipal level are true at lower levels of analysis (e.g., neighborhoods, individuals). Nor should observed relationships between Whiteness and mortality be interpreted as "contextual effects" of municipal segregation (i.e., those attributable to municipal-level factors, after controlling for confounders), but rather as average population-level health differentials between residents of municipalities with varying degrees of spatial Whiteness (Geronimus & Bound, 1998).

Further, this study's ecological design masks substantial heterogeneity at lower levels of analysis. For instance, municipal-level measures did not account for patterns of segregation and mortality at the neighborhood-level which are well-documented in prior research. Suburbs that appeared similarly "integrated" based on their level of municipal Whiteness may indeed produce racially divergent intra-municipal geographies and health outcomes that were unobserved in the present study. Further, municipal-level health outcomes for racialized groups, while standardized to account for population-level differences in age and sex, crudely summarize the manifold histories and lived experiences of racialized individuals. Truncated within-group diversity in mortality is likely to be more pronounced in larger municipalities (especially Detroit) and suburbs with larger non-White populations, which also tend be more economically diverse.

While a strength of this analysis is its contextualized, intrametropolitan approach, this study suffered from sample size limitations and potential selection bias. While sensitivity analysis (**Appendix A.2)** helped mitigate concerns over bias stemming from the exclusion of places with low death counts (and regression standard errors were robust to heteroskedasticity), it is possible that variation in population size across municipalities may have influenced the reliability of mortality outcomes. It was not possible to observe the mortality experiences of relatively small Black populations in some of the DMA's predominantly White suburbs; the psychosocial consequences of this residential context have potential health implications that warrant further investigation (Anderson, 2015). Lower rates of excess mortality among females compared to males systemically influenced sex-specific sample sizes and thus may have affected the validity of sex-specific findings. Partly for this reason the study focused on interpretations of sex-combined (but sex-standardized) totals, precluding analysis of how intersectional forms race- and gender-based oppression manifest across space to influence health. In particular, high levels of excess death observed among Black females in predominantly White municipalities deserve further attention.

This study's operationalization of race as a discrete, quantifiable identity that can be derived administratively exists in contrast to its conceptualization of race as a contextually

contested and relational social construct. Indeed, this study's cross-sectional, census-based measurement of spatial Whiteness may function to "objectify" the construct, rather than engage with its historical and geographical contingencies (Bonnett, 1996). While the level of Whiteness in the tri-county DMA (65.0%) provided a contextually appropriate benchmark for determining "predominantly White" municipalities, this threshold did not account for the possibility that "the full exploitation of white privilege" could require very high proportions of White people (Pulido, 2000: 16). Despite the high quality of the NCHS race-bridging methodology (Liebler & Halpern-Manners, 2008), deterministic assignment rules inherent to bridged-race estimates effectively masked racial diversity and may have biased this study's race-specific mortality results, especially in less populous places with sizable mixed-race populations.

A related source of bias was this study's use of racial mortality data undifferentiated by ethnicity. 4.0% of DMA residents identified under the pan-ethnic label of Hispanic/Latinx on the 2010 Census; while 56.0% identified as single-race White, many identified as some other race (29.0%), two or more races (8.2%), or single-race Black (4.9%). Hispanic/Latinx populations exceeded the DMA average in 22 sample municipalities and comprised between 6.0 and 26.6% of the White population in 8 of 95 municipalities in the White total sub-sample. Divergent Hispanic/Latinx mortality profiles compared to other racial/ethnic groups (Ruiz et al., 2013) and segmented racialization among Hispanic/Latinx sub-groups (Henry-Sanchez & Geronimus, 2013) makes their consolidation within single-race categories as a significant data limitation. People of Arab descent comprised about 3% of the sample population but between 5.0% and 38.7% of the population in 6 of the 95 municipalities in the White total sub-sample.[40] Though the exclusion of three municipalities with large Arab populations from the White sub-sample did not alter study estimates, it was not possible to discern the extent to which the "contested Whiteness" of Arab and Chaldean populations–involving their paradoxical racialization as both White and non-White, discrimination based on ethnicity, religion, or immigration status, and marked within-group cultural and socioeconomic differences–influenced the relationship between spatial Whiteness and mortality (Abboud et al., 2019). Future studies may consider locally heterogenous health consequences of ongoing racialization among Hispanic/Latinx, Arab, and other ethnic subgroups.

[40] Sample municipalities where persons of Arab ancestry accounted for more than 5% of the total population included: Dearborn city (38.7%); Hamtramck city (22.7%); Dearborn Heights city (20.5%); Gross Pointe Shores Village city (9.2%); Melvindale city (6.6%); Sterling Heights city (6.4%); West Bloomfield charter township (5.3%); and Madison Heights city (5.0%) (US Census Bureau, 2012d).

This study did not consider or adjust for socioeconomic position (SEP) or other socio-environmental conditions traditionally thought by social epidemiologists to "explain" or "confound" spatial associations between race and health (Kaufman et al., 1997). Critics may argue that to study Whiteness in absence of SEP ignores how the system of White supremacy is rooted in capitalism and may homogenize all White people as holding positions of power and privilege (Cole, 2009). I adopt the critical race perspective that "racism enshrines the inequality that capitalism requires" (Melamed, 2015: 77; Gilmore as quoted in Card, 2020), leading SEP inequities to exist along the causal pathway linking race to health (Williams, 1999; Mills, 2003a). I regard economic privilege a separate but deeply interrelated extension of White privilege, the latter which Claudia Rankine has laconically defined as "the ability to stay alive" (Hirsch, 2020). Whereas Part I of this paper series (Chapter 2) focused solely on the link between Whiteness and mortality to reveal the "crucial reality" of embodied White supremacy (Mills, 2009: 274), Part II (Chapter 3) examines whether racialized accumulation and deprivation of fiscal resources may in part mediate this relationship.

Implications for future research

This research heeds and echoes the call for health equity research that is based in critical race theory (Ford & Airhihenbuwa, 2010a, 2010b) and argues for scholars (and White scholars in particular) to turn their attention toward White supremacy as the root of urban racial inequality (Malat et al., 2018; Daniels & Schulz, 2006). To do so, public health researchers must adopt theoretical frameworks and study designs that delineate the connection between material and embodied manifestations of White privilege and anti-Black structural violence to reveal and dismantle the political, spatial, and institutional processes that perpetuate both. This study's attempt to name and problematize suburban Whiteness as a privileged and oppressive spatial identity is only the first step towards challenging its position within the metropolitan racial health hierarchy. Researchers and policy makers must work expediently to illuminate and dismantle the institutional mechanisms and material conditions that pattern this relationship.

The role of municipalities in structuring metropolitan geographies of White supremacy and racial health inequity discussed and demonstrated in this paper invites further inquiry into the pathways through which municipalities institutionalize race-related access to the assets (social and material resources) and activities that constrain or enhance livelihood and longevity at the population-level. Past research has shown that traditional socioeconomic factors measured at the

metropolitan and neighborhood levels cannot account for the relationship between segregation and racial inequity in excess death, suggesting that to address these factors alone will not eliminate health disparities. Despite the importance of municipal institutions not just for "race-making" (Wiggins, 2002), but also for fostering intra-regional disparities in quality of public life that stem from local governments' divergent taxing efforts, budgeting decisions, investment priorities, and public service levels, surprisingly little attention is paid to how racial health inequities may be reproduced through the "smooth functioning of everyday municipal business" (Seamster, 2015: 1054). How can critical analysis of the historical and geographic construction of suburban Whiteness–for instance, the policy-driven connection between zoning laws, property wealth, and fiscal accumulation–inform study designs that are apt to illuminate the mechanisms and material conditions of spatial White supremacy largely overlooked in prior studies? Towards these ends, Part II of this paper series (Chapter 3) explores the notion that institutionalized White supremacy might operate through under explored fiscal pathways at the municipal level to influence racial and spatial health inequity.

Chapter 3. Spatial White Supremacy and the Racial Health Hierarchy in Metropolitan Detroit – Part II: Racialized Municipal Distributions of Fiscal and Population Health

Introduction

US metropolitan areas are deeply hierarchical spaces. Particularly in older, industrial regions in the Midwest and Northeast, metropolitan areas are fragmented into many distinct and independent local governments (Hendrick & Shi, 2015). Under fragmented systems of local governance, municipalities are incentivized to advance parochial fiscal interests in a zero-sum competition for tax base (Cashin, 2000). Historically, municipal boundaries–and the zoning policies, planning practices, and development activities they empower–have served to stratify metropolitan areas by race and class, affording affluent White suburbs a competitive and comparative advantage in accumulating income, wealth, and public service benefits, all while preventing the redistribution of their taxable resources to neighboring communities (Tyson, 2014). These privileges have come at great cost to all but the most elite suburban residents, causing problems of decline, disinvestment, and concentrated poverty to seed outward from central cities to inner suburbs[41] as they diversify racially and economically (Orfield & Luce, 2013). Indeed, fragmented metropolitan regions tend to experience higher levels of racial segregation (Weiher, 1991), greater income inequality (Rusk, 1993), and wider disparities in taxing capacity across local jurisdictions (Orfield, 2002). It is unsurprising that these profoundly divided regions also lay claim to the nation's most pronounced Black-White mortality inequities (Hutson et al., 2012).

Despite an abundant public health literature linking spatial patterns of metropolitan racial segregation, socioeconomic position (SEP) and population health (e.g., Williams & Collins, 2001; Schulz et al., 2002), scholars have yet to conceptualize or measure how racialized disparity in the

[41] Inner suburbs refer generally to a group of older suburbs located near the central city that were developed prior to or during the first wave of postwar suburbanization, but before the low-density sprawl associated with the development of the interstate highway system (Cooke & Merchant, 2006). As many began as bedroom communities for central city workers (i.e., working-class suburbs), they tend to be characterized by single-family tract housing built in the 1950s and 60s (though sometimes much older), have fully developed infrastructures, and contain little vacant land for development, making them heavily dependent on residential taxes to fund basic services (Puentes & Orfield, 2002).

fiscal status of municipalities may contribute to persistent racial health inequities in US metropolitan areas. Fiscal disparities refer to the differential capacity of local governments to finance and deliver public goods and services, reflecting differences across municipalities in revenue-raising abilities and expenditure needs (Chernick & Reschovsky, 2007). A fiscally healthy municipality is one where its resources adequately meet its obligations to its citizenry (McDonald, 2017). As the revenue derived from property values and the costs associated with poverty are critical to local government fiscal health, systemic inequalities across these dimensions may shape municipalities' divergent taxing efforts, budgeting decisions, investment priorities, infrastructures, and service levels–producing material differences in public life that can structure the health and well-being of entire populations (León-Moreta, 2019; Hill, 1974). To the extent that fiscal disparities reflect and reinforce a spatial divide where fiscal resources (e.g., taxable property wealth, high-income residents, land for development) accumulate in predominantly White suburbs and social needs (e.g., poverty, health care needs, public service demands, aging infrastructure) concentrate in Black communities, the relative fiscal health or poverty of local governments may shape the geography of Black-White health inequities in metropolitan areas.

This ecological study lends new insight on the racial health hierarchy in US metropolitan areas by examining the municipal-level relationship between relative measures of Whiteness and fiscal advantage to assess the influence of these factors on patterns of excess mortality for Black and White populations in the Detroit Metropolitan Area (DMA) in 2010. Part I (Chapter 2) of this series revealed that stark inter-municipal disparities in excess death in the DMA could be partly attributed to a protective relationship between suburban Whiteness and mortality that preponderantly benefits White residents. This Chapter (Part II) builds on this work by exploring whether the privileged health status associated with spatial Whiteness can be explained by systemic fiscal advantages, and to what extent these institutional disparities may disproportionately harm the health of Black populations.

The first section of this paper describes the novelty and theoretical basis of this research, including a discussion of how spatial White supremacy manifests in a racialized distribution of fiscal costs and resources that can influence the geography of population health inequity in segregated and politically fragmented metropolitan areas. Subsequent sections describe the methods and results of an analysis examining this premise in the DMA, which proceeds in three parts. First, I construct a composite measure of fiscal health (and from this, a categorical measure

of fiscal class) to describe the extent of fiscal disparities across sample municipalities and to explore the expectation that fiscal distributions disproportionately advantage Whites in predominantly White suburbs at the expense of Black populations and spaces. Next, I use the Slope Index of Inequality to quantify gaps in excess death associated with municipalities' relative fiscal advantage and compare how the strength of these gradients differ between White and Black municipal populations. Last, I use a series of regression models to explore associations between fiscal health and race-specific variation in excess mortality, with particular attention to whether systemic fiscal advantages mediate the health-relevant power of suburban Whiteness.

This paper concludes with a summary of key findings and a discussion of what these results suggest about the functional role that municipal institutions play in reproducing the material conditions of Whiteness and the embodied consequences of White supremacy in US metropolitan areas. Eradicating White supremacy from the foundation of our metropolitan infrastructures is an exceedingly complex task with no singular solution or approach; I conclude with a discussion of diverse strategies through which public health scholars may support the necessary process of social and metropolitan transformation.

Background

Scholars have long regarded suburbs as the "northern way to insure separate and unequal" (Long, 1967: 254; Hill, 1974). Legacies of anti-Black suburban hostility, high levels of municipal fragmentation, and a predominance of restrictive land-use laws in older, larger metropolitan areas in the industrial north help explain why high levels of jurisdiction-level segregation persist in these regions (Pendall et al., 2006; Lichter et al., 2015; Rothwell & Massey, 2009; Pendall, 2000), and remain entrenched despite decades of Black suburbanization and neighborhood-level integration (Adelman, 2004; Massey et al., 2009). Here, incessant racial divides exist alongside sharpening economic ones, as the exodus of affluent Whites to the outer suburban ring has coincided with socioeconomic decline and poverty concentration in central cities, inner-ring suburbs and industrial satellite cities where the vast majority of Black, poor, and working-class people live (Lewis & Hamilton, 2011; Jimenez, 2014). Black-White mortality disparities are especially pronounced in these highly segregated, economically polarized, and politically fragmented regions (Popescu et al., 2018; Cooper et al., 2001; Hart et al., 1998; Hutson et al., 2012).

Of key importance to this analysis is how the underlying structures of government that balkanize regions by race and class also mediate the distribution of fiscal needs and resources,

producing inequalities in the cost, quality, and availability of local goods and services that have significant bearing on public life and population health. As municipal governments are the core providers and regulators of the public's "health, safety…[and] general welfare" in metropolitan areas (US Department of Commerce, 1926), the differential capacity of municipalities to uphold their responsibilities has clear implications for health equity, especially in regions where health inequities are already severe. As noted in Part I, the segregation and mortality literature has relied on routine SEP indicators–e.g., poverty, income, education, and employment (or a composite of these)–measured either at the metropolitan- or neighborhood-levels to help explain geographic patterns of racial health inequity across a range of outcomes (Kramer & Hogue, 2009; White & Borrell, 2011) including mortality (Popescu et al., 2018; Greer, 2011; Cooper et al., 2001; Polednak, 1991, 1993, 1996; Inagami et al., 2006; Fang et al., 1998). Despite strong evidence that segregation undergirds stark racial wealth gaps, few studies have attempted to link patterns of segregation, wealth, and health across space (Oliver & Shapiro, 1995; Darden et al., 2010; Mehdipanah et al., 2017). The discipline has paid little attention to whether historic inequities in income and wealth might stratify the distribution of public service demands and taxable resources between geographies to institutionalize racialized hierarchies in fiscal and population health.

Central to this discussion is the historical product of Whiteness, and the role that municipal institutions play in reifying this construct with social, material, and embodied meaning. By excluding particular land uses and driving up the cost of land, suburban White homeowners and their elected officials pursued incorporation and land-use enactments as political strategies not just to maintain White homogeneity and private property wealth, but also a state of fiscal dominance–maximizing tax revenues, minimizing tax burdens, and preventing redistribution of their taxable resources to other localities, where social needs accumulated in their absence (Rice et al., 2014; Tyson, 2014; Quigley & Rosenthal, 2005). The Metropolitan Area Research Council finds that in many regions, a subset of predominantly White, upper-income, high tax-base suburbs capture the largest share of region's economic investments, job growth, and federal and state infrastructure spending–despite typically being home to just a quarter of the regional population (Orfield, 2002). In what Cashin (2000: 1987) dubs the "tyranny of the favored quarter," the rest of the metropolitan population–its unfavored majority–are not just excluded, but subject to the displaced costs of exclusive, low density-development, all while subsidizing the public investments (e.g., sewage systems, highways) that guide patterns of growth and accumulation (Leinberger, 2010). Hence the

fragmented structure of local governance that empowers Whites (especially affluent Whites) to overwhelmingly control the region's fiscal resources and govern "independently from and at the expense of communities of color" (Herson-Ford et al., 2018) gives Whiteness its territorial and political significance, and thus can be thought play an institutional role in reproducing White supremacy and its embodied consequences in US metropolitan areas (Ansley, 1989).

Fragmentation, fiscal zoning, and spatial White supremacy

Local governments depend primarily on the taxable resources within their borders to fund local services (Alm et al., 2011). As the principal source of locally raised revenue for municipalities is the property tax (Youngman, 2016), property values are critical in determining a community's level of service expenditures and tax costs borne by residents (Bell et al., 2004; Schneider & Logan, 1982). Under a fragmented system of local governance, independent municipalities are thus inclined to leverage their land-use and taxing powers to compete for "high-end" developments like commercial businesses and exclusive housing that will generate the most in tax revenues and the least in service burdens (Ihlanfeldt, 2004). This creates a "de facto price of entry" that bars low-cost housing, low-income residents, and their accompanying social needs, displacing these responsibilities to other localities (Briffault, 1996). By spreading low service demands across a rich tax base, localities minimize the unit cost of public goods and maximize the net benefit to local residents (Orfield, 1999).

Over time, interlocal competition and "fiscal zoning" reinforce an overlap in wealth, tax burdens, and service quality among local units in metropolitan areas. The strong tax bases and limited service needs of affluent suburbs allow them to maintain both low levels of expenditure and taxation (Schneider & Logan, 1981, 1982), generating a cycle where the wealthiest suburbs can offer the most profitable contexts for businesses and developers, leading new construction and firms to concentrate in places with more fiscal resources (Schneider, 1985). High-wealth localities are not only better able to support their common services, but also to invest in "developmental" services and infrastructure (e.g., transit, utilities) that help build the tax base by attracting mobile capital and encouraging private investment (Phelan & Schneider, 1996; Schneider, 1987). Lower tax rates and better services are then capitalized as higher property values, perpetuating wealth accumulation for taxpayers and their local governing units (Oates, 1969; Palmon & Smith, 1998).

The same cycle that perpetuates fiscal advantage in affluent suburbs causes cumulative fiscal poverty in places with low wealth and high community needs. Cities and inner-suburbs at a

systematic disadvantage in the regional competition for tax base tend to have high service burdens and fixed costs (i.e., those that do not reduce with decline), such as legacy payments (e.g., pensions), debt service obligations, and outlays for aging infrastructures built for larger populations, all of which place a high burden on taxpayers without benefiting the public directly (Haughwout, 1997; Dye & Gordon, 2012). Poverty concentration adds to fiscal stress not just by increasing spending on redistributive services (those benefiting the poor; e.g., affordable housing, health care, social services) but also by raising the cost of general functions and services (Joassart-Marcelli et al., 2005; Pack, 1998; Xu & Warner, 2016). For instance, higher spending on police, transportation, and fire protection can stem from higher rates of crime, more dependent ridership, and older, distressed building stocks (Chernick & Reschovsky, 1995; Cullen & Levitt, 1996). Such indirect costs have increased more rapidly and are typically uncompensated by revenue-transfer policies at the federal and state levels (Joassart-Marcelli et al., 2005). Local officials are forced to raise taxes or limit services, either of which can undermine anti-poverty efforts and further the incentive for firms and middle-class residents to leave, perpetuating decline, tax base erosion, and the persistent "needs-resources gap" in poor localities (Bennett, 1984; Ladd et al., 1991).

The racialized outcome of these dynamics is that White communities, in comparison to localities with larger Black and non-White residents, tend to have stronger property tax bases, lower per-capita spending levels, and are better able to fund local services with taxes from their own local property wealth (Jimenez, 2014; Schneider & Logan, 1981, 1982; Cutler et al., 1993). Black populations are overrepresented in localities with weak tax bases and high service needs that are more reliant on intergovernmental transfers to fund their services; such payments have been insufficient to offset these fiscal imbalances, leading to higher tax rates, lower service quality, and higher levels of public debt (Schneider & Logan, 1982; Logan & Schneider, 1984; Phelan & Schneider, 1996; Wiese, 2005; Kahrl, 2017; DeHoog et al., 1991).

Though suburban Black populations tend to live in poorer localities than Whites regardless of SEP (Alba et al., 2000; Darden & Kamel, 2000), community affluence does not fully account for the disadvantaged fiscal status of suburbs with large Black populations (Phelan & Schneider, 1996). Half of all middle- and upper-income Black metropolitan residents lived in a suburb as of the late 2000s, but still 42% lived in a majority-Black neighborhood (Sharkey, 2014), and a significant number of predominately Black suburbs have emerged in many regions (Harshbarger & Perry, 2019). Scholars suggest that despite the political and "soul-regenerating" benefits of

majority-Black enclaves, systemic factors like under- and dis-investment by retailers and commercial firms, real estate steering, and growth patterns that favor the affluent quarter undercut prosperity and fiscal stability in even the most affluent Black suburbs (Cashin, 2001: 755; Wiggins, 2002). Thus middle-class Black suburbs, typically though not exclusively located in the inner ring, occupy a "precarious space" in the metropolitan political economy, and tend to be characterized by higher poverty, older infrastructures, underfunded schools, and lower fiscal capacities than White middle-class communities (Ascher & Branch-Smith, 2005; Pattillo, 2005; Johnson, 2014).

Undoubtedly, the average characteristics of predominantly White suburbs mask variability among them; as poverty, and especially White poverty, increasingly becomes a suburban phenomenon, poor White suburbs tend to have more in common with central cities and Black suburbs than their affluent White counterparts (Puentes & Orfield, 2002). Yet current evidence supports the assertion that more homogenously White communities enjoy more favorable fiscal situations as a whole, with the most affluent among them reaping the greatest benefits, while Black residents bear the brunt of metropolitan fiscal inequity (Cashin, 2000; Schneider & Logan, 1982).

Fiscal and population health

The implications of local fiscal disparities for population health are myriad. Over the last several decades, federal and state retrenchment has shifted the fiscal burden for health and social service delivery onto local governments (Altman & Morgan, 1983; Joassart-Marcelli et al., 2005). Local health departments (LHDs), particularly in cities in large metropolitan areas, are responsible for providing a broad range of essential public health functions including disease prevention and monitoring, health care for high-risk groups, environmental health surveillance, and population-based interventions (Salinsky, 2010; Institute of Medicine, 2003). As local per-capita spending is a consistent determinant of public health service performance (Mays et al., 2006) and community-level preventable mortality (Mays & Smith, 2011), LHDs' increased reliance on diminishing local resources, particularly in declining central cities, undermines core public health infrastructure.

Though smaller suburbs are not typically tasked with formal public health functions, all municipalities exert a powerful influence over the social determinants of health through their general-purpose responsibilities related to public health and safety (e.g., fire, ambulances), housing and environmental quality (e.g., sanitation, building code enforcement), social infrastructures (e.g., libraries, schools) and utilities (e.g., water and sewerage, transit) (NACCHO, 2009). Fiscal strength offers budgetary flexibility; localities with larger tax bases can choose to support higher

service levels and investments in salubrious resources like recreation centers, parks, and walkable streetscapes (Joassart-Marcelli, 2010). Research shows that higher municipal-level walkability scores are associated with lower rates of cardiovascular disease mortality (Koohsari et al., 2020) and per capita spending on parks and recreation is associated with decreased county-level all-cause mortality (Mueller et al., 2019).

Wealthy areas are also able to shoulder special taxing districts and local millages to fund physical and social infrastructures that support public quality of life without over-burdening their residents. Honoré et al. (2011) found that for higher-income counties in Mississippi, levying a dedicated public health tax was associated with lower mortality rates (compared to those without dedicated funds), but in poorer counties the added property tax burden was associated with *higher* mortality. The fiscal latitude to grant tax and service concessions that lead new jobs and health-promoting amenities (e.g., grocery stores) to locate in Whiter, well-off suburbs (Zenk et al., 2005) may also structure the social-ecological factors (e.g. community unemployment, poorer food retail environments) that have been linked to higher mortality in past research (Ahern et al., 2011).

In contrast, municipalities operating under conditions of fiscal scarcity are more likely not only to shortchange health promotion efforts and postpone infrastructure improvements, but also engage in budgeting decisions and development strategies that harm the health of their most vulnerable residents. Desperate to build tax base and compete for development, fiscally deprived places often tailor services and subsidize projects to attract high-income residents and firms, even if those decisions come at a cost to services benefitting the majority of residents or go against community concerns (Jimenez, 2014). This fiscal logic disproportionately harms the health and longevity in poor and Black communities, for instance through redevelopment projects that lead to gentrification and displacement (Mehdipanah et al., 2017; Huynh & Maroko, 2013; Tighe & Ganning, 2015), or the siting of hazardous land uses or facilities that increase deadly exposure to pollution (Schulz et al., 2016; Pulido, 2000). Poorer municipalities tend to spend larger shares of their general funds on policing (Friedman & Youngblood, 2020); local government police spending not only outpaces but comes at the cost of spending on social and public health services (CPD, Law for Black Lives, & BYP 100, 2017) and the health consequences of racialized police violence, both direct (i.e., killings) and indirect (i.e., chronic stress), systematically and disparately impact Black populations (Cooper & Fullilove, 2016; Obasogie & Newman, 2017).

An abundant literature documents how rampant public sector austerity budgeting causes externalities and risks to culminate at the local level (Peck, 2001, 2012; Donald et al., 2014; Lobao & Adua, 2011), leaving struggling cities and institutionally lean suburban governments little choice but to minimize public costs by cutting staff and public programs, privatize public functions, or make up for lost revenues with regressive service fees and user charges (Kim, 2019; Miller & Hokenstad, 2014). Scholars document how in some cases fiscal austerity has led local officials and municipal institutions to enact draconian and inhumane policies of neglect and service withdrawal (e.g., water shutoffs, see Phinney, 2018) and engage in illegal and coercive forms of extraction (e.g., profits derived from over-policing and abuse of civil forfeiture laws, property tax over-assessments and property tax foreclosures, see Atuahene, 2020), that fall hardest on poor communities of color, and have many material and psychosocial consequences for health.

The violence of racialized fiscal austerity is especially hard felt during and after periods of economic downturn (e.g., the 2007-9 recession), when the distressed fiscal position of poor local governments run up against falling property values, contracting state revenue transfers, or untenable debt obligations (Gordon, 2012; Anderson, 2013). While recession-induced austerity can affect localities of all resource levels, the consequences of austerity are most harmful in places where services have been chronically underfunded, and it is thus more difficult to cut spending without jeopardizing residents' health and safety (Joassart-Marcelli et al., 2005). While the public health harms of discrete, scarcity-driven policy decisions tend to be the most observable (e.g., the Flint water crisis, see Sadler & Highsmith, 2016), an immense and enduring threat is posed by smaller, more diffuse changes over several decades that chronically erode public health and the local institutions responsible for upholding it (Altman & Morgan, 1983; Miller, 1975).

Scholars have long argued that the racialized allocation of municipal resources can influence regional patterns of excess death (LaVeist, 1992; Greenberg & Schneider, 1994). Work by R. Wallace, D. Wallace, and Fullilove examines the pathways through which policy-mediated processes of urban decay, housing loss, and population decline (outcomes of "planned shrinkage") ecologically interact with poverty to impact a range of etiological diverse mortality outcomes (e.g., infectious disease, substance abuse, homicide), indicating that the denial of essential municipal services can degrade public health in communities of color with cascading effects for inner-cities and their surrounding suburbs (Wallace, 1990; Wallace R. & Wallace D., 1997, 1998; Wallace et al., 1995, 1997; Wallace & Fullilove, 2008). Though difficult to disentangle the "contextual

effects" of neighborhood SEP from the systematic withdrawal of municipal resources from poor communities (Nandi & Kawachi, 2011), studies find that manifestations of public disinvestment endemic to neighborhood poverty (e.g., property abandonment, poor housing conditions, crime prevalence) have independent mortality implications that extend beyond deaths caused by injury and homicide (Sampson et al., 2002), to infant deaths and those caused by stress-related chronic diseases (Cohen et al., 2003; Ellen et al., 2001; Browning et al., 2011 Diez Roux & Mair, 2010).

Lending conceptual credence to these findings is Geronimus's weathering hypothesis, which posits that cumulative exposure and adaptation to socially structured stressors over the life course exacts a psychological toll on the body's major systems, accelerating the biological aging process and causing early health deterioration in marginalized populations (Geronimus, 1992; Geronimus et al., 2006). Weathering has been applied to understand the role of stress-mediated wear and tear in contributing to age-related Back-White differences in chronic disease mortality (Geronimus et al., 1996; Geronimus et al., 2001; Duru et al., 2012), especially excess death rates among working-age Black adults in high-poverty local areas (Geronimus et al., 1999, 2001, 2011); maternal weathering has also been linked to Black-White infant mortality disparities (Buescher & Mittal, 2006; Geronimus, 1996). From a weathering perspective, to the extent that municipalities' racialized histories structure lifelong physical, social, and economic environments that differently expose groups to material and psychosocial stressors and shape opportunities for respite from repeated physiological stress process activation, they are also likely to structure racialized spatial patterns of excess death (Geronimus, 2000; Geronimus & Thompson, 2004).

Weathering also posits that the relative marginalization of social group identities is contingent–varying by class, across interpersonal and institutional settings, and with the strength of co-ethnic ties–suggesting that the stress-mediated health impacts associated with membership of a particular racial group will vary across racially-identified residential space (Geronimus et al., 2016; 2020). For instance, the potential health benefits derived from the socioeconomic advantages that accompany residence in a White-identified space may be reduced for Black residents who are simultaneously more exposed to discrimination and more disconnected from affirmative cultural networks; for similar reasons, the innumerable chronic health threats posed by racialized poverty and fiscal deprivation may be particularly hard-felt by Whites in a predominantly Black space who may lack collective strategies to combat material deprivation and stigma (Geronimus et al., 2015).

This evidence suggests that the fragmented system of local governance that has accompanied suburban development has an embedded institutional bias that allocates accumulating fiscal benefit to affluent White suburbs; these benefits come at a cost to the majority of the region, to poor communities generally, and to Black communities specifically. Despite an array of evidence that connects fiscal health to population health, public health scholars have yet to evaluate this link empirically. This informs the following analysis in the DMA.

Methods

Study setting

As described in detail in Chapter 2, the tri-county DMA (Oakland, Macomb, and Wayne) provides a suitable context for this analysis due to its history of racialized suburbanization, political fragmentation, and economic decentralization (Darden et al., 1987; Freund, 2007; Tyson, 2014). Centered around the nation's largest majority-Black city, the DMA is comprised of a plurality of predominantly White suburbs, though patterns of Black suburbanization, immigration, and middle-class flight from inner and industrial suburbs (several with historically Black populations) since the 1970s has led to a number of racially-mixed suburbs, including several majority-Black ones. Chapter 2 also revealed severe inequities in excess death between and among White and Black municipal populations, which were in part attributed to a health advantage associated with municipal Whiteness. Though extreme, the DMA's stark municipal divides are in many ways emblematic of trends observed elsewhere in the industrial Midwest and Northeast (Orfield, 2002).

Examining the Detroit area between 1980 and 1990, Orfield (1999) attributed three sub-regional trends to the dynamic of fiscal zoning. The first was that social needs (e.g., poverty, crime) accelerated on an eroding tax base in the central city and its older, distressed suburbs, with several industrial suburbs demonstrating more rapid decline than the city of Detroit. The next was that municipalities with the highest tax bases and school-district spending were experiencing the largest gains in White population, property values, jobs per-capita, and infrastructure investments. For example, despite containing just a quarter of the population, Oakland county (where at the time the median household income ranked near the 99th percentile nationally (US Census Bureau, 1990b)) received 78% of the region's $1 billion investment in new highway capacity between 1985 and 1996. Third, a mix of older and newer middle-income communities with somewhat weak tax bases showed signs of either unsustainable growth or initial decline and were thus at risk of becoming the "declining suburbs of tomorrow" (Orfield, 1999: 30; Allard & Roth, 2010).

Additional fiscal context is relevant to this study, which takes place in the aftermath of the 2007-09 recession. Michigan municipalities faced mounting budgetary pressures throughout the 2000s when major cuts to state revenue sharing increased their reliance on local tax bases (MDT, 2018). Falling property values affected many localities, but the spatially uneven collapse of the DMA's housing market–shaped by its severe and racially targeted subprime mortgage crisis–disproportionately reduced property values and tax revenues in communities of color affected by high foreclosure rates (Akers & Seymour, 2018; Alm & Leguizamon, 2018; Chernick et al., 2017). Skidmore and Scorsone (2011) found that falling property tax revenues were a major underlying cause of severe fiscal stress among Michigan municipalities between 2005 and 2009. In 2010 property tax revenues declined in 98% of local governments in southeast Michigan, and most officials reported a growing inability to meet their jurisdictions' fiscal needs (Ivacko et al., 2012).

Whereas wealthy municipalities could respond to revenue losses by raising tax rates, falling back on "rainy day" funds, or slimming nonessential services, prolonged fiscal problems in many DMA localities escalated to crisis levels (MSHDA, 2010). Despite reported increases in infrastructure, human service, and public safety needs after the recession, fiscally marginalized municipalities reduced their spending by laying off staff, cutting services, reducing capital outlays, or increasing fees and health care copays (CLOSUP, 2011; Loh, 2016). Between 2009 and 2013 seven DMA cities–home to 66.1% of Black DMA residents but just 5.6% of its Whites–came under control of state-appointed emergency financial managers who implemented strict fiscal retrenchment without consent from elected officials or the public (Lee et al., 2016; US Census Bureau, 2010b). Taxable property values in Detroit declined 21% between 2008 and 2012.[42] In the years prior to its 2013 bankruptcy, city officials slashed department budgets, closed roughly 50 city parks, and discontinued garbage pick-up, police patrols, and public lighting in large swaths of the city (AlHajal, 2013; Shedlock, 2010). Detroit's health department, which in 2007 serviced more than 200,000 people annually (Detroit DHWP, 2007), was down to just five employees in 2012 when its funding was cut and its remaining services were turned over to a nonprofit agency (AlHajal, 2012; Nather, 2016). Budget shortfalls in many smaller, fiscally eroded inner-suburban cities also prompted cuts to basic public health and safety functions. For instance, Allen Park laid off its entire fire department (Leverage Academy, 2011), Ecorse shed one third of its workforce

[42] This is based on the difference ($2.2 billion) adjusted to 2012 dollars; the unadjusted figure is $1.6 billion (15.8%) (MDT 2008, 2012).

and privatized ambulance services (Burdziak, 2012), Inkster let go of one quarter of its public employees (Hulett, 2011), and Dearborn closed its health department (Tippen, 2011).

Study design and sample

This is a cross-sectional ecological study of secondary data sources. The full sample included all sub-county general purpose municipalities located fully within the DMA that had a population greater than 2,500 in 2010 (N=108; 69 cities, 23 charter townships, 16 townships), encompassing 99.6% of the DMA population. As noted in Part I (pg. 33), a 2009-2011 average death count of 10 or more was necessary to calculate mortality outcomes, generating nine race- and sex-specific sub-samples for which there were sufficient death counts for analysis. Here, I primarily report and interpret the mortality experiences of the three *total* (sex-combined) municipal sub-samples for all races combined, White, and Black populations (accounting for 98.6%, 98.3%, and 58.1% of the full sample total population under age 65, respectively).

Data sources and measures

Table 3.1 shows municipal-level measures and associated data sources for this study. Vital statistics and population data (years 2009-2011) used to construct the outcome variable of interest (excess mortality) came from the Michigan Department of Community Health (MDCH). Data for the relative spatial Whiteness variable and covariates came from the 2010 US Census. Data for the indicators of fiscal advantage used to calculate the composite measure of fiscal health came from the five-year (2008-2012) American Community Survey (ACS) estimates (absence of poverty, median household income, and median housing value) and the Michigan Department of Treasury's (MDT) Community Financial Dashboard (property tax base per capita). As the measures of excess mortality and relative spatial Whiteness were described in detail in Chapter 2 (Pgs. 30-34), I briefly summarize these variables below, following with a more detailed description of the fiscal measure.

Excess mortality was operationalized using indirectly Standardized Mortality Ratios (SMRs) and Standardized Death Rates (SDRs, per 100,000) based on average three year (2009-2011) all-cause mortality for persons under age 65, stratified by sex and race (all races, White, Black). Race-specific death and population counts from MDCH were undifferentiated by ethnicity and estimated using the National Center for Health Statistics (NCHS) bridged-race methodology. The 2010 DMA population (all races combined) served as the standard population. Calculated as shown in **Table 3.1**, SMRs and SDRs permit interpretation of municipal excess death rates in relation to the DMA, controlling for different age and sex structures across sample municipalities.

Table 3.1 *Data sources and measures (all measures are at the municipal level)*

Variable		Description	Source	Years
Outcome				
Excess mortality				
Indirectly standardized mortality ratio (SMR)		The number of observed deaths <65 (by race/sex) in a municipality relative to the number of deaths <65 that would be expected based on the age- and sex-specific rates in the DMA and the population size of the municipality in the same age/race/sex groups	MDCH	2009-11
Indirectly standardized death rate (SDR)		The SMR expressed as rate per 100,000 members of the race-/sex-specific population; equal to the SMR multiplied by the crude death rate (CDR) in the DMA	MDCH	2009-11
Independent variables				
Relative spatial Whiteness				
Location quotient (LQ)		Percentage of residents who are non-Latinx White in the municipality relative to the percentage of residents who are non-Latinx White in the DMA as a whole (65.0%)	Census	2010
Fiscal health				
Fiscal health composite/classes		Sum of z-scores based on four indicators of municipal fiscal advantage relative to full sample distribution; ranked and divided into three equally sized tertiles		
1	Absence of Poverty	Percentage of the population living above the federal poverty level	ACS	2008-12
2	Median household income	Median household income (2012 inflation-adjusted US dollars)	ACS	2008-12
3	Property tax base per capita	Total taxable property values per population (2010 US dollars)	MDT	2010
4	Median housing value	Median value of owner-occupied housing units (2012 inflation-adjusted US dollars)	ACS	2008-12
Covariates				
Land area		Size, in square miles, of land area in geographic municipal boundary	Census	2010
Population size		Total population size (logged)	Census	2010
Type of municipality		City or township	Census	2010
Race-specific age		Percentage of same race-specific population that is middle aged (45-64)	Census	2010
Pct. of population IPOC		Percentage of population not non-Latinx Black or non-Latinx White	Census	2010

MDCH=Michigan Department of Community Health; Census=US Census Summary File; ACS=five-year American Community Survey estimate; MDT=Michigan Department of Treasury (MDT) MI Community Financial Dashboard.

Relative spatial Whiteness is conceptualized as a social and material condition representing a state of dominance in the metropolitan power structure, intended to proxy a set of socio-spatial relationships, processes, institutions, and historical foundations that work to reproduce unearned privileges, benefits, and protections for people and places racialized as White through the subordination of people and places racialized as Black or non-White (Leonardo, 2004; powell, 2005; Bonds & Inwood, 2016). Relative spatial Whiteness was operationalized by the Location

Quotient (LQ) index, a ratio of two proportions in which the numerator was the proportion of non-Latinx White residents in the municipality and the denominator was the proportion of non-Latinx White residents in the DMA as a whole (65.0%). An LQ index less than 1.0 indicates a higher degree of spatial Whiteness (i.e., predominantly White), an LQ equal to 1.0 indicates Whiteness on par with the DMA as a whole, and an LQ greater than 1.0 indicates less homogenous Whiteness (i.e., predominantly non-White or disproportionately Black). Majority-Black municipalities refer to those where the Black population proportion exceeded that of any other racial/ethnic group.

Fiscal health was operationalized as a composite measure that proxies the distribution of social needs and fiscal resources across municipalities, and classified municipalities as fiscally poor, modest, or affluent based on their capacity to generate public goods and services. There is no consensus on how best to measure the complex condition of municipal fiscal health (McDonald, 2017), which requires scholars to account not just for levels of expenditure need (i.e., funds needed to provide an average level of services) and revenue-raising capacity (i.e., tax revenues raised at a uniform tax rate, plus inter-governmental aid), but also dynamic and cumulative aspects of the fiscal conditions and structure (Hendrick, 2004; Bird, 2013). The "daunting nature" of this task leads scholars to commonly rely on a set of environmental fiscal health correlates (Chernick & Reschovsky, 2007: 77). The method and variables used to create this measure were adapted from prior research on inter-municipal fiscal disparities (Hill, 1974; Orfield, 2002) and socioeconomic inequality (Darden et al., 2010) within metropolitan areas, including the DMA (Orfield, 1999; Darden et al., 2019). The indicators used to construct the measure are defined as follows:

Absence of poverty was defined as the percentage of the population living above the poverty threshold, based on a person's total family income in the last 12 months. As discussed, municipal poverty concentration is a significant driver of poor fiscal health in that it increases local spending and exacerbates decline through the raising of taxes or limiting of services (Joassart-Marcelli et al., 2005). Across a range of areal units, geographic poverty concentrations strongly predict variation in all-cause and cause-specific mortality and Black-White mortality differences between local areas in the same region (Chen et al., 2006; Gebreab & Diez Roux, 2012; Geronimus et al., 1996). As racial segregation is a well-known cause of concentrated poverty and its compounding social correlates (Massey & Fischer, 2000), Black residents of urban, high-poverty areas are at substantially higher risk of excess death, particularly due to early-onset stress-related chronic disease (Geronimus et al., 1999, 2001, 2011).

Median household income was based on the income distribution of all households, including those without income, measured in 2012 dollars. As a binary poverty measure can reflect neither the depth of poverty that people experience nor the extent of a population's affluence, the continuous measure of household income was used to capture more nuanced variation in municipal income. Because sources of revenue vary across municipalities within the same metropolitan area, scholars have argued that the median income can serve as a reliable proxy for the actual level of fiscal resources in a municipality, since all local taxes and fees are ultimately paid out of income (Hill, 1974, 1976; Atkins et al., 2005; Chernick & Reschovsky, 2007). Median income measured at the block group, census tract, and zip code levels has been shown to detect a steep stepwise gradient in all-cause mortality to persons under 65 in past research (Krieger et al., 2003).

Property tax base per capita was defined as the total 2010 taxable property value per population, which MDT defines as "the service-level solvency or the ability of a local government to generate revenues so they can provide public services…the higher the value, the better situated the local government is to provide these services" (MDT, n.d.). Taxable values are based on the State Equalized Value (SEV) of six classes of real (residential, commercial, industrial, developmental, agricultural, timber-cutover) and personal property (MCL 211.34c)[43] and provide the base against which local governments establish the tax rate (i.e., millage rate) sufficient to generate a desired level of property tax revenues, or the tax levy. Townships are far more limited than cities in the number of mills they can levy, but cities are also subject to statutory tax limitations that cap total millage rates and fiscal year increases in tax revenues and rates (Article IX § 6-25-31). This measure has been widely used in urban studies and public finance literatures (Hackworth, 2018; Lee et al., 2013; Chernick et al., 2017), but absent from urban health research.

Median housing value was based on the distribution of owner-occupied housing values (as estimated by owners when asked how much their property would sell for if it were for sale). This measure supplements the prior indicator, as per capita tax base measures may overstate the fiscal and health-related benefits to suburban municipalities that function as industrial-, commercial-, or service-based sectors for the larger region conditions, and which may experience disadvantages due to high service or infrastructure demands and environmental burdens (Hendrick, 2004). As more than half of the DMA's tax base is residential, systemic housing market patterns, including

[43] The SEV typically mirrors the property's assessed value as it is determined by the local tax assessor, which by law should be equal to 50 percent of its true cash value (MCL 211.27a).

home price declines and mortgage foreclosures sustained during and after the 2007-09 recession, can significantly influence inter-jurisdictional fiscal disparity (Smith et al., 2001), not only by way of their strong relationship with property tax revenues (Alm et al., 2014), but also their rippling consequences on other sources of revenue (Alm & Leguizamon, 2018).

The composite measure of fiscal health was constructed based on the value of these four fiscal indicators relative to their distribution in the DMA full sample. First, a z-score was calculated for each indicator by subtracting the indicator's mean for the DMA sample from the indicator's value for a municipality, then dividing by the standard deviation of the indicator for the DMA sample. The z-scores were then summed to generate a composite fiscal health score for each municipality. Higher composite values correspond to greater relative fiscal advantage, whereas lower values indicate relative fiscal poverty. This can be stated mathematically as:

$$FH_i = \sum_{j=1}^{k} \frac{V_{ij} - V_{jDMA}}{S(V_{jDMA})}$$

Where FH_i is the composite fiscal health score for municipality i, equal to the sum of z-scores for fiscal indicators j, relative to their distribution in the DMA full sample (N=108); DMA is the tri-county Detroit Metropolitan Area; k is the number of indicators in the index; V_{ij} is the j^{th} fiscal indicator for a given municipality i; V_{jDMA} is the mean of the j^{th} indicator in the DMA sample; and $S(V_{jDMA})$ is the standard deviation of the j^{th} indicator in the DMA full sample.

The resulting fiscal health scores were ranked low to high and divided into three tertile groups, or "fiscal classes," which I refer to as fiscally poor municipalities, modest suburbs, and affluent suburbs. Additional measures relevant to fiscal health were used to describe each fiscal class. These include population density and median housing age, as both are associated with increased public spending on capital outlays and public safety (Ladd, 1992; Hendrick, 2004). Housing age is also commonly used to identify inner-ring suburbs that are increasingly vulnerable to socioeconomic decline (Green Leigh & Lee, 2005; Hanlon & Vicino, 2007). Percentage population change between 2000 and 2010 was also assessed; whereas population loss is typically associated with erosion of the tax base and higher per-capita costs (Chernick & Reschovsky, 2007), rapid population gain without adequate tax base can also be a sign of fiscal distress (Orfield, 2002).

Covariates included spatial and demographic variables that may vary systematically with municipal distributions of mortality, fiscal health, and spatial Whiteness: land area, population size (logged), municipality type (city or township), race-specific age (percentage of the racial group

that is middle aged, 45-64), and the proportion of the population Indigenous and other people of color (IPOC) (i.e., racial/ethnic categories other than non-Latinx White and non-Latinx Black).

Analysis

First, descriptive statistics of the full sample and each fiscal class were used to illustrate the extent of fiscal health disparity in the DMA (for ease of interpretation, the percentage *below* poverty is referenced in descriptive tables). One-way analysis-of-variance (ANOVA) models using Bonferroni multiple comparison tests discerned whether fiscal indicators differ significantly across the three classes. A choropleth map was used to visualize how the fiscal classes patterned spatially.

Second, demographic and fiscal distributions were examined to determine the degree to which fiscal health disparities in the DMA were racialized. To assess whether populations living in predominantly White municipalities experienced a significant fiscal health advantage, two-sample Welch's unequal variance t-tests were used determine whether mean measures of fiscal health differed between municipalities grouped as having Whiteness LQ indices less than or greater than 1.0. The degree of racial inequity observed within each fiscal class was also assessed. After comparing the all race, White, and Black total sub-samples in terms of their fiscal, racial, and mortality characteristics, frequency distributions were used to illustrate and contrast the distribution of fiscal health among the White and Black samples.

Next, the Slope Index of Inequality (SII) (Low & Low, 2004) was used to quantify, visualize, and compare fiscal gradients in excess death. Municipalities in each race/sex sub-sample were ordered from low to high according to their composite fiscal health score and assigned a relative rank (0.0-1.0) based on the proportion of the population younger than age 65 in the municipality (municipalities with greater fiscal advantage received higher scores). An estimate of the SII was given by the slope (*b* coefficient) of the regression line describing the relationship between a municipality's SDR and its fiscal ranking; i.e., the SII is the change in the dependent variable (excess mortality) per one unit change in the independent variable (relative fiscal rank), interpreted as the absolute gap in deaths before age 65 (per 100,000) associated with fiscal variation across sample municipalities (i.e., least vs. most fiscally advantaged). Nine SII regression models were run (one for each race/sex sub-sample). Because grouped data cause the error terms to be heteroskedastic, the models were transformed using the square root of the proportion of the

sub-sample population (by race/sex) in each municipality as a multiplier for the dependent variable (SDR) and the relative rank variable, and was also used as an additional independent variable:[44]

$$Y_i\sqrt{a_i} = 0 + \sqrt{a_i} + x_i\sqrt{a_i}$$

Where Y_i is the SDR (by race/sex) for persons under age 65 in municipality i; a_i is the proportion of the race/sex group in the race/sex sub-sample population under age 65 in municipality i; and x_i is the relative rank of municipality i based on its fiscal health and the cumulative proportion of race/sex population under age 65 in the municipality (there is no constant term). The proportion of the population under age 65 (a_i) was logged to adjust for population sizes across municipalities (and the outsized influence of the city of Detroit) on the SII estimate. As the relative rank variable is cumulative, results were adjusted using the Prais-Winsten method.

Finally, bivariate correlations and multivariate regression models (90% confidence) examined relationships among indicators of Whiteness, fiscal health, and their influence on patterns of excess mortality in the all race, White, and Black total sub-samples. Model 1 was fit using only covariates. Model 2 replicated the relationship between Whiteness and SMR established in Part I (Chapter 2). Model 3 assessed the independent association between composite fiscal health and SMR. Model 4 assessed whether fiscal health mediated any of the association between spatial Whiteness and SMR. Model 5 replicated Model 4 but assessed fiscal class as a categorical measure. Variable Inflation Factors (VIF) were used to detect multicollinearity in the models. Standard errors were obtained using Huber-White sandwich estimators to account for heteroskedasticity in SMRs across municipalities of varying population sizes.

A sensitivity analysis assessed the possibility that any observed relationship between municipal fiscal health and excess mortality was entirely attributable to compositional factors (i.e., aggregate individual-level characteristics) rather than the structural dynamics of theoretical interest to this study. In contrast to fiscal indicators based on population-level distributions (median household income, property tax base per capita, median housing value), poverty is an absolute measure of deprivation that has been strongly associated with mortality variation at the individual- and neighborhood-levels in past research. Hence, if the mortality effect of fiscal health was solely due to individual- or neighborhood-level factors rather than municipal-level structural factors, I would expect that the fiscal health composite (excluding poverty) would be insignificant

[44] E.g., in calculating the White female SII, this multiplier would be equal to the square root of the proportion of all White females under age 65 in the White female sub-sample that resides in the municipality.

after poverty was accounted for. To test this, the composite fiscal health score was recalculated (using the method described above) excluding the measure of poverty and models were rerun using poverty as an independent variable in addition to the fiscal health score (excluding poverty).

To address potential bias from inclusion of both cities and townships, descriptive statistics and bivariate correlations for the main study variables were compared for the full sample and the sample restricted to cities **(Appendix A.3** and **Appendix A.4)**; as trends were consistent between the two samples, only data for the full sample is reported here.

Results

Fiscal health disparity in the DMA

Table 3.2 describes characteristics of the full sample and for sample municipalities grouped according to their fiscal class; **Figure 3.1** illustrates how these classes patterned spatially. In addition to the city of Detroit (74), fiscally poor municipalities consisted of an extended urban core of older, working-class inner suburbs and outlying industrial satellites (e.g., Pontiac city (38)), located mostly in Wayne county and along the northern border of Detroit in Oakland and Macomb. Compared to their modest and affluent neighbors, fiscally poor places tend to be larger and more densely populated.[45] Contributing to their fiscal vulnerability, poor municipalities had considerably older housing stocks and tended to be declining in population. The modest suburbs had the youngest housing stocks and consisted largely of middle-class residential suburbs located throughout the DMA outer ring. While 2000-2010 population increases in the modest and affluent suburbs were approximately equal, the modest suburbs were characterized by lower-density sprawl and less robust tax bases. Affluent suburbs included a mix of younger outer-ring communities and historic inner suburbs located primarily in Oakland county, as well as northern Macomb, northwest Wayne county, and just east of Detroit in the Grosse Pointe suburbs (80, 82, 77, 72, 113).

The average fiscal health indicators across fiscal classes shown in **Table 3.2** reveal substantial fiscal health disparities in the DMA in 2010. Affluent suburbs experienced a very low burden of poverty (5.2%) relative to the sample as a whole and in sharp contrast to the high concentration of poverty (20.8%) observed among fiscally poor municipalities. Similarly, the median household income among affluent municipalities was roughly 1.5 times higher than that of modest suburbs and more than twice that of fiscally poor places. In fiscally poor places the

[45] Excluding Detroit, fiscally poor municipalities (n=35) had an average population size of 34,367 and density of 4,337.

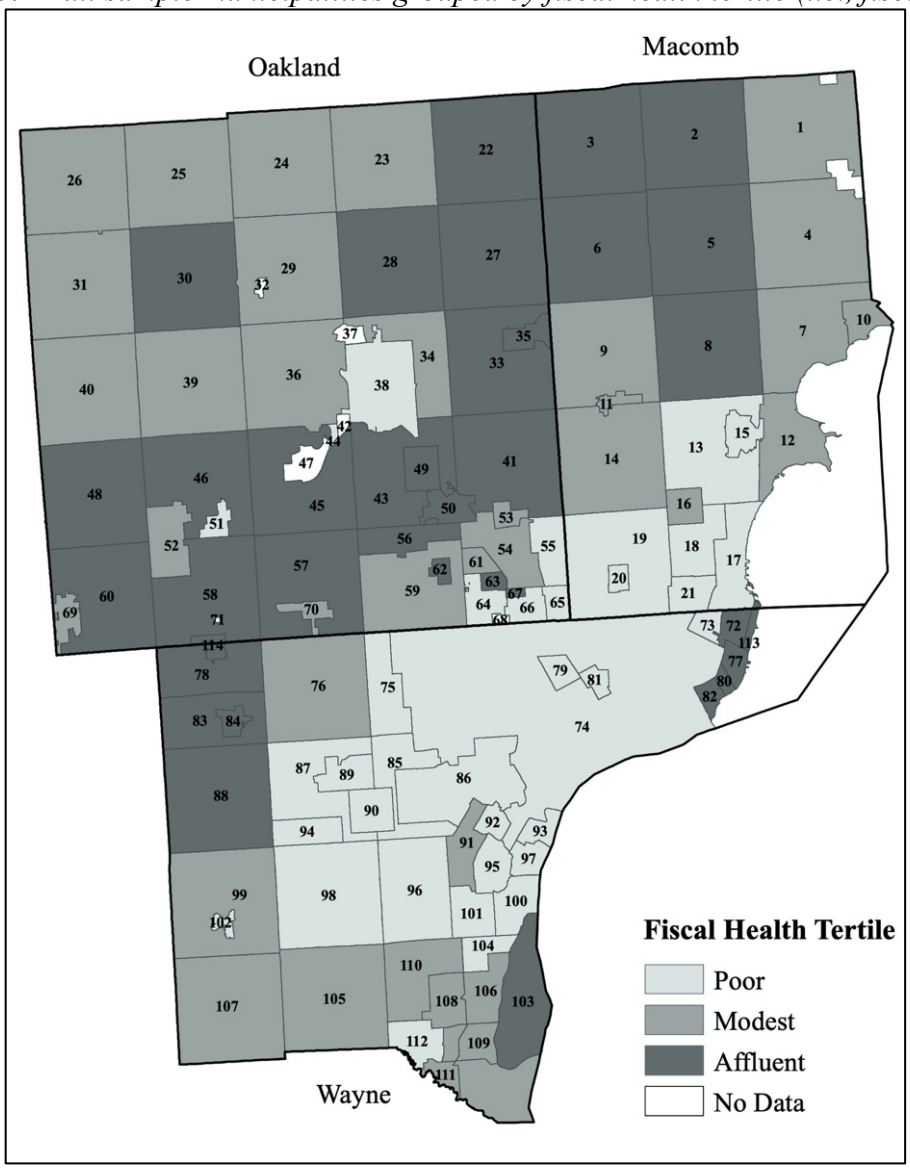
average property tax base per capita was 64% the value for the sample as a whole, while the value for affluent municipalities was 140% the regional average. For every $1,000 in taxable property value per capita held by fiscally poor and modest suburbs, affluent suburbs held an average of $2,309 and $1,581, respectively. Municipal wealth disparities were further reflected in the distribution of home values, with median housing values averaging near a quarter of a million dollars in the DMA's affluent suburbs–1.7 times the median home value in modest suburbs, and nearly three times the median value in fiscally poor places. One-way ANOVA models confirmed that all fiscal differences between these three groups were significant ($p<0.05$).

Table 3.2 *Characteristics of full sample and sample municipalities grouped by fiscal class*

	Full sample	Fiscal class		
		Poor	Modest	Affluent
No. of municipalities	108	36	36	36
Cities	69	34	18	17
Townships	16	0	7	9
Charter townships	23	2	11	10
Average fiscal health indicators				
Pct. of pop. below poverty	11.8	20.8	9.5	5.2
Median household income (US$)	63,835	40,970	61,080	89,454
Property tax base per capita (US$)	40,661	25,573	37,348	59,061
Median housing value (US$)	166,753	89,272	153,606	257,381
Composite fiscal health score	0.00	-3.49	-0.16	3.65
Population distributions				
Pct. of sample pop.	-	49.8	25.8	24.4
Pct. of suburban sample pop.	-	38.4	31.7	30.0
Pct. of non-Lat. White sample pop.	-	36.8	32.6	30.6
Pct. of non-Lat. White suburban sample pop.	-	35.4	33.4	31.3
Pct. of non-Lat. Black sample pop.	-	83.8	10.1	6.1
Pct. of non-Lat. Black suburban sample pop.	-	58.6	25.8	15.6
Avg. pct. non-Lat. White	79.4	66.5	85.6	86.2
Avg. pct. non-Lat. Black	11.8	23.3	6.8	5.3
Avg. pct. IPOC	8.7	10.2	7.6	8.5
Avg. Whiteness LQ index	1.22	1.02	1.32	1.33
Whiteness LQ < 1.0	16	12	3	1
Whiteness LQ > 1.0	92	24	33	35
Other municipal characteristics				
Avg. population size	35,644	53,240	27,595	26,097
Avg. pct. pop. change 2000-2010	2.6	-5.2	6.1	6.8
Avg. population density (sq. miles)	2,823	4,360	1,943	2,164
Median housing age	1969	1958	1977	1972

Note: 'Non-Latinx White' and 'Non-Latinx Black' racial groups refer to those who identified as "White alone" or "Black or African American alone" on the 2010 US Census. 'Lat./other races' includes all other racial/ethnic groups. The 'suburban sample' refers to the total population living in sample municipalities excluding the city of Detroit. Detroit falls into the first fiscal class, thus the suburban sample population represented in the poor class refers to 35 suburban municipalities.

Figure 3.1 *Full sample municipalities grouped by fiscal health tertile (i.e., fiscal class)*



Note: See **Figure 2.1** for a list of numbered municipalities by name.

Municipalities in the fiscally poor group were home to a disproportionate half of the region's population. When the city of Detroit was excluded, the remaining 35 cities and townships in this class contained 38.4% of the population, still the largest proportion of the three fiscal groups despite it containing one less municipality than either the modest or affluent classes. Despite the affluent suburbs containing just 24.4% of the regional population, these suburbs contained a disproportionate 38.3% of the full sample's aggregate taxable property values (data not shown).

Racial inequity in fiscal health

Table 3.2 also sheds light on the racialization of fiscal disparity in the DMA in 2010. While the DMA's White population was rather evenly distributed across the fiscal classes, the Black population was highly concentrated (83.8%) in fiscally poor places. When Detroit was excluded, still the majority (58.6%) of suburban Black residents resided in a fiscally poor suburb. Proportionally, Black suburban populations were about half as likely as White suburban residents to live in an affluent suburb. As indicated by mean Whiteness LQ indices of 1.32 and 1.33, modest and affluent suburbs were substantially Whiter than the region as a whole. Accordingly, the average proportion Black population in fiscally poor places (23.3%) was four times that of affluent suburbs (5.3%). While most (75.0%) of the DMA's 16 predominantly non-White municipalities were categorized as poor (including 7 of its 9 majority-Black cities), all but one of the DMA's affluent suburbs were predominantly White (the exception is the small majority-Black suburb of Lathrup Village city). Still, the majority of fiscally poor suburbs were predominantly White, representing more than a quarter (n=24) of the 92 predominantly White suburbs in the sample.

Table 3.3 and **Figure 3.2** further quantify and visualize racial inequity in fiscal status. Compared to predominantly non-White municipalities, predominantly White suburbs on average experienced poverty rates that were 15.6% lower, median incomes that were $26,753 greater, tax bases that were 43.7% larger, and median home values that were 111.3% higher (t-tests indicated that all differences were significant, $p<0.05$). These disparities are captured in **Figure 3.2**, which shows the mean z-scores for each fiscal indicator among municipalities categorized as either predominantly White or predominately non-White; here, the racialized maldistribution of poverty is especially apparent, while the property tax base per capita shows less relative racial variability.

Table 3.3 *T-tests comparing mean fiscal indicators and composite fiscal health scores in the full sample grouped by Whiteness LQ index (less than or greater than 1.0)*

	Predominantly Non-White LQ <1.0 (n=16)		Predominantly White LQ>1.0 (n=92)		Diff.	Std. err.	P sig.
Fiscal health indicators	Mean	SD	Mean	SD			
Pct. of pop. below poverty	25.1	13.2	9.5	5.5	-15.6	3.35	0.000
Median household income (US$)	41,045	16,563	67,798	22,040	26,753	4,736	0.000
Property tax base per capita (US$)	29,621	20,061	42,580	23,323	12,959	5,574	0.029
Median housing value (US$)	85,588	32,833	180,869	88,018	95,281	12,312	0.000
Composite fiscal health score	-3.84	2.98	0.67	3.24	4.51	0.82	0.000

Figure 3.2 *Mean fiscal indicator z-scores for the full sample, grouped by Whiteness LQ index (less than or greater than 1.0)*

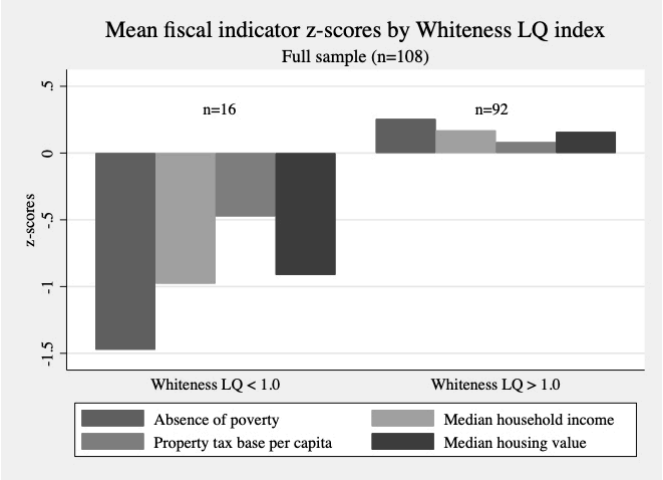
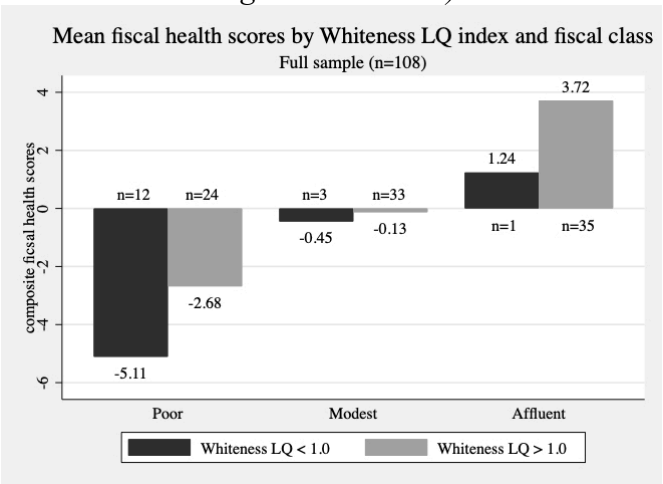


Figure 3.3 illustrates how racial and fiscal inequities intersect across DMA municipalities, revealing inequities not captured when either variable was considered independently. For instance, the mean composite fiscal health score of 0.67 observed for all predominantly White municipalities (**Table 3.3**) fails to capture wide variability across fiscal classes, which ranged from -2.68 among poor White suburbs to 3.72 among affluent White suburbs (**Figure 3.3**). Further, the mean composite score of -3.49 among fiscally poor municipalities shown in **Table 3.2** does not capture how the degree of fiscal poverty experienced in predominantly non-White municipalities was nearly twice as severe as that documented among predominantly White suburbs. Majority-Black municipalities were concentrated at the low end of the composite fiscal health score distribution, with 6 of the 7 poor and majority-Black cities ranking below the 10th percentile (data not shown).

Figure 3.3 *Mean composite fiscal health score by fiscal class and Whiteness LQ index (less than or greater than 1.0)*



Description of White and Black samples

Table 3.4 compares descriptive statistics for municipalities included in and excluded from the White and Black total sub-samples. Chapter 2 revealed that the all race and White total sub-samples were identical except for one municipality, hence I present only the White and Black total sub-samples here (see **Appendix A.5** for a description of the all race total sub-sample). As focused on in Chapter 2, racialized hierarchy in excess death was apparent in 2010, demonstrated by mean SMR/SDR values in the White sub-sample that were 63.1% lower than those observed in the Black sub-sample. Standard deviations and minimum and maximum SMR/SDR values also indicate wide mortality differences among White and Black populations (note the more erratic SMR/SDR distributions among excluded municipalities in the single-race sub-samples, justifying exclusion). As described more thoroughly in Chapter 2 (Pg. 38), the White and Black sub-samples differed systematically by sample size and demographic characteristics, with the White sample consisting mostly of smaller municipalities (and more townships) with predominantly White populations.

Table 3.4 also shows wide fiscal differences between the White and Black sub-samples; all fiscal indicators clearly favored the White sub-sample. To illustrate, **Figure 3.4** shows frequency distributions of composite fiscal health scores in the White and Black sub-samples, shaded light or dark according to whether municipalities had a Whiteness LQ index less than or greater than 1.0 (indicating predominantly non-White or predominantly White). The mean fiscal health score for the White sub-sample was slightly less than the full sample mean of zero; the mean observed in the Black sub-sample was seven times lower. **Figure 3.5** shows the two samples categorized by fiscal class; as indicated above in the full sample description, most of the municipalities where Black residents resided were fiscally poor. Still, White and Black total sub-samples demonstrated racial and fiscal variability; i.e., the White sub-sample was not ubiquitously White and wealthy, nor was the Black sub-sample universally Black and impoverished.

Fiscal gradients in excess death

Figure 3.6 shows mean SMR values by fiscal class for the all race, White, and Black total sub-samples, demonstrating a crude stepwise pattern. One-way ANOVA models found that SMR differences between fiscal classes among each sub-sample were significant ($p<0.05$), except for that between the modest and affluent classes in the Black sub-sample due to a low number of observations. White populations experienced less excess death at all levels of fiscal class.

Table 3.4 *Characteristics of municipalities included and excluded from the White and Black total sub-samples*

	Included					Excluded				
	Mean	SD	Median	Min.	Max.	Mean	SD	Median	Min.	Max.
	White total (n=95)					**White total (n=13)**				
<65 Avg. 3-yr. deaths (W)	62	63	42	10	351	6	2	6	2	9
<65 Population size (W)	23,414	21,223	13,476	2,786	93,163	3,266	1,918	2,761	373	7,464
<65 SMR (W)	0.87	0.38	0.79	0.31	2.19	0.70	0.71	0.55	0.26	2.99
<65 SDR per 100,000 (W)	268	116	244	95	673	217	220	169	80	921
Total population size	39,809	75,614	21,412	3,739	713,777	5,199	2,733	4,075	2,526	11,776
Pct. non-Latinx White	79.3	18.3	86.2	7.8	96.4	80.3	28.6	92.1	2.9	96.7
Pct. non-Latinx Black	11.6	16.7	4.5	0.4	82.2	13.7	28.9	1.9	0.3	93.0
Pct. IPOC	9.1	4.9	7.3	3.2	27.9	6.0	3.4	5	2.9	15.7
Whiteness LQ index	1.22	0.28	1.33	0.12	1.48	1.24	0.44	1.42	0.05	1.49
Pct. of pop. below poverty	12.1	8.4	9.3	2.4	44.6	9.9	13.0	5.1	2.2	46.7
Median household income (US$)	60,846	19,814	56,647	24,888	111,681	85,673	34,305	88,237	20,298	136,875
Property tax base per capita (US$)	37,988	15,403	35,694	10,763	93,425	60,194	49,905	48,672	13,732	208,670
Median housing value (US$)	155,228	68,839	138,000	49,600	346,900	250,969	156,694	245,300	54,100	674,900
Composite fiscal health score	-0.40	2.91	-0.53	-7.85	6.67	2.94	6.08	3.59	-8.16	16.97
	Black total (n=30)					**Black total (n=78)**				
<65 Avg. 3-yr. deaths (B)	127	503	21	10	2782	2	2	1	0	9
<65 Population size (B)	27,954	95,637	8,944	2,512	532,178	992	1,105	511	18	4,794
<65 SMR (B)	1.38	0.43	1.44	0.57	2.16	0.98	0.87	0.86	0.00	5.47
<65 SDR per 100,000 (B)	425	132	443	176	665	303	269	265	0	1,685
Total population size	74,506	125,933	47,831	7,903	713,777	20,696	19,264	14,210	2,526	80,980
Pct. non-Latinx White	58.6	24.4	66.5	2.9	90.1	87.4	8.9	90.2	33.7	96.7
Pct. non-Latinx Black	30.3	25	18.6	3.4	93	4.7	7.3	3	0.3	60.9
Pct. IPOC	11.0	5.8	9.3	4	27.9	7.9	4.1	6.5	2.9	23.3
Whiteness LQ index	0.9	0.38	1.02	0.05	1.39	1.35	0.14	1.39	0.52	1.49
Pct. of pop. below poverty	20.4	11.5	17.1	5.4	46.7	8.5	4.9	7.9	2.2	28.0
Median household income (US$)	45,538	16,190	44,833	20,298	90,865	70,872	21,792	68,013	31,411	136,875
Property tax base per capita (US$)	30,815	16,057	26,600	10,763	91,745	44,448	24,527	37,943	16,867	208,670
Median housing value (US$)	104,510	48,564	88,050	49,600	247,600	190,692	89,412	179,000	63,100	674,900
Composite fiscal health score	-2.86	2.83	-2.95	-8.16	3.31	1.10	3.21	0.65	-5.09	16.97

Note: Variables labeled (W) and (B) indicate counts or values specific to White and Black populations, respectively.

Figure 3.4 *Frequency distributions of composite fiscal health scores for the White and Black total sub-samples, shaded by Whiteness LQ (less than or greater than 1.0)*

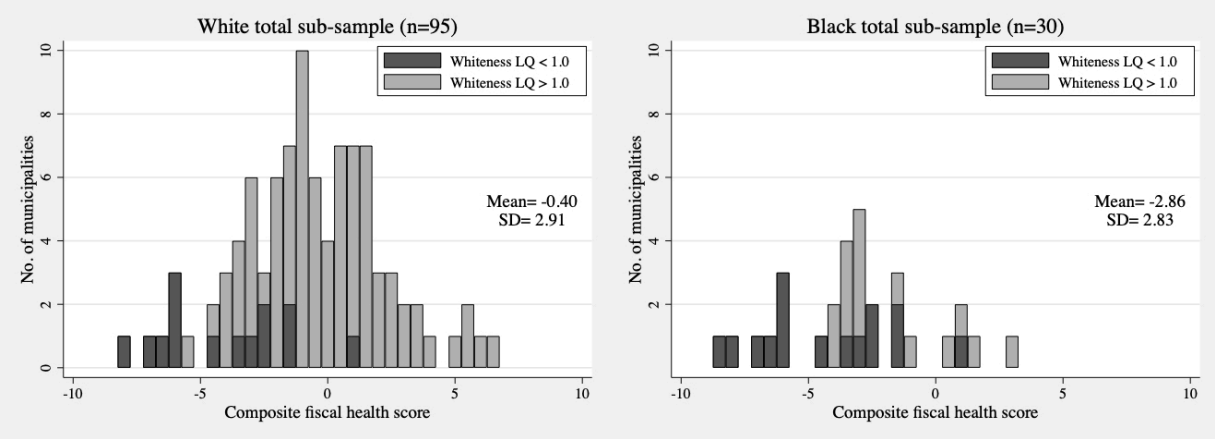


Figure 3.5 *White and Black total sub-samples categorized by fiscal class*

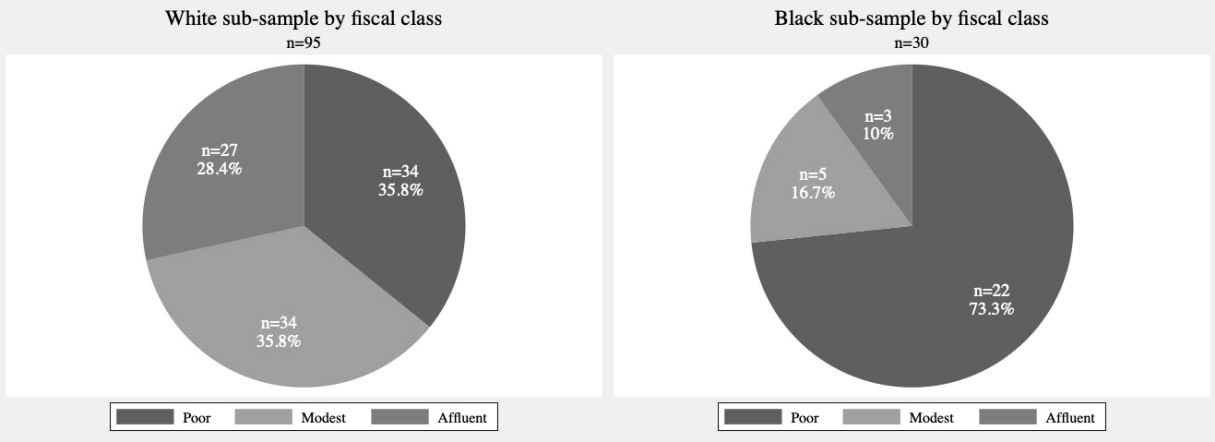
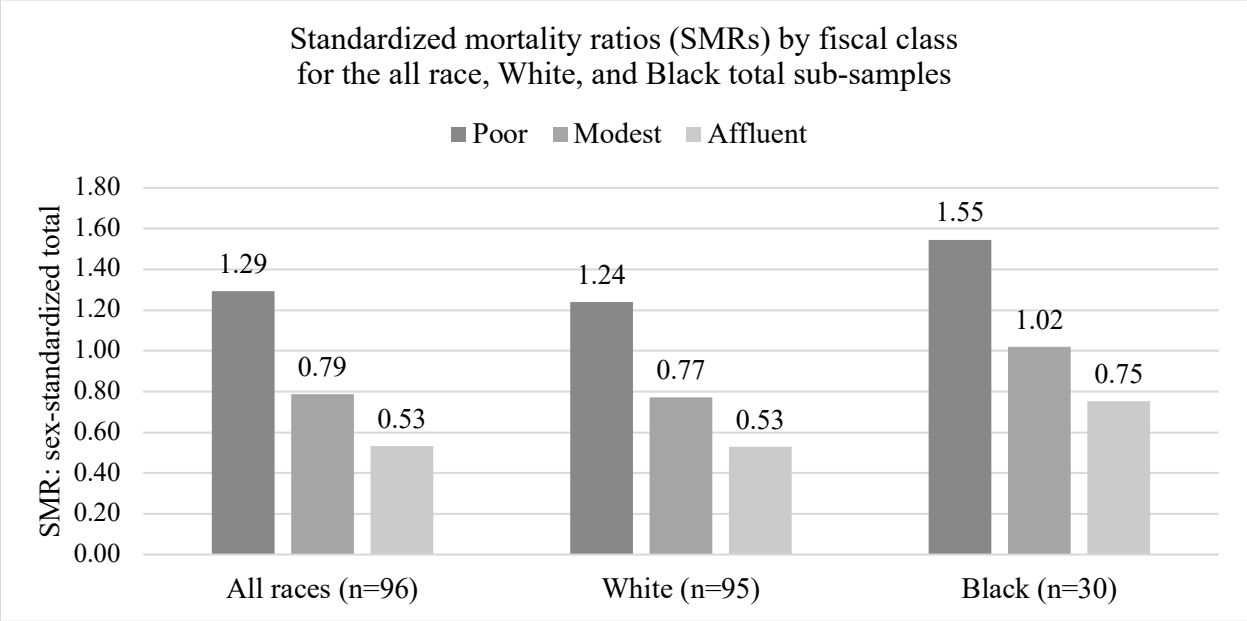


Figure 3.6 *Mean SMRs by fiscal class for the all race, White, and Black total sub-samples*



To examine these gradients in more detail, **Table 3.5** presents the SII regression results for each sex- and race-specific sub-sample, describing how rates of excess death (per 100,000) varied in relation to the population-weighted relative ranking of municipalities based on their composite fiscal health score. The SII (*b*) coefficients estimated the absolute gap (or change) in SDR across municipalities ranked from the most fiscally poor to the most fiscally affluent (models estimated with and without the Prais-Winsten adjustment indicated the effect of autocorrelation on the SII error terms was minimal). The scatter plots and SII slopes shown in **Figure 3.7** visualize the bivariate SII relationships; hallow and opaque points represent predominantly White and predominantly non-White municipalities, respectively, helping to illustrate intersections between relative Whiteness and fiscal advantage. For reference, grey horizontal lines indicate the 2009-2011 sex-specific crude under-65 death rate for all races in the DMA standard population.

SII results (**Table 3.5, Figure 3.7**) reveal a significant fiscal gradient in excess death across sample municipalities. In the sample examining SDRs for all races and sexes combined, the SII value indicated that the absolute difference in SDR associated with municipal fiscal advantage was 371 fewer excess deaths per 100,000 persons; the equivalent change among total (sex-combined) White and Black municipal populations was 330 and 387 fewer deaths per 100,000 persons, respectively. This degree of inequity is substantial given that the crude under-65 death rate in the standard population is 308 deaths per 100,000. While it is not appropriate to compare male and female SIIs because they are based on different sex-specific standard populations, the magnitude of the slopes was far steeper for males than females, indicating greater within-sex inequity.

Though high adjusted R^2 values in **Table 3.5** suggest overall goodness of fit, the plots in **Figure 3.7** and residual plots (not shown) for the all-race sub-samples indicate that the SII slope systematically under and over predicted SDRs near the bottom of the fiscal distribution, especially among a cluster of fiscally impoverished, majority-Black cities (Highland Park, Detroit, Inkster, Pontiac, and Ecorse) that demonstrated higher than expected death rates, particularly among males. These patterns not only reflect the very high rates of death observed among Black populations in these places, but also excess deaths among Whites that were well above the DMA standard and in some cases (as in Inkster and Ecorse) higher than Black populations in the same city. Though these incidences may in part be artifacts of statistical noise and should be interpreted cautiously, there was a clear tendency for predominantly non-White municipalities in the all race and White sub-samples to exhibit SDRs near or above the DMA average and fiscal rankings below 0.5.

Table 3.5 *SII regression results describing the relationship between municipal SDR and relative fiscal rank among race- and sex-specific sub-samples*

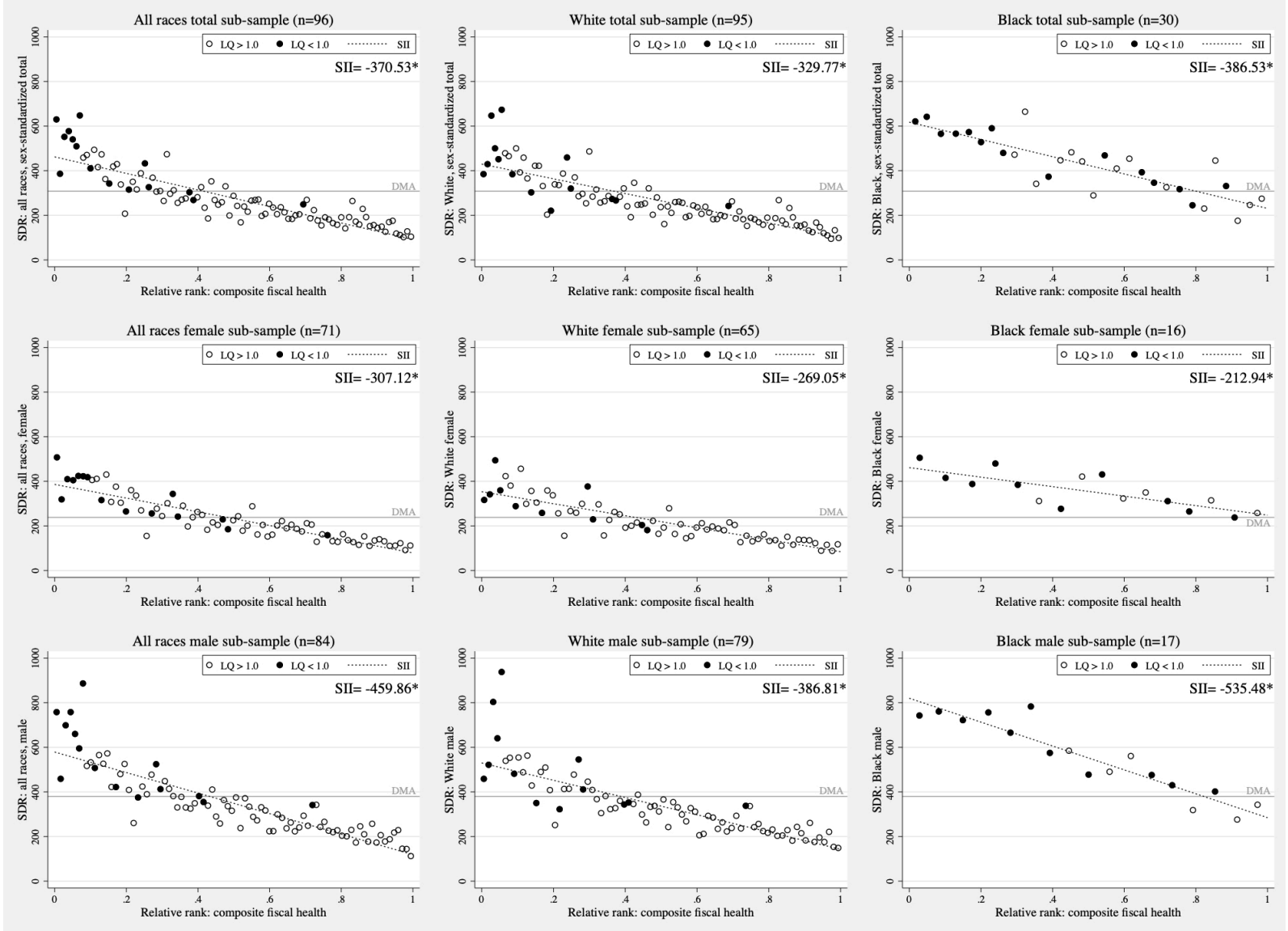
		n	Intercept	SII (*b*)	Std. err.	P sig.	Adj. R^2
All races	Total	96	462.04	-370.53	26.96	0.000	0.94
	Female	71	386.15	-307.12	20.61	0.000	0.96
	Male	84	578.75	-459.86	36.64	0.000	0.94
White	Total	95	429.59	-329.77	27.78	0.000	0.93
	Female	65	353.40	-269.05	21.01	0.000	0.96
	Male	79	529.63	-386.81	42.75	0.000	0.91
Black	Total	30	617.45	-386.53	37.84	0.000	0.98
	Female	16	461.31	-212.94	44.52	0.000	0.98
	Male	17	820.02	-535.48	39.45	0.000	0.99

The intersecting relationship between Whiteness and fiscal advantage was less overt, but still apparent, in the restricted Black sub-sample where predominantly non-White municipalities were represented across the fiscal distribution (**Figure 3.7**). As the mean SMR (**Table 3.4)** indicates, the majority of Black municipal populations experienced excess death rates above that of the DMA standard population. Of the six municipalities in the Black total sub-sample with excess death rates below the DMA standard, five were predominantly White (the exception was Van Buren Township, which had a Whiteness LQ index of 0.97) and five were fiscally modest or affluent suburbs (the exception was Dearborn city). Among Black female populations, just one municipality (majority-Black Southfield city) experienced a death rate below the DMA average.[46]

Despite the remarkably unequal mortality experiences and fiscal profiles of the White and Black sub-samples, the trends captured by their respective SIIs were notably consistent in terms of their direction and magnitude, indicating that substantial fiscal gradients in excess death were common to both races. SIIs for the total and male sub-samples indicated that inequity was more prominent among Black populations than White populations; the reverse racial pattern was observed for females. Yet it is critical to note the racially disparate contexts of these intra-group inequities; regardless of sex, the SII regression lines were substantially elevated for the Black population relative to Whites, and in no instance did a fiscal ranking near 1.0 confer health benefits to Black populations anywhere near those observed among the White populations. As indicated by the intercept values for each race-specific total sub-sample (**Table 3.5**), a fiscal rank of 0.0 equated to a White SDR of 423 and a Black SDR of 617, and according to the SII values, a fiscal ranking of 1.0 predicted a White SDR of 100 and a Black SDR of 231.

[46] Black females in Oak Park city, Redford Charter Township, and West Bloomfield Township had SMRs < 1.2

Figure 3.7 *Scatter plots and SII slopes for municipalities in each sex- and race-specific sub-sample*



* p <0.001

Whiteness, fiscal advantage, and mortality

Correlation matrices (**Appendix A.4**) illustrate bivariate relationships between excess death, spatial Whiteness, and fiscal health in the all race, White and Black total sub-samples (for reference, associations are shown for samples restricted to cities and for each fiscal indicator independently). As discussed in Chapter 2 (Pg. 45), the advantageous relationship between Whiteness and mortality was weaker in the Black sub-sample compared to the White sub-sample. In contrast, negative associations between the composite fiscal health score and excess death were strong across the all race (r=-0.89, p<0.001), White (r=-0.85, p<0.001), and Black (r=-0.82, p<0.001) sub-samples.[47] Though moderately positive relationships between Whiteness and fiscal advantage were apparent in the all race (r=0.62, p<0.001), White (r=0.58, p<0.001), and Black (r=0.62, p<0.001) sub-samples,[48] multicollinearity did not preclude multivariate analysis.

Table 3.6 shows multivariate regression model results, which predicted a substantial degree of SMR variation in the White and Black total sub-samples.[49] The trends observed among the all race and White sub-samples were similar and differed from the Black sub-sample, hence I only interpret findings for the White and Black sub-samples (see **Appendix A.5** for the all race total sub-sample results). Change in the R^2 values between Model 2 and Model 3 indicate that, as an independent predictor, the composite fiscal health score explained substantially more variation in excess death than municipal Whiteness. Fiscal health coefficients were similar in the White (b=-0.118, p<0.001) and Black (b=-0.113, p<0.001) samples (Model 3). When municipal Whiteness and fiscal health were considered simultaneously in Model 4, the strong negative coefficient between Whiteness and excess death observed in the White sample in Model 2 (b=-0.800, p<0.001) substantially reduced in magnitude and weakened in significance (b=-0.257, p<0.1), and the effect of the fiscal coefficient between Model 3 and Model 4 changed minimally. In the Black sub-sample, the somewhat weak association between Whiteness and excess mortality disappeared once fiscal advantage was accounted for, and the fiscal coefficient increased in strength

[47] Though less predictive than the composite fiscal health score, each fiscal indicator was associated with SMR, though the association between property tax base per capita was somewhat weaker, and relationships in general were weaker in the Black sub-sample likely due to less overall variation.

[48] In each sub-sample, the association between Whiteness and poverty was strong; the associations between Whiteness and median household and median housing values were moderate; and the association between Whiteness and property tax base per capita was somewhat weak, and insignificant in the Black sub-sample.

[49] Models were rerun without municipalities (n=8) where the Hispanic/Latinx population comprised more than 5% of the White population. This did not substantially alter the key findings, although the relative spatial Whiteness coefficient was slightly lower in Model 2 (b=-0.73, p<0.05), the effect disappeared in Model 4, then reemerged in Model 5 (b=-0.41, p<0.1).

Table 3.6 *Multivariate regression results assessing the relationship between municipal Whiteness, fiscal health, and SMR in the White and Black total sub-samples*

		White total					**Black total**				
Variable		Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
Covariates											
Land area (sq. miles)	Coef.	0.002	-0.002	0.000	-0.001	0.002	0.004	-0.001	-0.001	0.001	0.000
	P sig.	0.381	0.235	0.914	0.466	0.343	0.528	0.808	0.591	0.820	0.899
Population size (logged)	Coef.	-0.063	-0.077	-0.057	-0.062	-0.110	-0.201	-0.062	-0.009	-0.052	-0.024
	P sig.	0.144	0.039	0.046	0.028	0.000	0.137	0.600	0.906	0.472	0.771
Pct. of <65 pop. age 45-64	Coef.	-0.027	-0.025	0.009	0.005	-0.005	0.001	-0.017	0.010	0.025	0.038
(Race-specific)	P sig.	0.001	0.001	0.152	0.319	0.336	0.958	0.379	0.327	0.124	0.037
Type of municipality	Coef.	0.258	0.084	0.006	-0.020	-0.025	0.479	0.368	0.128	0.109	0.119
(Ref.=Twp.)	P sig.	0.000	0.155	0.890	0.625	0.589	0.004	0.028	0.354	0.417	0.304
Pct. of pop. IPOC	Coef.	0.003	-0.012	0.003	-0.002	0.001	0.013	0.011	0.012	0.013	0.033
	P sig.	0.720	0.121	0.593	0.823	0.830	0.350	0.387	0.092	0.077	0.003
Relative spatial Whiteness											
Whiteness LQ	Coef.		-0.800		-0.257	-0.443		-0.554		0.377	0.037
	P sig.		0.000		0.094	0.015		0.048		0.168	0.885
Fiscal health											
Composite fiscal health	Coef.			-0.118	-0.104				-0.113	-0.143	
(continuous)	P sig.			0.000	0.000				0.000	0.000	
Fiscal class (ref.=Poor)											
Modest	Coef.					-0.397					-0.601
	P sig.					0.000					0.000
Affluent	Coef.					-0.610					-1.089
	P sig.					0.000					0.001
Constant		2.227	3.579	1.050	1.622	2.993	2.884	2.565	0.708	0.340	0.419
Mean VIF		1.50	1.60	1.63	1.87	1.87	1.92	2.32	2.02	2.91	2.67
R^2		0.261	0.495	0.753	0.770	0.724	0.351	0.461	0.721	0.745	0.749
n		95	95	95	95	95	30	30	30	30	30

$p<0.10$

Though the categorical fiscal variable explained less overall variation in excess mortality than the continuous measure, the categorical measure provides a sense of how populations in each fiscal class fared in relation to each other. As expected, the coefficients shown in Model 5 indicate that both modest and affluent municipalities experienced significantly lower SMRs than fiscally poor places, with the largest benefits afforded to affluent suburbs (the coefficients were substantially larger in the Black sample compared to the White sample, which may be an artifact of the small number of non-poor Black sub-sample municipalities). This distinguished health status of affluent suburbs held when modest suburbs were used as the referent category (data not shown).

The results of the sensitivity analysis (**Appendix A.6**) suggest that the observed association between fiscal health and excess mortality was not attributable to the compositional effects of poverty in either the White or Black sub-samples; the results also allude to a differential role of fiscal health as a structural determinant of health for White and Black municipal populations. As stand-alone measures, poverty and fiscal health (excluding poverty) explained similar proportions of SMR variation in the White total sub-sample after accounting for covariates (R^2=0.699 and R^2=0.680, respectively (see Models A and B)). However, in the Black total sub-sample, poverty explained substantially less variation than the structural measure of fiscal health (R^2=0.608 and R^2=0.753, respectively). In the White sub-sample, the fiscal health coefficient decreased somewhat in magnitude but maintained significant after poverty and Whiteness were accounted for (from b=-0.145, p<0.001 to b=-0.084, p<0.001, see Models B and C); the measure of poverty predicted SMR variation not captured by fiscal health and caused the Whiteness variable to lose significance. In the Black sub-sample, the fiscal health coefficient increased in magnitude after poverty and Whiteness were accounted for (from b=-0.190, p<0.001 to b=-0.222, p<0.001); neither poverty nor Whiteness contributed to the model when the structural measure of fiscal health was included.

Discussion

Summary of findings

This ecological study assessed the influence of relative measures of municipal Whiteness and fiscal health on patterns of excess mortality for Black and White populations in the DMA in 2010. Consistent with expectations, the results revealed a fiscally stratified structure of local governance that was discernibly racialized. Though the maldistribution of fiscal needs and resources privileged predominantly White suburbs as a whole, it primarily benefited a class of affluent White suburbs where a minority of the region's population held an immense share of its

income and wealth. These institutional advantages coincided with patterns of concentrated fiscal poverty that acutely disadvantaged non-White and especially majority-Black municipalities.

Racial inequity evident in the relative fiscal health of municipalities helped explain the steep metropolitan hierarchy in excess death observed in Part I of this series (Chapter 2). Municipalities' relative fiscal advantage predicted a substantial gradient in excess death; though patterns were similar for Black and White populations, the places where most Black residents lived were characterized by poorer fiscal profiles and higher mortality burdens overall. Interdependent relationships between Whiteness, fiscal health, and excess death revealed that the mortality privilege associated with suburban Whiteness could be largely explained by its accompanying fiscal advantages; correspondingly, Whites in the most affluent suburbs experienced the lowest mortality burdens relative to the rest of the region and especially in comparison to poor municipalities, where Black populations suffered disproportionately from excess death.

Discussion of findings

Since their inception, the suburbs were an institution designed to manipulate demographic patterns and fiscal outcomes to allow Whites to fully exploit their privileges (Pulido, 2000; Kwon, 1995). Under a fragmented system of local governance, the cumulative effects of exclusionary land-use policies, fiscal zoning, and tax base competition are entrenched municipal patterns of racial segregation, fiscal disparity, and as this study suggests, health inequity. Findings are consistent with prior studies showing that a class of affluent White suburbs (the "favored quarter") largely control and benefit from the region's fiscal resources (Schneider & Logan, 1981; Orfield, 2002); this study adds to this literature by documenting that the favored quarter is also favored in health. Though legally autonomous, municipalities are politically interconnected (Gilmore, 2002a; Tyson, 2014). The mechanisms of exclusion and resource hoarding that result in accumulating wealth and political power for some result in the subordination of others–the people and places left to shoulder the responsibilities and costs externalized by those in power, but disenfranchised from the right to share in health-relevant public resources, meet the needs of their citizenry, or determine the land-use policies that negatively affect them (Ford, 1994; Cashin, 2000, 2001).

Hence, these findings bring light to a relational system of spatial White supremacy in which the privileges afforded to a minority of affluent White suburbs with respect to wealth and longevity are intimately tied to the burdens of poverty and early death elsewhere in the region, with the most grievous consequences for the health of Black communities. These harms are not perpetrated by

explicitly anti-Black policies or actors, but by a racialized political structure that "gives value to Whiteness and offers rewards for racism;" an arrangement that White residents and their elected officials are so invested in that they choose to remain complicit (Lipsitz, 1998: viii). Discourse that acknowledges fiscal disparities but overlooks the subsidization and power of the favored quarter (Cashin, 2000) is akin to that which acknowledges the link between institutional racism and health but obscures the role of Whiteness; both perpetuate a myth of White innocence that allows White people to evade responsibility for recreating their own structural domination (D. W. Sue, 2006; Leonardo, 2004). By naming Whiteness and investigating its distributive power with regard to fiscal resources and excess mortality, this study lends insight on the role that suburban institutions and their agents play in the material and embodied violence of White supremacy.

As a whole, White populations and predominantly White suburbs in the DMA experienced more advantaged fiscal health and mortality profiles compared to Black populations and non-White municipalities; these trends remained at all levels of fiscal class. Though these findings indicate that metropolitan processes of White supremacy benefit all White residents, the "tyranny of the favored quarter" is such that many poor Whites and predominantly White suburbs are also indelibly harmed (Cashin, 2000). The largest share of White DMA residents lived in a fiscally poor municipality where they experienced a mean SMR that was 24% higher than the standard and 134% higher than the mean among Whites in affluent suburbs. Still, poor White populations had mean SMRs that were 20% lower than that of poor Black populations, and predominantly White suburbs had fiscal scores that were on average half as poor as non-White municipalities.

Scholars contend that slavery gave propertyless Whites a legal property interest in White racial identity ("the property of free human beings" (Harris, 1993: 1721)), sustaining a sense of racial superiority that made them willing to accept their economic subjugation (Bell, 1988). Similarly, a racially stratified and decentralized structure of local governance gives poor White suburbs a property interest in White municipal identity–a status that permits relative access to fiscal resources and public benefits–though only the most elite White suburbs attain the suburban ideal (Tyson, 2014). This is in line with evidence which indicates that central-city poverty and declining suburbs "go hand in hand," as municipalities comprise interdependent parts of a shared regional economy (Pastor, 2000: 3). Beyond problems of inequity, the inefficiencies and environmental destruction caused by decentralized growth harm politically fragmented regions as a whole (Orfield & Dawes, 2005). Even as declining White suburbs increasingly fall victim to

eroding tax bases, rising poverty, and the flight of people and capital to the favored quarter, pragmatic solidarity with Black communities is unlikely so long as the property interest in White municipal identity remains coveted, thus maintaining the fiscal relations that harm the health of the majority and Black populations most acutely (Geronimus & Thompson, 2004).

This study is the first to employ a measure of municipal fiscal health to examine intra-regional health inequities, shedding new light on the relationship between segregation, SEP, and racial mortality disparities that has engrossed public health scholars for decades. Prior research has found that across metropolitan areas, political fragmentation is associated with higher Black-White segregation and Black-White mortality gaps, after accounting for racial variation in poverty and education (Hart et al., 1998; Hutson et al., 2012). This paper enriches this area of research by assessing patterns across local units within the highly fragmented DMA region, finding evidence to suggest that local municipal boundaries play an important role in shaping the geography of racial mortality disparities in part by structuring inequitable distributions of fiscal resources by race. More generally, these results highlight the importance of analytic frameworks that consider how metropolitan hierarchies in population health are influenced by social, historical, and institutional relations between politically defined spaces, as well as how systemic racial inequities in income and wealth become embedded in the structures of local governance that shape everyday life.

Though all indicators comprising the composite fiscal health score favored predominantly White suburbs, they were not equally maldistributed. Consistent with prior analyses, this study confirms that Black communities "bear nearly the full burden of disproportionate black poverty," which was especially concentrated in the places with the fewest fiscal resources (Pattillo, 1999: 217). This finding, along with research on the strain that poverty places on basic municipal functions, suggests some of the institutional pathways that comprise the powerful, multi-level relationship between poverty and health and which may amplify its effects at lower levels. Critical race scholars have long asserted that the violence of Black poverty is a specific dynamic that cannot be understood as the mere sum of race- or class-based oppression (Ford, 1992). The fact that the Black poor suffer the deprivation and indignities not only of household and neighborhood poverty, but also the fiscal poverty of their local governments, elucidates a dimension of this phenomenon.

While the property tax base was comparably less racialized than the other measures, this pattern was influenced in part by the presence of several poor, non-White cities with heavily industrial tax bases that are home to health-hazardous, locally undesirable land uses (LULUs),

alluding to the complicating role of environmental racism in the connection between tax base and health (Pulido, 2000; Keeler et al., 2002). Among poor municipalities (both White and non-White), the two cities with the highest per capita tax bases were Romulus (43% Black), home of the Detroit Metropolitan Airport, and River Rouge (50% Black), home to Zug Island–a heavy industrial complex on the Detroit River that has been referred to as "the dirtiest square mile in Michigan"–along with other steel mills, refineries, and coal-fired utilities (Allnut, 2020).

Though within-sample variation permitted exploration into how municipal patterns of race, fiscal health, and excess mortality differed for White and Black DMA populations, the fiscal health distributions observed in the White and Black sub-samples revealed little overlap. These systematic differences made it difficult to compare relationships between groups, but at the same time offer an accurate portrayal of these groups' disparate metropolitan realities; a grim affirmation of Justice Thurgood Marshall's 1974 prediction that "our great metropolitan areas [would] be divided up each into two cities–one white, the other black" (*Milliken v. Bradley*). Unequal fiscal distributions carried over to latitudinal differences in race-specific SIIs; though fiscal gradients were common to both races, SII estimates indicated that the most advantaged Black populations would still experience death rates 2.3 times that of their advantaged White "counterparts."

Similar trends between the White sub-sample and that for all races indicate that municipal analyses of excess mortality undifferentiated by race are likely to capture trends in the dominant population (here, Whites) and mask differences pertinent to the health of minoritized groups. This is important given the tendency in public health research to presume that the robust inverse gradient between conventional SEP measures and mortality documented in primarily White national samples applies universally (Pearson, 2008), despite evidence that SEP measures are not equivalent across racial groups (Williams et al., 2010) and the relationship between SEP and mortality varies across salient social identities and contexts (Geronimus et al., 1999). Economistic assumptions that ignore racial identity but are rooted in White norms tend to overestimate the health benefits of material resources and discount the health impacts of either working to obtain access to conventional resources in the face of systemic barriers or utilizing alternative sociocultural resources (e.g., extended kin networks, alternative economies) developed to contend with structural oppression (Pearson, 2008; Geronimus & Thompson, 2004).

Observed links between racialized political space, differential exposure to socially structured stressors of fiscal poverty, and disparate age-related mortality outcomes in the DMA

are generally consistent with Geronimus's weathering hypothesis. So too are results that suggest the health benefits of spatial Whiteness are contingent upon place and social identity. Health gains among Black residents living Whiter, more well-off suburbs were marginal relative to poorer Black populations and far lower than Whites in the same jurisdiction. Though impossible to discern ecologically, this finding may reflect a range of race-related and contextually-fluctuating cultural factors including (but not limited to) the cumulative stressors and prolonged high-effort coping associated with Black upward spatial and socioeconomic mobility (Colen et al., 2006), racial differences in the socioeconomic composition of kin networks and neighborhoods (Heflin & Pattillo, 2004) or racial wealth gaps at all income levels (Williams & Collins, 1995; Kochhar & Cilluffo, 2017). The finding that suburban Black female populations experienced above-average rates of excess death (with the exception of majority-Black Southfield city) is consistent with prior weathering research (Geronimus et al., 2006), and may potentially reflect how the loss of spatially-rooted social support networks associated with suburbanization may intersect with the unique demands of Black women within extended family economies and caretaking systems (Geronimus et al., 2007). Higher death rates among White compared to Black populations in majority-Black and fiscally poor cities may in part reflect how the health impacts of resource deprivation may be mitigated by identity-affirming cultural frameworks and support networks that are less available to Whites in these settings (Pattillo, 1998; Geronimus et al., 2015, 2016).

The complex, chronic, and compounding nature of fiscal disparities makes them especially pernicious, but difficult to study, and further research is necessary to identify aspects of municipal fiscal condition that may be most impactful for health and how these impacts accrue across the life course. Results from this study's sensitivity analysis not only indicated a structural (rather than compositional) association between fiscal and population health, but also showed that fiscal inequity was more explanatory for health than poverty levels among Black compared to White municipal populations. Given that the influence of local government is more subtle in affluent White suburbs with limited service levels, it possible that the observed relationship between fiscal and population health is less reflective of the health *benefits* of fiscal capacity, but rather the severe health *detriments* posed by rampant fiscal austerity documented among the DMA's historically marginalized municipalities during the study period. Beyond this, a body of research on "spatial stigma" suggests that the material conditions of fiscally marginalized places can interact with broader societal meanings of place to impact population health (Keene & Padilla, 2014; Pearce,

2012). At the structural level, municipal stigma may function to legitimize policies that undermine access to economic opportunities and health protective services, while at the individual level, structural violence and internalized stigma can influence risk behaviors, mental health, and access to opportunities for economic advancement (Graham et al., 2016). Regardless of the precise causal linkages, it is safe to conjecture that the far-reaching material, environmental, and biopsychosocial consequences of vastly unequal distributions of policy-induced stressors and publicly available resources between Black and White communities in highly segregated metropolitan areas can only serve to further entrench existing heath inequities in these regions (Geronimus, 2000).

In seeking to explain the mortality privilege associated with spatial Whiteness, this study exposed race-related patterns of fiscal accumulation and deprivation that were unambiguously anti-Black. The DMA's majority-Black cities experienced the deepest fiscal poverty and the most immense burdens of excess death. These patterns embody far more than just "disparities"–they are exemplary of a cumulative and ongoing process of policy-induced decline, resource extraction, and austerity that results in the systematic loss of Black life before age 65, and the innumerable social and economic dislocations those losses represent. As one of the most segregated areas in the county, the harrowing burden of excess death among metropolitan Detroit's Black population is indicative of an indefatigable legacy of White supremacy in the US.

Limitations

The limitations described in Chapter 2 (Pgs. 50-53) pertaining to this study's ecological design, sample size restrictions, and operationalization of race (both spatial and population-level) also extend to this analysis and may have similarly biased results. Below, additional limitations are considered in light of the data sources and theoretical assumptions specific to the present study.

Population health is a dynamic, contingent, and cumulative state that reflects socially patterned lived experiences and life chances (Geronimus et al., 2020). The measures of Whiteness and fiscal health employed here are crude proxies for unobserved heterogeneity in collective lived experience that are hypothesized to pattern in accordance with the distribution of power among interconnected political geographies within a metropolitan area that has been organized according to intersecting hierarchies of race and class. This study's ecological design was ill-equipped to disentangle the complex and interacting health effects of race and class privilege and oppression or account for the reality that these hierarchies influence health at several scales simultaneously. For instance, this study could not discern whether or to what extent municipal fiscal contexts have

health implications, over and above (or in conjunction with) well-established (and more proximal) links between SEP and health at the individual and neighborhood levels. While sensitivity analysis could alleviate some concern over whether the effects were purely compositional, lack of data on income or wealth at more proximal levels made it impossible to examine these pathways or capture important multi-level dynamics, such as whether poor fiscal health may differentially impact the health of poor people or poor communities. Hence, the associations between fiscal and population health observed here should be interpreted as average, group-level mortality differences between more or less fiscally advantaged municipalities.

However illustrative, this study's reliance on conventional SEP measures (e.g., income, wealth) espouses a somewhat narrow, economistic view of segregation that may exaggerate the importance of material resources while overlooking the sociocultural infrastructure of racism (Geronimus & Thompson, 2004). The results of this study should not be construed to equate Whiteness with SEP, or to suggest that interventions addressing the acquisition of conventional resources or fiscal redistribution alone will be sufficient to eliminate racial health inequity. Nor should the results of this study be interpreted to suggest that there is anything inherently "healthy" about monocultural, auto-dependent suburban communities (characterized by shopping plazas, campus-style office parks, and sprawling residential subdivisions) or lifestyles; only their relative advantage in relation to places and populations oppressed by their metropolitan dominance.

Further, this study was largely unable to consider important interactions between race and class or how these interactions fluctuate across place and other salient social identities (Geronimus et al., 2020). As noted, mortality distributions that vary with measures of income and wealth are not only a product of inequitable distributions of resources across groups, but also of structurally rooted social-psychological processes developed in response to systems of inequality (Geronimus, 2000). Hence, the health consequences of material wealth or poverty likely vary dependent upon how the DMA's "racialized history differentially structures current systems of risk pooling, opportunities for cultural affirmation, and exposures to "othering" encounters across racial/ethnic groups" (Geronimus et al., 2020: 9). Though race-specific mortality outcomes (some mentioned above) can shed light on these dynamics, this study does not give their investigation due diligence.

This study assigns White and Black populations in the same municipality an average fiscal status, effectively assuming that these groups similarly experience the benefits or costs of their shared fiscal condition. This is a form of aggregation bias (Kaufman et al., 1997), since resources

are allocated unevenly across groups in the same jurisdiction, leading to racialized patterns of service level and quality, planning-induced gentrification, and policing that systematically harm Black communities (Van Ryzin et al., 2004; Tighe & Ganning, 2015; Cooper & Fullilove, 2016). Racial nonequivalence and other errors stemming from the use of aggregate SEP measures result in residual confounding, which can bias results in opposing directions (Geronimus et al., 1996).

This study's measure of fiscal health provides a rather crude proxy for an intricate and multidimensional construct. While more direct measures exist (e.g., "net operating surplus;" current revenues less current expenditures (McDonald, 2017)), they are not only more technically demanding, but also poor at capturing the effects of long-term fiscal marginalization or the trade-off between taxation and expenditures (Schneider & Logan, 1981; Hendrick, 2004). While it is generally accepted that strength of the tax base, particularly the property tax base, reflects the *potential* service level and tax cost to residents, still this is complicated by the presence of other revenue sources, like intergovernmental transfers (Ladd et al., 1991). Though Michigan has a relatively robust local revenue-sharing policy that takes into account municipality type, size, and taxing capacity, large fiscal disparities remain after accounting for such aid (Orfield, 2002), and state revenue sharing declined by about 25% between 2002 and 2010 (MDT, 2018). Though this study used statistical techniques to limit threats to internal validity posed by the inclusion of townships in the sample, the more limited service and taxing levels of townships discussed in Chapter 2 present construct validity concerns that require further evaluation (Shadish et al., 2002).

Implications for research and policy

This study suggests that severing the link between racial segregation and mortality disparities require transformative approaches that can account for and dismantle cumulative disparities in wealth, power, and fiscal health that maintain a property interest in suburban Whiteness. Eradicating White supremacy from the foundation of our metropolitan structures is an exceedingly complex task with no singular solution or approach; below I discuss some strategies and movements in which scholars, alongside those most impacted by oppression, can leverage their skills, resources, and expertise to play an instrumental role in the process of transformation.

Some scholars argue that regional reforms in the areas of metropolitan finance, land-use policy, and governance may mitigate racial health inequities and improve the collective well-being of entire metropolitan populations by deconcentrating poverty, broadening and redistributing the metropolitan tax base, and promoting equity in public resources, goods, and services (Blackwell

et al., 2007; powell, 2008; Cashin, 2000). The African American Forum on Race and Regionalism has outlined principles of "equity-based regionalism," contending that "those concerned with civil rights in this nation, and stakeholders in metropolitan regional vitality more generally, must push for metropolitan policies that place racial justice issues at the fore" (powell, 2001 quoted in Blackwell et al., 2007: 29). This study highlights the potential of equity-based "fiscal regionalism," including revenue sharing programs that augment local government structure with regional funding mechanisms and institutions that can equitably redistribute the metropolitan tax base (Miller, 2002; Orfield & Wallace, 2007). Other policies that that may mitigate the exurban growth that decentralizes regional capital in favor of White communities are inclusionary zoning laws, "fair share" housing requirements, and dedicated regional revenue streams for affordable housing, coupled with the abolition of existing regulations (e.g., single-family zoning requirements) that distort the tax-base and serve as racialized wealth tests (Manville et al., 2020). Though potential for a powerful coalition exists among the majority of metropolitan residents who reside in inner suburbs and low tax-base developing communities that would benefit from regional reform, Whites' racial interests have historically eclipsed compelling material interests, including the prospect of regional governance (Norris, 2001). Yet policies rooted in equity-based regionalism align well with the framework of "targeted universalism," a policy approach that pursues universal goals through targeted strategies that support the needs of particular groups (powell et al., 2019), making regional approaches with an explicit focus on race and class possible (Hayduk, 2003).

Those in the reparations movement suggest that race-conscious policies, investments, and direct compensation at all levels of government are required to materially and symbolically confront, redress, and overcome the cumulative effects of state violence and unjust enrichment grown out of slavery, and are necessary to reverse health inequities (Basset & Galea, 2020; Williams, 2005; Robinson R., 2000; Darity & Mullen, 2020; Magee, 1993; Henry, 2003). Public health scholars have called for one component of federal reparations to be a major infusion of economic capital to rebuild the physical and economic infrastructures of segregated Black communities (Williams & Collins, 2004). This study highlights need for redress on behalf of state governments, not only for the historic role of state incorporation and zoning laws, but also the contemporary role of property tax limitations (which primarily benefit White homeowners and restrict local government fiscal capacity) and chronically underfunded needs-based revenue transfer programs that have exacerbated fiscal inequities in recent years (Kim, 2019; Skidmore,

1999; Mullins & Joyce, 1996). Local governments have begun recognizing the need to repair for harm caused to Black people by local housing and urban policies (Mock, 2021), though some argue that calling these efforts "reparations" can do more harm than good (Mullen & Darity, 2021).

The Black Lives Matter movement's call to defund the police and invest in communities has brought participatory budgeting and direct democratic community control to the forefront of the fight for racial justice (M4BL, n.d.). This study implies that structural racism has undermined the fiscal capacities of local governments with large Black populations, but officials have agency and responsibility to best ensure that policies, services, and resource distributions address the distinct histories, challenges, and needs of their communities. States, cities and counties across the US have implemented participatory processes and equity-based decision-making tools into their budgeting frameworks with the explicit intent of reducing racial disparities and monitoring equity outcomes over time (GARE, n.d.; Dilday, 2020). Activists in several cities have used community-led processes to produce spending plans or "People's budgets" that redirect public resources from policing to other needs like health care, child services, housing, and infrastructure (Bliss, 2020; Gilman, 2020). In Michigan, public safety comprises the largest share (36.7%) of local general fund spending compared to 13.6% on public works, health and welfare, community and economic development, and recreation and culture *combined* (MDT, 2018); here and elsewhere, efforts to reimagine public safety and build democratic collective capacity can address the "public health funding paradox," with far-reaching implications for racial health equity (Fleming et al., 2020).

Proponents of healing justice pursue a political framework of restoration, resistance, and reclamation in which "communities collectively heal from the shared trauma of deep racial and economic inequality" to produce lasting "social change from the inside out" (Lee, 2014: 6, 15; Ginwright, 2014; KSHJC, n.d.). As Hemphill (2017), Director of Healing Justice at Black Lives Matter, states: "Healing justice is active intervention in which we transform the lived experience of Blackness in our world." The Truth, Racial Healing & Transformation process, which is currently being implemented in 14 metropolitan areas around the country, offers a framework for communities to engage in processes of narrative changing, racial healing, and community building with the goal of uprooting racial hierarchy in the areas separation (e.g., colonization, segregation, concentrated poverty), law (e.g., civil, criminal, public policies), and the economy (e.g., structured inequality, barriers to opportunity) (WKKF, 2016).

It is impossible to fashion policy remedies for racism within a system based on White supremacy (Magee, 1993). Though structural reforms may do much to disestablish the material inequalities that give racial identity and racial health inequity such a durable basis in society, they will be insufficient so long as they are built on expediency rather than shared principles of racial justice (Thompson, 1998). The power and deep interracial solidary needed for fundamental health reform requires a new policy discussion that challenges hegemonic notions of justice and expands the rules of democratic inclusion (Geronimus & Thompson, 2004). Each of the strategies discussed above offer hope and direction along the unclear path to metropolitan racial equity.

Chapter 4. The Health Equity Implications of (Un)fair Housing Law: Racialized Spatial Patterns of Occupied Property Tax Foreclosures and Health Inequity in Wayne County, Michigan

Introduction

As the embodied legacy of race-based residential segregation, the entrenched geography of Black-White health inequity in US urban areas is rooted in White supremacy and anti-Black racism in US housing policies (Rothstein, 2017; White & Borrell, 2011; Fullilove et al., 2011). Reflecting what critical race scholars call the "ordinariness of racism," anti-Black discrimination in housing (and across societal domains) is not aberrational, but widespread–the result of structural racialization operating through a set of policies, practices, and inter-institutional arrangements to recreate hierarchy and maintain White dominance (Ford & Airhihenbuwa, 2010a; Delgado & Stefancic, 2017; powell, 2013a, 2013b). The Supreme Court has upheld the application of disparate impact analysis under the Fair Housing Act (FHA), protecting against facially neutral policies and practices that have a disproportionately adverse effect on a protected class (e.g., non-White racialized groups), regardless of any explicit intent to discriminate (42 U.S.C.§3601 *et seq.*). While scholars contend that the court's limited interpretation of the disparate impact standard is ill-equipped to redress for many surreptitious, habituated, and spatialized forms of housing injustice that persist in the US (Connolly, 2016; Seicshnaydre, 2013), disparate impact nonetheless provides a useful framework for public health scholars to identify–and work collectively to mitigate, resist, and remedy–the role of the state in reifying racial and spatial hierarchies in housing and health.

All US states have tax foreclosure laws that dictate the actions that local governments take when property owners fail to pay property taxes (Rao, 2012). These laws vary by state, but typically authorize first the creation of a lien against property when taxes are unpaid, then the enforcement of that lien through the sale of the lien or the property after a period of delinquency (Alexander, 2000). The intent of tax foreclosure law is to permit local governments to recover tax revenue necessary to provide public services and to facilitate the return of abandoned property to tax-generating productive use (Marchinoy, 2012; Mallach, 2006). Limited existing evidence suggests that legal protections are inadequate to prevent the dispossession, displacement, and

exploitation of people living in tax-foreclosed homes–whether they be owner-occupants, tenants, or the informally housed (Jacobson, 2014; Dewar, 2006, 2015; Eisenberg et al., 2020a; Rao, 2012). Scholars document how the subprime mortgage crisis and ensuing recession intensified racial inequities in local property taxation in segregated US housing markets, causing tax foreclosures to disproportionately burden Black and other non-White racialized communities (Kahrl, 2017; Akers & Seymour, 2018; Atuahene, 2018).

Despite growing evidence for the racialized impacts of tax foreclosure proceedings and an emergent body of research connecting foreclosure and health, tax foreclosure policy remains understudied as a cause of racialized dispossession (Atuahene & Berry, 2019) and an issue of consequence for population health and health equity (Eisenberg et al., 2020b). Most scholars that have examined the relationship between foreclosure and health have done so under a "dominant epidemiological paradigm" that is not apt to examine the upstream role of policy, account for the structural and historical context of segregation, nor consider underlying spatial patterns of health inequity (Brown et al., 2001). Hence prior analyses have largely failed to investigate whether (and through what policy mechanisms) racialized spatial patterns of housing dispossession (including foreclosures) may intersect with preexisting inequities in segregated communities–where excess burdens of death and disability are already severe–to exacerbate persistent disparities health.

This paper examines the racial and spatial patterning of occupied tax foreclosures in Wayne county, Michigan to evaluate the extent to which tax foreclosure law operated as a legal mechanism of racialized dispossession in this jurisdiction and to explore the implications of this for health equity. The first section describes the patterns and structural drivers of property tax foreclosures after the 2007-09 recession. Drawing on prior literature and a social ecological model of housing and health, I then elaborate the multi-level pathways through which tax foreclosure can influence health and health equity. Remarking on the limitations of past research, I suggest that the relationship between housing dispossession and health should be assessed in a manner that moves away from the dominant epidemiological paradigm, towards a more historicized, spatial, and race-critical approach that is designed to investigate the legal mechanisms through which structural racialization perpetuates inequities in housing and health.

Subsequent sections describe the design, methods, and results of an analysis that examines evidence for structural racialization in the spatial distribution of occupied tax foreclosure burdens and urban health equity across neighborhoods (census tracts) in Wayne county in the mid 2010s.

First, I construct a composite measure of urban health equity to describe the severity of racialized health inequity in the sample, assessing the hypothesis that unevenness in the spatial distribution of Black and White households across neighborhoods with inequitable urban health conditions will harm the former group and benefit the latter. Next, I examine novel data on the occupancy status of tax-foreclosed properties to expand evidence for the racially disparate impact of tax foreclosure administration in Wayne county, using negative binomial models to quantify the extent to which occupied tax foreclosures disproportionately burdened neighborhoods where Black households were overrepresented relative to the county as a whole and to predominantly White neighborhoods. Last, I use a series of multivariate regression models to explore associations between occupied foreclosure burdens and population health, with attentiveness to the expectation that structural racialization will shape concurrent inequities in both domains. The paper concludes with a summary and discussion of findings, study limitations, and implications for future research.

Background

Property tax foreclosure patterns and the case of Wayne county, Michigan

Urban areas across the US experienced a dramatic rise in property tax delinquency during and after the 2007-09 recession, but places characterized by persistent segregation, racialized poverty, chronic post-WWII population loss, and weak real-estate markets were the most severely affected (Rao, 2012; Ginsberg, 2013). Owing to segregation, tax foreclosure exacted the highest toll in majority-Black and Latinx cities like Detroit, Michigan, Cleveland, Ohio, Philadelphia, Pennsylvania, and Baltimore, Maryland (Dewar, 2006; Dewar et al., 2015; Jacobson, 2014). Here, the systemic denial of conventional mortgage credit to communities of color created geographic housing submarkets that banks efficiently targeted for subprime loans, leading to disproportionate rates of mortgage foreclosure (Hwang et al., 2014; Rugh et al., 2015; Rugh & Massey, 2010).

In these cities, high property tax rates (i.e., the ratio of tax to property value) were already high due to decades of decline, disinvestment, and tax base erosion (Kahrl, 2017; Lincoln Institute of Land Policy and Minnesota Taxpayers Association, 2011). Because the property tax is levied based on property value, not income, it bears no relation to ability to pay and tends toward regressivity (Mikesell & Mullins, 2008). This problem is exacerbated by institutional asymmetries in tax assessment systems across the US which make local officials more likely to over-assess low-valued homes than higher valued ones, leading the property tax to overburden less wealthy and disproportionately Black owners (Berry, 2021). On average, Black residents bear a 13% higher tax

burden than White residents in the same jurisdiction (Avenancio-León & Howard, 2019). These structural disadvantages–coupled with steep declines in property values associated with high rates of mortgage foreclosures and the recession–culminated to produce excessive property tax burdens when home values fell, downward reassessment of property lagged, and low-income communities of color suffered disproportionately from unemployment and income loss during the recession (Hodge et al., 2017; Owens & Sampson, 2013).

The case of Wayne county (home to the city of Detroit) is illustrative of these trends. Detroit, the nation's largest majority-Black city, had one of the highest subprime lending rates in the US, precipitating a devasting wave of mortgage foreclosures (MacDonald & Kurth, 2015). Between 2005 and 2014 completed mortgage foreclosures exceeded 78,000 in the city, involving nearly 30% of residential properties (Deng et al., 2018). Population losses coincided with steep declines in home values, as Detroit lost more than one quarter of its population between 2000 and 2010 and home prices declined 87% between 2003 and 2009 (US Census Bureau, 2000b, 2010c; Deng et al., 2018).

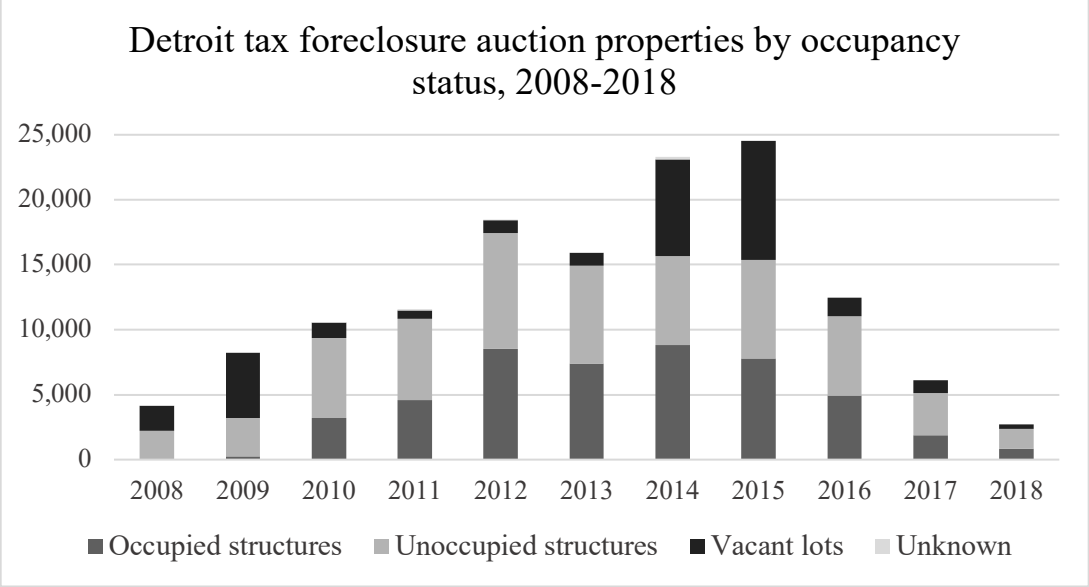
These phenomena exacerbated Detroit's long-standing fiscal problems, undermining the capacity and incentive of the city government to implement fair property tax assessment practices and foreclosure prevention programs (Atuahene 2018; Eisenberg et al., 2018, 2020a). Stemming from a history of segregation and racialized disinvestment, Detroit had the highest effective property tax rate for owner-occupied homes and the highest poverty rate among the 50 largest cities as of 2010 (Lincoln Institute of Land Policy and Minnesota Taxpayers Association, 2011; US Census Bureau, 2010d).Though Michigan law requires municipalities to assess all properties annually (MCL 211.10(1)) Detroit's tax assessor did not conduct a citywide property reappraisal for decades until 2017, contributing to widespread property value overassessments (City of Detroit Office of the Assessor, 2017). The majority of Detroit's properties were assessed above the state's legal threshold between 2009 and 2015, resulting in inflated tax bills that overtaxed Detroit homeowners by at least $600 million (Atuahene & Hodge, 2018; MacDonald & Betancourt, 2020).

Between 2010 and 2018, the Wayne County Treasurer foreclosed on more than 125,000 Detroit properties, equivalent to more than one in four in the city, for unpaid property taxes (**Figure 4.1**). Of those, approximately 48,000 foreclosed structures in Detroit were identified by the treasurer's office as occupied upon receipt of foreclosure notice. Detroit tax foreclosures peaked in 2014 and 2015, when city officials estimated that more than 12,200 Detroit homeowners were

dispossessed by tax foreclosure, roughly 10% of the 123,000 owner-occupied households in the city at that time (City of Detroit Department of Neighborhoods, 2018; US Census Bureau, 2016a).

The overt racialization of tax foreclosure in Wayne county was not limited to Detroit. Like many large central metros,[50] Wayne county is highly segregated by race and municipality; it includes five majority-Black suburbs that have endured similar structural processes to its central city. Atuahene (2018) found that among 43 municipalities in the county, nine had median home values below $50,000 and experienced at least a 50% decline in home prices between 2005 and 2013, including all five majority-Black jurisdictions. Due to these structural conditions, majority-Black jurisdictions were far more likely than majority-White jurisdictions to experience extensive property tax overassessments, resulting in tax foreclosures rates that were far greater.

Figure 4.1 *Detroit properties in tax foreclosure auction by occupancy status, 2008-2018*



Source: Wayne County Treasurer (2018), obtained through a Freedom of Information Act (FOIA) request by J. Paffendorf (CEO, Loveland Technologies) and provided to the author.

Public health implications

While the health consequences of tax foreclosure have yet to be examined, a social-ecological model of housing and health (Mehdipanah et al., 2019; Libman et al., 2012) and prior evidence suggests that the cascading effects of tax foreclosure can influence population health and health equity through a confluence of multilevel pathways, described below.

[50] The National Center for Health Statistics (NCHS) defines a large central metro as "[c]ounties in MSAs of 1 million or more population that: 1. Contain the entire population of the largest principal city of the MSA, or 2. Have their entire population contained in the largest principal city of the MSA, or 3. Contain at least 250,000 inhabitants of any principal city of the MSA." (NCHS, 2013).

At the individual level, households that undergo tax foreclosure can endure a lengthy and distressing process involving threat and reality of housing loss, often followed by a wake of housing instability (Desmond et al., 2015). Among homeowners, the experience of mortgage foreclosure or mortgage-related distress (i.e., notice of default) has been associated with worse self-rated health and serious psychological distress (Cannuscio et al., 2012; Burgard et al., 2012); higher prevalence and symptoms of psychiatric morbidity (Pevalin 2009, Osypuk et al., 2012; McLaughlin et al., 2012); higher prevalence of hypertension, heart disease, cost-related unmet health needs and prescription non-adherence (Pollack & Lynch, 2009; Pollack et al., 2011); and suicide (Cook & Davis, 2012; Fowler et al., 2015). Qualitative research reveals potential pathways linking housing loss to health, including stress-related physiology and coping behaviors, lost wealth, material hardship, internalized stigma, ontological insecurity, and disrupted relationships (Keene et al., 2015; Libman et al., 2012; Nettleton & Burrows, 1998, 2000).

A small but important area of work on the foreclosure-health nexus has associated poor and worsening health status with higher risk for foreclosure and default (Robertson et al., 2008; Pollack & Lynch, 2009), largely due to declines in family income and loss of health insurance (Houle & Keene, 2015). This suggests that racial inequities that predispose Black Americans to poor health and disability at earlier ages, as well as more limited access to personal and public safety nets, can lead to compounding health and housing risks (Keene et al., 2014).

Though the process may differ, research suggests that tax foreclosure can also have devastating consequences for tenants; not only through the health detriments of eviction (Desmond & Kimbro, 2015; Vásquez-Vera et al., 2017), but also exposure to substandard housing conditions, as landlords who fail to pay taxes are also likely to withhold necessary health and safety repairs (Hasty, 2011). Further, the forced displacement of households into tightening rental markets can also lead to the health consequences linked to unaffordable rent burdens (Stahre et al., 2015), overcrowding (Howden-Chapman, 2004; Burgard et al., 2012) and homelessness (Crane & Warnes, 2000). Housing loss has also been found to precipitate job loss in working-age adults (Desmond & Gershenson, 2016) and chronic absenteeism in school-age children (Henderson et al., 2014), reproducing and deepening the violence of poverty (Desmond, 2012).

Through its mediate effects on the social and built environment, tax foreclosure can also harm the health of communities where dispossession events are spatially concentrated. Foreclosure of occupied homes fractures community-based networks of exchange and support that are critical

for preserving the health of oppressed groups (James, 1993; Geronimus & Thompson, 2004; Keene & Geronimus, 2011). Particularly in distressed housing markets, occupied homes become vacant, abandoned, and deteriorated, lowering nearby home values, prompting or furthering disinvestment, and undermining safety (Dewar et al., 2015; Immergluck & Smith, 2006a, 2006b). In Pittsburgh, Zuberi and colleagues (2015) found that the proportion of tax-delinquent properties was far higher in majority-Black neighborhoods, overlapped significantly with disparities in adverse birth outcomes, and helped explain greater variation in those outcomes than a composite measure of socioeconomic disadvantage. Living in areas with a higher foreclosure burdens has been associated with increased hospitalizations related to anxiety, heart problems, and suicide attempts (Currie & Tekin, 2015); increases in cardiometabolic risk factors including blood pressure, fasting glucose and BMI (Arcaya et al., 2013, 2014; Christine et al., 2017); and poorer self-reported health, mental health, and quality of life (Batson & Monnat, 2015; Cagney et al., 2014; Schootman et al., 2012).

Tax foreclosure can also influence population health through its far-reaching effects on local housing markets and government fiscal conditions (Alm et al., 2014; Sands & Skidmore, 2015). Tax foreclosure facilitates the loss of taxpaying residents, undermining local revenues that affect the level and quality of essential public services (Alm & Leguizamon, 2018). After the 2008 housing crisis, a torrent of foreclosure sales channeled large amounts of low-cost properties to real estate investors and speculators with little interest in providing safe and affordable rental housing (Akers & Seymour, 2018). Scholars have found that investors who purchase foreclosed homes are more likely than other types of owners to evict their tenants (Seymour & Akers, 2019; Raymond et al., 2018). In Detroit, children living in investor-owned homes purchased out of tax foreclosure were more likely to experience lead poisoning than children in other types of properties (Eisenberg et al., 2020b). Foreclosed properties that are unsold at auction often become government-owned, where their maintenance or demolition can contribute to neighborhood instability and high public costs (HUD, 2009; Akers & Seymour, 2019). In fiscally vulnerable cities where tax foreclosures are common, such externalities can exacerbate racialized processes of decline and austerity inherited by 20th century uneven metropolitan growth and neoliberal urban restructuring (Brenner & Theodore, 2002; Peck, 2012; Clement & Kanai, 2015).

The breath of this evidence makes clear that at each level of the social-ecological model, the material and psychosocial effects of tax foreclosure are grave, and many instances–such as in

the permanent loss of family wealth, the destruction of neighborhoods, and the perpetuation of local fiscal austerity–irreparable and enduring. In the case of mass foreclosures in Detroit and other majority-Black cities in Wayne county after the last recession, it is difficult to apprehend, let alone measure, the compounding impact of each of these domains operating simultaneously. Not least is that the weight of these effects is brought to bear within a structural and historical context of segregation, where an uninterrupted cycle of policy-induced dispossessions has cumulatively eroded the health and wealth of Black and other non-White racialized groups, within and across generations (Fullilove & Wallace, 2011; Wallace & Fullilove, 2008; Fullilove, 2001, 2004; Keene & Geronimus, 2011; Wallace, 2011; Saegert et al., 2011). Hence the purpose of this article is to go beyond examining the health impacts of tax foreclosure *per se*, by exploring how structural and spatial racialization adapts over time and operates though new policy mechanisms to recreate the power differentials necessary for health inequities to persist and fester (Harris, 1993; Siegel, 1997).

Limitations of prior research

While prior studies have been effective in identifying housing dispossession as an important social determinant of health, most conform to a "dominant epidemiological paradigm" (DEP) that regards the relationship between foreclosure and health as one of individualized "risk factors" and "outcomes," rather than the systemic expression of group-based power differentials (Brown et al., 2001). This approach is inadequate because it obscures the structured inter-connectedness between patterns of foreclosure and population health, overlooks the spatial and historical rootedness of health inequities, and limits the policy relevance of study findings.

Under the prevailing DEP framework, health (e.g., a symptomology, self-reported health status, hospitalization rate) is modeled in relation to a risk exposure (e.g., foreclosure), the effect of which is considered significant if it explains variation in the outcome not already accounted for by factors correlated with either the exposure or outcome (e.g., socioeconomic position, baseline health status, neighborhood fixed-effects). In large part because structural racialization generates such severe and pervasive inequities in housing and health, controlling for race and its social and spatial correlates is often considered necessary to derive "unbiased" point estimates for the independent variable (Cohen et al., 2013; Jones, 2001).

This decontextualized approach is problematic for public health research conducted at the individual level (where health and foreclosure is most often studied), but especially limits the findings of ecological and multilevel studies where spatial patterns are of conceptual importance

to the relationship in question. Patterns of Black-White segregation powerfully predicted foreclosure patterns across US metropolitan areas (Rugh & Massey, 2010), leading predominantly Black (and Latinx) neighborhoods to experience far higher foreclosure rates relative to White neighborhoods (Hall et al., 2015). Still, prior studies that have investigated foreclosures and health at the neighborhood level have largely considered spatial variation in foreclosure apart from local socio-geographic context (i.e., metropolitan segregation), often relying on national samples or state-wide databases, adjusting for metropolitan-, municipal-, or county-level factors, and controlling for neighborhood "distress" (Tsai, 2015; Arcaya et al., 2014). This approach not only ignores the racialized distribution of foreclosures but implies that differential foreclosure patterns are rooted in differences between "individual neighborhoods" rather than a geographically interconnected system of structural racialization[51] (Osypuk & Acevedo-Garcia, 2010).

Both Tsai (2015) and Vásquez-Vera et al. (2017) reviewed the social epidemiology literature on foreclosure and health that proliferated in recent years, finding only two studies that examined whether foreclosures had differential adverse effects for the health of racialized groups or communities. One such study by Houle (2014) integrated individual-level health data with county-level foreclosure and sociodemographic data, finding an association between foreclosure rates and mental health that was stronger in counties with a high proportion of Black residents.

Yet this approach of using race as a modifier is also limited, as it does not adequately contend with the primacy of structural racialization in shaping risk distributions both for housing dispossession *and* poor health (Ford & Airhihenbuwa, 2010a). Geographically entrenched health inequities precede contemporary foreclosure patterns in US urban areas, themselves the product of prior policies, power structures, and historical processes that produce racialized vulnerability to foreclosure (Saegert et al., 2011; McClure et al., 2019). In contexts where experiences of foreclosure and health are systematically unequal, efforts to distill the "effect" of foreclosure on health or compare these effects between racialized groups can obscure population-level dynamics

[51] A recent study by Christine et al. (2017) in the *American Journal of Epidemiology* is illustrative. The authors posit that "spillover effects" from nearby home foreclosures operate through stress-mediated pathways to increase risk for cardiovascular disease; the study examines empirically whether greater counts of census tract foreclosures lead to temporal increases in three cardiometabolic risk factors. The authors pool data from socio-spatially diverse (and differentially segregated) metropolitan regions, controlling for time-variant and invariant fixed effects. Among the many covariates included in their multilevel model is a dummy variable for individual-level race and a variety of neighborhood-level socioeconomic variables; a spatial operationalization of race is not included, and neither racially stratified models or interactions with race are tested. While the authors discuss the implications of their findings within the context of the 2008 foreclosure crisis, they do not acknowledge its well-known racial and spatial patterning.

with important health equity implications (e.g., that structurally marginalized groups are more likely to experience foreclosure and ill health at baseline). Efforts to control for "reverse causality" (the prospect that poor health influences foreclosure risk) can be similarly reductive, in that they overlook the complex, interactive, and cumulative nature of housing and health disparities (Libman et al., 2012). Finding a link between foreclosure rates and the prevalence of high blood pressure (HBP) across 69 US metropolitan areas, Jones and colleagues (2014) reported that both foreclosure rates and HBP prevalence were higher in metropolitan areas with higher levels of racial segregation and concentrated poverty, and the link between foreclosure and HBP was stronger in metropolitan areas with more concentrated poverty. Acknowledging that "health, along with economic and social policies, are societal factors that create conditions leading to the geographically uneven impacts of foreclosure" this study invites further inquiry on how these macro-level trends manifest across communities *within* segregated areas to perpetuate racial and spatial hierarchies in housing and health.

Further, by largely neglecting (or routinely documenting) race- and space-associated differences in housing and health research, scholars leave the basis of those differences poorly explained and therefore unaddressed (Jones, 2001). To dismantle the structures that place Black and other non-White racialized groups and communities at a persistent health disadvantage demands a research approach that does not disregard race as a "nuisance confounder" (Jones, 2001: 302), but one that employs the construct of race to illuminate policies and practices through which racialization processes recreate hierarchy (Ford & Airhihenbuwa, 2010b). Efforts to address racial inequities in housing and health must therefore work to identify situations and mechanisms that perpetuate injustice in both domains, then seek to destabilize and subvert them (powell, 2012).

Critical race legal epidemiology

The growing discipline of legal epidemiology is defined as the "study and deployment of law as a factor in the cause, distribution, and prevention of disease and injury in a population" (Burris et al., 2016a: 139). Legal epidemiology is premised on the idea that while most laws and policies are implemented with little or no thought to health, they play a powerful structural role in shaping health outcomes at the population level. Empirical analysis of the law's unintended and unexpected health consequences is therefore considered crucial to addressing upstream factors that produce or reinforce health inequity (Burris et al., 2016a). Gutman et al. (2019) proposed a system of legal levers thought to be instrumental for attaining health equity in housing. Adopting the

critical race perspective that structural racialization "characterizes society's normal state" (Ford & Airhihenbuwa, 2010a: 1395), this paper leverages the legal concept of disparate impact to explore the potential and limits of fair housing statute as a legal lever for racial health equity, using the administration of tax foreclosure law in Wayne county as a case study.

Passed in the wake of Martin Luther King Jr.'s assassination and since expanded, the Fair Housing Act of 1968 (FHA) prohibits racial discrimination in housing and requires federal agencies and grantees to take meaningful actions towards desegregation (42 USC §3601 *et seq.*). More than 50 years later, high and persistent levels of Black-White segregation in many US metropolitan areas are a testament to the FHA's unmet mandate, which scholars attribute to willful political neglect, lack of critical enforcement mechanisms, and an individualistic legal bias that is ill-suited to remedy systemic and institutional harms (Darden et al., 1992; powell & Cardwell, 2014; powell, 2008). A legacy of the FHA's failure is that segregation exists as both cause and consequence of enduring public and private discrimination in the US housing system, as apartheid conditions enable many diverse, insidious, and spatialized forms of housing injustice to take on racial meaning and materiality (Feagin, 1999; Marsh et al., 2010; Pager & Shepherd, 2008).

Disparate impact is a legal doctrine under the FHA which states that a policy or practice may be considered discriminatory if it has a disproportionate "adverse impact" on a protected group[52] when there is no legitimate, non-discriminatory need for the policy (NFHA, n.d.). In 2015, the US Supreme Court took up the question of whether disparate impact claims were permissible under the FHA in *Texas Department of Housing and Community Affairs v. Inclusive Communities Project, Inc. ("Texas v. ICI I")*.[53] At the time, the Department of Housing and Urban Development's (HUD) "2013 Rule" for proving a disparate impact claim required a three-part burden-shifting framework (24 CFR 100.500).[54] After considering the FHA's "results-oriented

[52] The FHA, as amended, protects against discrimination based on race, color, religion, sex, familial status, disability status, and national origin. In Michigan, the Elliot–Larsen Civil Rights Act prohibits discrimination based on age and marital status, while the City of Detroit further prohibits discrimination based on sexual orientation, public benefit status, and gender identity or expression.

[53] In this case an affordable housing nonprofit, the Inclusive Communities Project, alleged that the Texas Department of Housing and Community Affairs (which distributes federal low-income housing tax credits) had contributed to "segregated housing patterns by allocating too many tax credits to housing in predominantly black inner-city areas and too few in predominantly white suburban neighborhoods" (*Texas v. ICI I)*.

[54] Under this framework, a plaintiff must first provide statistical evidence that a defendant's challenged policy causes a disparate impact on a FHA-protected class; if the defendant then proves that its policy is necessary to achieve one or more substantial, legitimate, and nondiscriminatory interests, the plaintiff may still establish liability by proving that the defendant's interests could be served by a less discriminatory alternative (Schwemm & Bradford, 2016).

language," the Court upheld that disparate impact claims are cognizable under the FHA, meaning that disparate impact would remain a safeguard against housing discrimination regardless of intent.

While the Court's decision upheld the theory of disparate impact, it imposed significant limitations on the application of disparate impact in practice (Hancock & Glass, 2015; Rich, 2018). Among the standards purported to "protect…against abusive disparate impact claims" were that plaintiffs were required to establish evidence for "robust causality" between the challenged policy and the demonstrated statistical disparity at the pleading stage. The Court clarified that disparate impact liability should be used to remove "arbitrary, artificial, and unnecessary barriers," not "valid governmental policies," and that "remedial orders in disparate impact cases concentrate on the elimination of the offending practice" in a manner that is "race-neutral" (*Texas v. ICI I)*.

Despite these legal limitations, disparate impact analysis can nonetheless provide a useful tool for public health scholars to investigate evidence for structural racialization in housing policy and practice that may go overlooked in dominant epidemiological research. Regardless of whether such patterns constitute "discrimination" under the narrow purview of the law, revealing the mechanisms that perpetuate structural racialized violence is a crucial step in working across disciplines to reduce and repair for harm, forging the way for more equitable policy solutions.

In 2016, several legal organizations[55] filed a class-action lawsuit against the Wayne County Treasurer and the Wayne county municipal corporation,[56] alleging that the practice of foreclosing on homes for nonpayment of unlawfully overassessed taxes had a disparate impact on Black homeowners in violation of the FHA[57] (*MorningSide Community v. Sabree*, 2016). This paper builds on evidence established by the plaintiffs in this case and several legal scholars (Parnell, 2016; Atuahene, 2018) to investigate the racially disparate impact of tax foreclosures across neighborhoods in Wayne county, exploring the implications of these patterns for health equity.

Methods

Study setting

[55] Plaintiffs included the American Civil Liberties Union of Michigan, the National Association for the Advancement of Colored People Legal Defense and Educational Fund, Inc., and the law firm Covington & Burling.

[56] Defendants also included the City of Detroit and the Detroit Citizens Board of Review, under a separate due process claim regarding the city's administration of the state's Poverty Tax Exemption.

[57] The complaint for this case was filed with the State of Michigan Wayne County Circuit Court on July 13, 2016, which granted a summary disposition in favor of the defendants, holding that the court lacked subject-matter jurisdiction. On September 21, 2017 the Court of Appeals affirmed the trial court's decision. On January 24, 2018 The Michigan Supreme Court denied an appeal of this decision on lack of jurisdiction grounds (Walz, 2018).

The social and legal geography of Wayne county after the 2007-09 recession is a useful setting for this research. Wayne is the central county of the Detroit-Warren-Dearborn Metropolitan Statistical Area, Michigan's largest MSA and home to its largest city, Detroit. Counties As "foreclosing governmental units"[58] are responsible for executing the state's tax foreclosure process (MCL 211.78a), making the county an appropriate geographic area for analysis. During the study period (2014-2015), Wayne county's foreclosure burden far exceeded that of other counties in MSA, accounting for 72% of foreclosures statewide[59] (MDT, 2017). About half of all Black Michigan residents reside in Wayne county (US Census Bureau, 2016c).

Michigan's property tax law was reformed in 1999 to encourage the "expeditious return" of tax delinquent property to productive use, shortening the foreclosure process from seven to three years, mandating a land auction, and transferring responsibility for foreclosed properties from state to local governments (PA 123 of 1999). Under this legislation (MCL 211), unpaid taxes to a city, village or township are transferred to the encompassing county treasurer for collection each year; the county then reimburses the local government in full for its uncollected property taxes, charging owners an interest rate of 18% per year (plus additional fees) on the debt owed. After three years of non-payment, the county forecloses on the property and offers it for sale at public auction to the highest bidder.[60] Property owners retain no equity in foreclosed properties and tenants are granted no legal right of first refusal to purchase the property before an investor.

According to American Community Survey (ACS) 2012-2016 estimates, the population of Wayne county was 39.1 percent non-Latinx Black, 49.7 percent non-Latinx White, 5.6 percent Latinx, and 5.5 percent some other race (US Census Bureau, 2016c).[61] Despite its overall racial and ethnic diversity, segregation in Wayne County–especially that between its Black and White populations–remains high; in 2010 the Dissimilarity Index (a measure of racial unevenness) between non-Latinx Black and White residents indicated that 80.4% of either group would have to move to a different census tract for all tracts in the county to exhibit racial parity. While most

[58] The state acts as the foreclosing governmental unit if the county elects not to handle the process.

[59] During this time period, the average tax foreclosure rate (per 100,000 persons) was significantly higher in Wayne (1540.1) than all other (primarily White) counties in the MSA: Lapeer (39.1), Livingston (68.3), Macomb (49.3), Monroe (59.4), Oakland (64.5), Saint Clair (84.0) (MDT, 2017; US Census Bureau, 2016b).

[60] Wayne County conducts two tax foreclosure auctions. At the first auction, properties are offered at a starting bid of the cost of the taxes owed. Properties that do not sell are offered at a second auction for a starting bid of $500.

[61] Wayne County is home to the state's largest Arab-American population (the largest proportion of the population lives in Dearborn city, where 44% of the population is of Arab ancestry) (US Census Bureau, 2016d).

(78.4%) of the county's Black population resides in Detroit, the county maintains a sizable Black suburban population, including five majority-Black cities outside of Detroit (a total of six have Black populations exceeding 40%) (US Census Bureau, 2016c).[62]

Scholars have previously demonstrated statistical disparities indicating that property tax administration policies in Wayne county after the 2007-09 recession disparately impacted Black residents in violation of the FHA. In addition to articulating a comprehensive legal theory supporting *MorningSide* plaintiffs' FHA claim, Atuahene (2018) showed that overassessments and tax foreclosure rates were higher in majority-Black municipalities compared to majority-White ones. Providing expert analysis for the *MorningSide* complaint, Parnell (2016) found that in July of 2016 (two months before foreclosure auction), owner-occupied homes in majority-Black census blocks where a majority of homeowners are Black were between 20 and 75 times more likely to be subject to foreclosure sale than owner-occupied homes in census blocks where a majority of homeowners were non-Black or White, respectively.[63]

Though not the first study to examine the disparate impact of tax foreclosures in Wayne County, it is the first to use data on the legally determined occupancy status of tax-foreclosed homes to evaluate racialized spatial patterns of dispossession.[64] It is also the first to apply disparate impact analysis using a framework of legal epidemiology, generating new insight on the enduring connection between structural racialization, unfair housing practices, and racial health inequities.

Study design and sample

This is a cross-sectional ecological analysis of secondary data sources. Wayne county CTs that met the following criteria were included in the analysis: a total population of at least 500 persons, a minimum number of 100 households, a group quarters population less than 40% of the total population, and a median household income greater than 0 (Darden et al., 2019). This excluded 18 CTs (containing less than 0.5% of residents), resulting in a final sample of 593 CTs. Foreclosure data from the 2014 and 2015 was used to encompass the height of Wayne County's

[62] Here, "majority Black" refers to any area where the Black population comprises the largest share of the total population (relative to all other racial/ethnic groups). The six majority-Black cities in Wayne county as of 2010 were Highland Park, Detroit, Inkster, Harper Woods, River Rouge, and Ecorse. Romulus was over 43% Black.

[63] This disparity existed despite the fact that there were more than 2.4 times as many owner-occupied homes in majority non-Black census blocks than in majority Black census blocks and more than 2.3 times as many owner-occupied homes in majority White census blocks than in majority Black census blocks.

[64] To date, scholars have relied upon public records of *total* property tax foreclosures, using parcel-matching techniques to limit analyses to residential properties with structures (Atuahene, 2018) or to indirectly proxy owner-occupancy (by matching the address of the property and the address where the tax bill is sent) (Parnell, 2016).

steep rise in post-recession occupied tax foreclosures (see **Figure 4.1** for Detroit figures).

Data sources and measures

CT-level measures used to operationalize key study constructs are shown in **Table 4.1** and described below. ACS 2012-2016 estimates were used to construct the measure disparate impact and the composition of households by race. The ACS tabulates non-White householders only by race, not by race-ethnicity; hereafter, "Black" householders refer to those who identified as "Black or African American alone" and "White" householders refer to those who identified as "White alone, not Hispanic or Latino" (US Census Bureau, 2016a). In addition to ACS data, occupied foreclosure burden was proxied using parcel-level data from the Wayne County Treasurer and the Detroit-based parcel-mapping firm, Loveland Technologies (www.landgrid.com). Covariate measures and all but three of the 15 indicators used to construct the undermentioned urban health equity index (UHEI) came from the 2012–2016 ACS (see **Table 4.2**).

Table 4.1 *Data sources and measures (all measures are at the CT level)*

Variable	Description	Source	Years
Key Constructs			
Structural racialization			
Disparate impact ratio (DIR)	Percentage of residents who are Black alone in the CT relative to the percentage of residents who are Black alone in the Wayne county sample as a whole (39.3%)	ACS	2012-2016
Urban health equity			
Urban health equity index (UHEI)	Mean of z-scores based on 15 health equity indicators across five policy domains	Varied, see Table 4.2	
UHEI-health	Mean of z-scores based on indicators in the population health domain		
UHEI-SDOH	Mean of z-scores based on indicators in the domains of economics, social and human development, governance, physical environment and infrastructure		
Occupied foreclosure burden			
Occupied foreclosure rate	Avg. number of occupied foreclosures per 100 households, per year	WCT, LT	2014-2015
Population affected	Avg. population dispossessed (based on avg. occupied foreclosure and avg. household size) per 1,000 residents, per year		
Covariates			
Population size	Total population size (logged)	ACS	2012-2016
Pct. of pop. age 18-64	Percentage of population age 18-64		
Pct. of households IPOC	Percentage of households Indigenous or other people of color (IPOC) (not Black or non-Latinx White alone)		
Pct. of population Arab	Percentage of population with Arab Ancestry		

ACS=five-year American Community Survey estimate; WCT= Wayne County Treasurer; LT= Loveland Technologies

Disparate impact ratio (DIR). A measure of relative Black occupancy was used to 1) assess the racialization of urban health inequity in Wayne county and 2) operationalize the construct of disparate impact. This measure is an adaptation of the Location Quotient (Isserman, 1977), a measure of local area segregation used to characterize the distribution of a specific population group relative to the overall composition of that group across a larger geographic area.

Here, the disparate impact ratio (DIR) is a ratio of the proportion of householders who are Black in a CT relative to their proportion in the Wayne county sample as a whole (39.3%). Thus, a CT with a DIR less than 1.0 indicates a disproportionately non-Black CT and a DIR greater than 1.0 indicates a "disproportionately Black" CT (a DIR equal to 1.0 would indicate Black residential parity with the county sample as a whole). **Table 4.5** shows that households in CTs with a DIR less than 1.0 were on average 79.8% White (compared to a county-wide proportion of 52.7%); thus disproportionately non-Black CTs are hereafter referred to as "predominantly White."[65] The sample was further categorized into five "DIR intervals:" those with DIRs less than 0.5; between 0.5 and 1.0; between 1.0 and 1.5; between 1.5 to 2.0; or greater than 2.0 (see **Table 4.6**).

HUD's 2013 regulation endorsing disparate impact claims under the FHA recognized that a policy may be discriminatory in effect if "members of a protected class are disproportionately burdened" (78 Fed. Reg. at 11468), but neither HUD nor the courts offer guidance for appropriate statistical evidence, instead requiring "proof of disproportionate impact measured in a plausible way" (*Mt. Holly Gardens Citizens in Action, Inc. v. Twp. of Mount Holly*, 2011). While some appellate decisions (e.g., *Tsombanidis v. West Haven Fire Department*, 2003) have required that statistical proof entails "appropriate comparison groups" (often a non-protected class), others have upheld methods demonstrating that a protected class is over or under represented in the population adversely impacted by the challenged policy (*Gallagher v. Magner*, 2010).

Here, disparate impact is operationalized by a spatial pattern that more adversely impacts CTs where Black householders were overrepresented relative to the Wayne county sample as a whole. Hence, if foreclosure burdens are significantly higher in CTs with a DIR greater than 1.0 and lower in CTs with a DIR equal to or less than 1.0, that would indicate a disparate impact on Black households. Given the predominance of Whites in CTs with DIRs less than 1.0, such findings would permit the conclusion that Black households were not only more adversely

[65] A DIR was also constructed for non-Latinx White householders. High segregation made the Black and White DIRs strongly negatively correlated (r=-0.96, p<0.0001); 271 (90.6%) of the 299 CTs with a Black DIR less than 1.0 (disproportionately non-Black) had a White DIR greater than 1.0 (disproportionately White).

impacted by foreclosure than what would be expected based on their distribution in the county as a whole, but also more adversely impacted than White populations households in the sample.

Occupied tax foreclosure burden. In examining the adverse impact of foreclosure law, it is important to distinguish occupied structures from vacant and abandoned properties for which the accelerated foreclosure process is intended. State law (MCL 211.78i(3)) requires that foreclosing governmental units make a personal visit to each property subject to foreclosure to ascertain whether the property is occupied. Parcel-level data on all Wayne County properties subject to tax foreclosure in 2014 and 2015 with occupancy status determined by the servicer of foreclosure notice was obtained through a Freedom of Information Act (FOIA) request granted by the Wayne County Treasurer (MCL 15.231 *et. seq.*).[66] As properties subject to foreclosure may be redeemed by their owners prior to foreclosure judgement and public auction,[67] completed occupied foreclosures were discerned by matching parcels subject to foreclosure to the corresponding year of tax auction data from Loveland Technologies. Parcel-level occupied foreclosures were geocoded, joined to their home CT, and aggregated.[68] To calculate a CT-level measure of occupied foreclosure burden (i.e., rate per 100 households), occupied foreclosures were averaged across the two years, then divided by the number of occupied housing units in the CT according to the ACS.[69] The sum of average CT-level occupied foreclosures and households were used to calculate foreclosure burdens at the municipal level.[70] To estimate a count (and proportion) of the population affected (i.e., dispossessed) by foreclosure each year, the average number of occupied foreclosures

[66] Properties subject to tax foreclosure in 2014 and 2015 were forfeited to the Wayne County Treasurer in 2013 and 2014, respectively (i.e., when property taxes were in their second year of delinquency). The Wayne County Treasurer conducted personal visits to properties subject to foreclosure between September and December of the forfeiting year.

[67] According to state law (MCL 211.78k), owners may redeem forfeited property by paying (or entering into an authorized payment plan for) taxes, interest, penalties, and fees by March 31st of the foreclosing year, when the Circuit Court enters a final judgement of foreclosure, property owners lose all rights, and title passes to the county treasurer. In 2015, the Wayne County Treasurer extended the redemption deadline multiple times until June 8th (Associated Press, 2014). In Wayne county in 2014 and 2015, foreclosed properties were offered for sale online at two public auctions (in September and October), unless they were purchased by the local, state, or county governments.

[68] Parcel addresses were geocoded using the PostGIS TIGER geocoder, resulting in a match rate of 97.3% and 94.7% for 2014 and 2015, respectively. For properties that could not be geocoded using this method (n=660 (2014), n=1,317 (2015)), parcel identification numbers were used to locate the properties. This process recovered 64% (2014) and 40% (2015) of foreclosed properties that could not be geocoded by address, including 80% of occupied properties (68 of 87 (2014); 81 of 103 (2015)), resulting in a high final geocode coverage rate (98.6% of 2014 and 95.6% in 2015).

[69] Rates were also calculated using households counts from the 2010 US Census as the denominator; rates tended to be lower due to population losses, but the distributions were similar to those calculated based on ACS estimates.

[70] CT centroids joined to county subdivisions were checked visually for accuracy, then confirmed by comparing summed CT-level population counts to those at the county subdivision level estimated by the ACS.

in each CT was multiplied by the CT-level average household size from the ACS (and expressed as a rate per 1,000 residents). When reported at the municipal level, the population affected was summed for all CTs in the municipality, then expressed as a rate per 1,000 residents.

Urban health equity index (UHEI). An index of urban health equity was adapted from the Urban Health Equity Assessment Response Tool (Urban HEART) Detroit. The Urban HEART Detroit tool was developed and implemented by the Healthy Environments Partnership (HEP), a community-based participatory research (CBPR) partnership aimed at addressing social determinants of health in Detroit[71] (Mehdipanah et al., 2018, 2021). As in the original Urban HEART Detroit tool, the UHEI is comprised of 15 CT-level health equity indicators, each corresponding to one of five policy domains: economics, social and human development, governance, physical environment and infrastructure, and population health[72] (see **Table 4.2**).

The UHEI was constructed based on the value of each CT-level Urban HEART indicator relative to its distribution in Wayne county as a whole. The method used to construct the UHEI was adapted from the modified Darden-Kamel Composite Socioeconomic Index (CSI) (Darden & Kamel, 2000; Darden et al., 2010; Darden et al., 2019). First, each variable was standardized so that it contributed equally to the UHEI: a z-score was calculated for each indicator by subtracting the mean of that indicator for the Wayne county sample from the value of the indicator for a CT, then dividing by the standard deviation of the respective variable for the Wayne county sample. Next, z-scores were averaged to generate a composite UHEI value for each CT.

Higher UHEI values correspond to relative health advantage and lower values indicate relative disadvantage. Z-scores for variables with a negative framing (diesel PM exposure, disability) were multiplied by -1 to contribute negatively to the overall score. Missing data for four of the 15 UHEI indicators resulted in incomplete data for 52 CTs (8.8% of the sample), such that mean z-scores for 46 CTs were missing a single indicator and 6 CTs were missing two indicators.[73]

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[71] The World Health Organization (WHO) developed Urban HEART (WHO, 2010), a decision-support tool designed to foster strong coordination among diverse policy sectors, levels of government, and communities to identify and reduce health inequities in cities. HEP applied WHO's six-step collaborative process to implement the Urban HEART in Detroit in 2016 (Mehdipanah et al., 2018). Adaptations to HEP's Urban HEART tool were approved by the HEP Steering Committee in 2019.

[72] Two Detroit Urban HEART indicators from the physical environment and infrastructure domain (parkland normalized by CT acreage and percent non-auto commuters) are omitted. Life expectancy is used instead of crude death rate to better account for age-structure in the CT. Home age and housing affordability were added.

[73] Sample CTs were missing data for median housing value (n=13); percent of children above poverty level (n=2); median housing age (n=3); and life expectancy at birth (n=39).

For descriptive analysis, sample CTs were sorted based on their UHEI values (from low to high) and divided into five UHEI quintile groups of approximately equal proportions. CTs grouped as having UHEI values that were "low" or "low moderate" indicate a health disadvantage relative to the sample distribution; "moderate" indicate conditions near the median; and "high moderate" and "high" indicate relative health advantage. For regression analysis, two UHEI subscores were generated by calculating mean z-scores for 1) indicators in the population health domain ("UHEI-health") and; 2) indicators in the social determinants of health domains: economics, social and human development, governance, and physical environment infrastructure ("UHEI-SDOH").

Covariates included population size, age (percent population aged 18-64), percent of householders that are Indigenous and/or other people of color (IPOC) (i.e., neither Black nor non-Latinx White). As in Chapters 2 and 3, the percent of the population with Arab Ancestry was considered for sensitivity analysis.

Table 4.2 *Urban health equity index (UHEI) indicators*

Domain	**Variable**	**Unit**	**Description**	**Source**	**Year(s)**
Economics	Household income	US dollars	Median household income in the past 12 months, measured in 2016 inflation-adjusted dollars.	American Community Survey (ACS)	2012-2016
	Housing value	US dollars	Median house value for owner-occupied housing units, based on homeowners' estimate of what the home would sell for if it were sold.	ACS	2012-2016
	Owner-occupancy	Percent	Percentage of occupied housing units that are owner-occupied, including mortgaged units.	ACS	2012-2016
	Labor force participation	Percent	Percentage of population 16 years and older who have a job or are actively looking for a job, including members of the U.S. Armed Forces.	ACS	2012-2016
	Housing affordability	Percent	Percentage of households with housing costs less than 30%of income in the past 12 months.	ACS	2012-2016
Social & Human Development	High school education	Percent	Percentage of population 25 years and older who have completed high school education.	ACS	2012-2016
	Bachelor's degree education	Percent	Percentage of population 25 years and older who have completed a Bachelor's degree or more.	ACS	2012-2016

	Children living above the poverty line	Percent	Percentage of children under the age of 6 living above the poverty threshold determined by that child's family size and composition.	ACS	2012-2016
Governance	Voter turnout	Percent	Percentage of registered voters that voted in the 2012 presidential election. Estimates are based on statewide numbers.	State of Michigan Qualified Voter File	2012
	Healthcare coverage	Percent	Percentage of civilian noninstitutionalized population with health insurance coverage, including plans and programs that provide comprehensive health coverage.	ACS	2012-2016
Physical Environment & Infrastructure	Diesel particulate matter exposure	µg/m3	Estimated inhalation exposure concentration of diesel particulate matter (DPM), modeled based on annual average ambient outdoor concentration, demographic characteristics, human activity patterns, and microenvironmental factors. Computed based on PM10 emissions from on-road and nonroad mobile sources burning diesel or residual fuels.	Environ-mental Protection Agency's National Air Toxics Assessment	2014
	Occupied housing	Percent	Percentage of housing units that are occupied.	ACS	2012-2016
	Housing age	Year	Median year structure built for all housing units, based on respondents' estimate.	ACS	2012-2016
Population Health	Life Expectancy	Years	Estimated life expectancy at birth, calculated using abridged period life tables based on observed and predicted age-specific death rates and population estimates between 2010-2015.	National Center for Health Statistics US Small-area Life Expectancy Estimates Project	2010-2015
	Disability	Percent	Percentage of civilian noninstitutionalized adult population age 18-64 who have one or more disabilities, as determined by six aspects of difficulty or limitation in basic functioning and activities of daily living.	ACS	2012-2016

Analysis

Geocode match rates and counts of foreclosed properties by occupancy status in Wayne county were reported for each year of data. Descriptive statistics and histograms were then used to examine demographic characteristics, household racial composition, and distributions of the key study variables (DIR, occupied foreclosure burden, UHEI) across CTs in the Wayne county sample. Choropleth maps visualized the distribution of key study variables spatially.

Next, several empirical methods were used and assess the degree to which urban health inequity in Wayne county was racialized. To answer the question of whether relative distributions of health advantage and disadvantage harmed disproportionately Black CTs and benefited predominantly White CTs, frequency distributions, bar charts, and two-sample Welch's unequal variance t-tests were used to determine whether the UHEI and its component indicators differed between CTs grouped as having DIRs less than or greater than 1.0 (no CTs had a DIR equal to 1.0). To further delineate the state of urban health inequity in the sample, mean values of the UHEI indicators were described and compared across each of the five UHEI quintiles (one-way ANOVA with Bonferroni comparisons tested differences in means).

The Index of Dissimilarity was used to measure unevenness in the spatial distribution of Black and White households across CTs with similar urban health characteristics (based on their proportional representation across quintile groups of UHEI-clustered CTs in the sample):

$$\mathrm{D} = 100\left(\frac{1}{2}\sum_{i=1}^{k}|b_i - w_i|\right)$$

Where k is the total number of grouped CTs in the Wayne county sample (here k=5 quintiles); b_i is the percentage of the sample's total number of Black-led households residing in the i^{th} UHEI quintile (grouped CTs); w_i is the percentage of the sample's total number of (non-Latinx) White-led households living in same UHEI quintile. The value of the Index of Dissimilarity can range from 0 (indicating that each quintile has an equal proportion of Black and White households) to 100 (indicating complete inequality in the spatial distribution of Black and Whites households across quintiles), and can be interpreted as the minimum proportion of one group that would have to change its quintile of residence in order for the two groups to have identical spatial distributions.

Several analytic techniques were then used to assess disparate impact by quantifying the extent to which occupied foreclosure burdens more adversely impacted disproportionately Black neighborhoods relative to 1) what would be expected based on their distribution in Wayne county

as a whole and 2) predominantly White neighborhoods with low proportions of Black residents. First, the percentage of foreclosures that occurred in CTs within each of the five DIR intervals were computed and compared. Next, negative binomial regression models (which can accommodate low counts and zeros in the outcome variable) with incidence rate ratios (IRR) assessed the relationship between DIRs and average CT-level occupied foreclosure burdens. In models assessing occupied foreclosures (expressed as a rate per 100 households), the average number of occupied foreclosures served as the dependent variable and the number of occupied housing units served as the exposure variable; in models assessing the population affected (expressed as a rate per 1,000 residents), the count of the population affected served as the dependent variable and the total CT-level population served as the exposure variable. The first set of negative binomial regression models (Models A and B) were fit using the continuous DIR as a predictor in order to compute and compare foreclosure burdens (i.e., expected counts and rates) at specified DIRs (e.g., DIR=1.0). The second set of models (Models C and D) were fit using DIR intervals as a categorical predictor in order to compute and compare average foreclosure burdens for CTs in each interval. Rate ratios and associated 95% confidence intervals (CI) are reported.

Finally, linear regression models (95% confidence) were used to explore the association between foreclosure burden (expressed as a rate per 100 household) and health inequity with attentiveness to the theoretical expectation that structural racialization (as captured by the DIR) strongly shapes the distribution of both variables simultaneously. To assess these relationships with greater specificity, the UHEI-health subscore served as the outcome in these regression models, while the UHEI-SDOH was used as an independent variable (all models were tested using a separate UHEI subscore for each domain included in the UHEI-SDOH; due to qualitatively similar findings, these findings are not reported here). All models were adjusted for covariates and rerun omitting CTs with majority-Arab (at least 50%) populations (n=13) from the sample. Correlation matrices were used to explore bivariate associations between key measures, Variance Inflation Factors (VIFs) were used to detect multicollinearity, and post-hoc analyses confirmed that models' residual errors did not violate normality assumptions. Regression standard errors were obtained using Huber-White sandwich estimators.

Model 1 served as a base model (UHEI-health regressed only on covariates). Model 2 estimated the relationship between the DIR and UHEI-health, revisiting the hypothesis that spatial patterns of health inequity in Wayne county would be racialized (Model 2a was fit using the DIR

interval as a categorical predictor). Model 3 added the UHEI-SDOH subscore as an independent variable, exploring the extent to which the association between the DIR and UHEI-health could be explained by racialized patterns of the social determinants of health. Model 4 estimated the relationship between occupied foreclosure burden and the UHEI-health subscore, testing the hypothesis that foreclosure burdens would be higher in communities already burdened by poorer health. Model 5 added the UHEI-SDOH subscore as an independent variable, exploring whether the association between foreclosure and health persisted after accounting for these social determinants. Model 6 added the DIR back into the model, exploring the expectation that multicollinearity would diminish any associations observed between 1) foreclosure burden and UHEI-health; and 2) UHEI-SDOH and UHEI-health.

Results

Description of foreclosure data

Table 4.3 describes aggregate foreclosure data (2014 and 2015) by occupancy status (occupied structures, unoccupied structures, vacant lots) proxied from parcel-matching properties subject to foreclosure to properties that later entered the Wayne county tax auction. Geocoding yielded high match rates across occupancy categories for each year of data. Though the number of properties subject to foreclosure (total and within each category) was substantially higher in 2015 than 2014, the number of occupied foreclosures was higher in 2014. At least one third (n=19,308) of properties subject to foreclosure in 2014 were at risk again in 2015, but repeated foreclosures were rare. Occupied structures accounted for about one third of all foreclosures during the study period. Each year about 92% of all Wayne county tax foreclosures occurred in Detroit.

Table 4.4 lists Wayne county municipalities ordered from highest to lowest occupied foreclosure burden, illustrating the scale of the crisis and its racialized maldistribution across local taxing jurisdictions. Detroit's immense share (93.4%) of the county's total occupied foreclosure burden was indeed disproportionate, as Detroit households accounted for 38.2% of the sample population. Expressed as a municipal rate, 3.30% of Detroit households experienced a foreclosure each year between 2014 and 2015, dispossessing an estimated population of 23,168 annually, equivalent to 34 of every 1,000 Detroit residents. Other municipalities with occupied foreclosure burdens that exceeded 1% were the majority-Black cities of Highland Park, River Rouge, Ecorse, and Inkster, where between 12 and 28 of every 1,000 residents were dispossessed by foreclosure

each year. These cities comprised a small (3.05%) share of the county's total households but were home to more than a quarter of Black households outside Detroit.

Table 4.3 *Wayne county property tax foreclosures by occupancy status at the time of foreclosure notice, 2014 and 2015*

	Occupied structures	Unoccupied structures	Vacant lots	Total foreclosures
2014				
Subject to foreclosure	33,212	11,199	9,150	53,561
Pct. geocoded	99.5%	99.4%	97.3%	99.1%
Completed foreclosures	9,443	7,734	7,975	25,152
Pct. of total	37.5%	30.7%	31.7%	-
Detroit	8,855	6,862	7,391	23,108
Pct. in Detroit	93.8%	88.7%	92.7%	91.9%
2015				
Subject to foreclosure	48,460	12,726	16,808	77,994
Pct. geocoded	99.4%	99.4%	95.9%	98.7%
Completed foreclosures	8,739	8,140	10,055	27,003
Pct. of total	32.4%	30.1%	37.2%	-
Detroit	8,139	7,537	9,148	24,892
Pct. in Detroit	93.1%	92.6%	91.0%	92.2%

Source: Wayne County Treasurer, Loveland Technologies.
Notes: Properties subject to foreclosure refer to properties forfeited in 2013 and 2014 and subject to foreclosure in 2014 and 2015, respectively. Occupancy status was determined by the servicer at the time of foreclosure notice (September through December of the forfeiting year). Forfeiture data with occupancy status was linked to completed foreclosure data to proxy the occupancy status of foreclosed properties. 19,308 properties were subject to foreclosure both in 2014 and 2015; 70 properties underwent completed foreclosures in both 2014 and 2015 (7 were occupied structures).

Description of the sample

Table 4.5 describes CTs included in the Wayne county sample (n=593). The average CT in the sample was home to 2,969 residents and 1,125 households, which had an average household size of 2.63 persons. The mean DIR was 1.19, indicating that the mean percentage of Black-led households across CTs was 47.0%. However, this grand mean, as well as those describing the percentage of householders that were White (45.3%) and IPOC (7.8%), failed to capture stark patterns of racial segregation evident in the Wayne county sample. **Table 4.6** describes CT populations within DIR intervals and **Figure 4.2** maps these intervals spatially. As shown in **Table 4.6,** sample CTs were largely concentrated at the far ends of the DIR range (0 to 2.54), indicating either very low or very high proportions of Black householders. Few CTs had a DIR near 1.0. Just 12.1% of Black households and 14.0% of White households lived in a CT with a DIR value greater than 0.5 but less than 1.5 (i.e., CTs that were between 19.7% and 59.0% Black).

Table 4.4 *Wayne county municipalities (n=43) ordered by occupied foreclosure burden, 2014-2015*

Municipality	Total pop.	Household characteristics				Occupied foreclosures, 2014-2015					
		Total	Pct. Black	Pct. White	Pct. of Wayne County total	Total	Pct. of Wayne County total	Avg., per yr.	Rate per 100 households	Pop. affected per yr.	Pop. affected per 1,000 pop., per yr.
Detroit	676,744	254,746	81.1	11.0	38.2	16,837	93.4	8,418.5	3.30	23,168	34.2
Highland Park	10,978	4,491	94.2	3.5	0.7	251	1.4	125.5	2.79	309	28.2
River Rouge	7,609	2,825	55.3	34.2	0.4	111	0.6	55.5	1.96	148	19.4
Ecorse	9,270	3,527	48.4	40.3	0.5	134	0.7	67.0	1.90	179	19.3
Inkster	24,738	9,477	70.7	23.9	1.4	238	1.3	119.0	1.26	305	12.3
Hamtramck	21,985	6,296	16.7	60.1	0.9	55	0.3	27.5	0.44	91	4.2
Melvindale	10,437	3,899	17.0	67.6	0.6	18	0.1	9.0	0.23	24	2.3
Harper Woods	13,895	5,177	49.1	45.7	0.8	20	0.1	10.0	0.19	28	2.0
Redford c-twp	47,411	17,957	31.1	64.8	2.7	51	0.3	25.5	0.14	65	1.4
Romulus	23,457	8,690	42.0	51.3	1.3	23	0.1	11.5	0.13	30	1.3
Dearborn Heights	56,329	20,547	7.9	84.8	3.1	43	0.2	21.5	0.10	58	1.0
Lincoln Park	37,155	14,265	7.7	77.0	2.1	28	0.2	14.0	0.10	37	1.0
Wyandotte	25,225	10,932	0.8	93.0	1.6	18	0.1	9.0	0.08	21	0.9
Westland	82,218	34,188	18.4	74.7	5.1	55	0.3	27.5	0.08	69	0.8
Taylor	61,716	23,825	16.0	77.1	3.6	37	0.2	18.5	0.08	47	0.8
Rockwood	3,209	1,326	0.0	91.0	0.2	2	0.0	1.0	0.08	2	0.7
Southgate	29,355	12,563	6.4	84.5	1.9	13	0.1	6.5	0.05	16	0.6
Dearborn	95,520	31,279	4.8	88.1	4.7	32	0.2	16.0	0.05	56	0.6
Riverview	12,208	5,005	4.5	89.9	0.8	5	0.0	2.5	0.05	6	0.5
Trenton	18,426	7,859	0.9	94.3	1.2	7	0.0	3.5	0.04	8	0.4
Sumpter twp	9,342	3,516	10.8	85.6	0.5	3	0.0	1.5	0.04	4	0.4
Belleville	3,896	1,605	9.4	87.1	0.2	1	0.0	0.5	0.03	1	0.3
Garden City	27,009	10,292	2.8	92.3	1.5	6	0.0	3.0	0.03	8	0.3
Gibraltar	4,547	1,791	2.4	92.2	0.3	1	0.0	0.5	0.03	1	0.3
Brownstown c-twp	30,685	11,077	7.0	82.8	1.7	6	0.0	3.0	0.03	8	0.3
Allen Park	27,519	10,805	1.9	90.5	1.6	5	0.0	2.5	0.02	6	0.2

Municipality	Total pop.	Household characteristics				Occupied foreclosures, 2014-2015					
		Total	Pct. Black	Pct. White	Pct. of Wayne County total	Total	Pct. of Wayne County total	Avg., per yr.	Rate per 100 households	Pop. affected per yr.	Pop. affected per 1,000 pop., per yr.
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Redford c-twp	47,411	17,957	31.1	64.8	2.7	51	0.3	25.5	0.14	65	1.4
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Westland	82,218	34,188	18.4	74.7	5.1	55	0.3	27.5	0.08	69	0.8
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Rockwood	3,209	1,326	0.0	91.0	0.2	2	0.0	1.0	0.08	2	0.7
Southgate	29,355	12,563	6.4	84.5	1.9	13	0.1	6.5	0.05	16	0.6
Dearborn	95,520	31,279	4.8	88.1	4.7	32	0.2	16.0	0.05	56	0.6
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Trenton	18,426	7,859	0.9	94.3	1.2	7	0.0	3.5	0.04	8	0.4
Sumpter twp	9,342	3,516	10.8	85.6	0.5	3	0.0	1.5	0.04	4	0.4
Belleville	3,896	1,605	9.4	87.1	0.2	1	0.0	0.5	0.03	1	0.3
Garden City	27,009	10,292	2.8	92.3	1.5	6	0.0	3.0	0.03	8	0.3
Gibraltar	4,547	1,791	2.4	92.2	0.3	1	0.0	0.5	0.03	1	0.3
Brownstown c-twp	30,685	11,077	7.0	82.8	1.7	6	0.0	3.0	0.03	8	0.3
Allen Park	27,519	10,805	1.9	90.5	1.6	5	0.0	2.5	0.02	6	0.2

Source: 2012-2016 ACS, Wayne County Treasurer, Loveland Technologies.

Notes: Wayne County refers to 593 of the 611 census tracts included in the sample. Detroit refers to the 284 of its 297 census tracts that are included in study sample (excluding a population of 6,699, 2,239 households, 405 structural foreclosures, and 157 occupied foreclosures). All municipalities are cities unless indicated as a township (twp) or charter township (c-twp). Black and White households refer to those where the householder identified as "Black or African American alone" or "White Alone, not Hispanic or Latino" on the ACS.

Table 4.5 *CT-level characteristics of Wayne county sample (n=593)*

Variable	Mean	SD	Median (Q2)	Q1	Q3	n
Demographic characteristics						
Total Population	2,969	1,320	2,825	1,981	3,737	593
Households	1,125	487	1,081	771	1,424	593
Avg. household size	2.63	0.45	2.61	2.41	2.83	593
Racial composition of households						
Disparate impact ratio (DIR)	1.19	1.03	0.90	0.12	2.34	593
Pct. of householders, Black	47.0	40.7	35.4	4.5	92.1	593
DIR <1.0	8.6	9.2	4.7	1.6	12.7	299
DIR >1.0	86.0	15.2	92.2	80.9	96.1	294
Pct. of householders, white	45.3	38.2	41.2	4.7	86.4	593
DIR <1.0	79.8	17.6	86.4	73.0	92.2	299
DIR >1.0	10.2	13.3	4.5	1.3	13.2	294
Pct. of householders, IPOC	7.8	10.9	4.9	2.2	8.3	593
DIR <1.0	11.6	13.7	7.2	4.8	12.3	299
DIR >1.0	3.8	4.4	2.6	1.3	5.0	294
Occupied foreclosure burden, 2014-2015						
Occupied foreclosures (avg. count)	15.2	21.6	3.0	0.0	25.5	593
Rate per 100 households, per year	1.87	2.55	0.26	0.00	3.22	593
Population affected (avg. count)	41.7	60.4	7.2	0.0	68.5	593
Rate per 1,000 residents, per year	18.4	25.2	2.5	0.0	31.6	593
Urban Health Equity Index (UHEI)						
UHEI composite	0.00	0.76	-0.14	-0.62	0.56	593
UHEI-health	-0.01	0.93	-0.09	-0.70	0.70	593
UHEI-SDOH	0.00	0.76	-0.13	-0.61	0.54	593

Notes: Black and White households refer to those where the householder identified as "Black or African American alone" or "White Alone, not Hispanic or Latino" on the ACS. Indigenous and other people of color (IPOC) householders refer to all other single- and mixed racial categories ("American Indian and Alaska Native alone," "Asian alone," "Native Hawaiian and Other Pacific Islander alone," "some other race alone", or "two or more races") and householders who identified as "Hispanic or Latino."

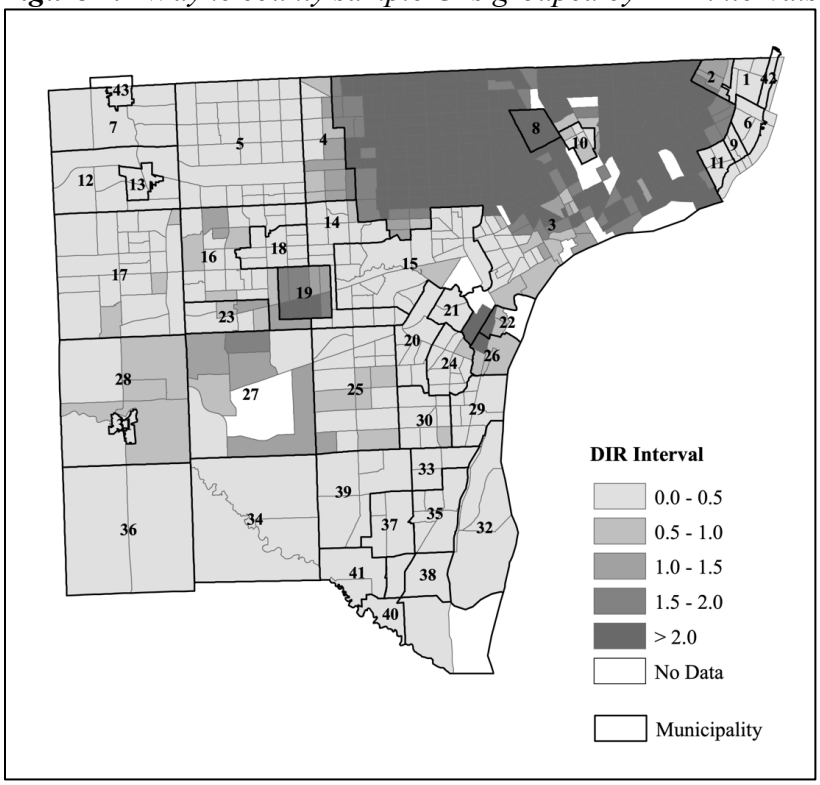
Table 4.6 *Racial composition of DIR intervals*

Range of potential values		n	Black			White		
DIR values	Pct. of HHs, Black		Mean pct. of HHs	Number of HHs	Pct. of total HHs	Mean pct. of HHs	Number of HHs	Pct. of total HHs
0.0–0.5	0.0–19.7	253	5.3	18,200	6.9	83.8	284,744	81.0
0.5–1.0	19.7–39.3	46	26.6	15,408	5.9	57.6	34,646	9.9
1.0–1.5	39.3–59.0	26	47.8	16,406	6.3	43.5	14,426	4.1
1.5–2.0	59.0–78.7	38	69.4	25,480	9.7	23.3	9,073	2.6
>2.0	78.7–100.0	230	93.0	186,890	71.2	4.2	8,724	2.5

HHs=Householders

Notes: The DIR indicates the proportion of householders who are Black in a CT relative to their proportion in the Wayne county sample as a whole (39.3%). Intervals include top-range values up to one decimal point. The total number of Black and White households in the sample was 262,384 and 351,613, respectively.

Figure 4.2 *Wayne county sample CTs grouped by DIR intervals*



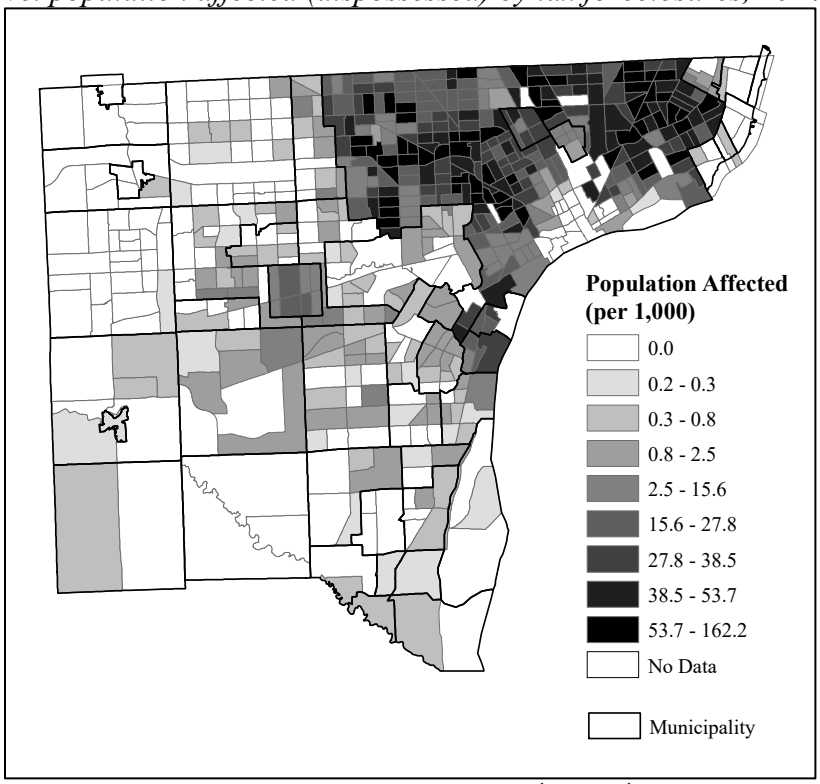
1. Grosse Pointe Woods city
2. Harper Woods city
3. Detroit city
4. Redford charter township
5. Livonia city
6. Grosse Pointe Farms city
7. Northville township
8. Highland Park city
9. Grosse Pointe city
10. Hamtramck city
11. Grosse Pointe Park city
12. Plymouth charter township
13. Plymouth city
14. Dearborn Heights city
15. Dearborn city
16. Westland city
17. Canton charter township
18. Garden City city
19. Inkster city
20. Allen Park city
21. Melvindale city
22. River Rouge city
23. Wayne city
24. Lincoln Park city
25. Taylor city
26. Ecorse city
27. Romulus city
28. Van Buren charter township
29. Wyandotte city
30. Southgate city
31. Belleville city
32. Grosse Ile township
33. Riverview city
34. Huron charter township
35. Trenton city
36. Sumpter township
37. Woodhaven city
38. Gibraltar city
39. Brownstown charter township
40. Rockwood city
41. Flat Rock city
42. Village of Grosse Pointe Shores city
43. Northville city

Of the 294 CTs with DIRs greater than 1.0, 78.2% (n=230) had DIRs greater than 2.0; on average, CTs in the highest interval range were 93.0% Black and contained 71.2% of all Black households in the sample (**Table 4.6**). Most CTs with a DIR greater than 2.0 were in Detroit (n=218), with others located in the majority-Black suburbs of Highland Park, Inkster, River Rouge and Ecorse (**Figure 4.2**). The 299 CTs with DIRs less than 1.0 were predominantly White (79.8%), home to far smaller Black populations (8.6%), and tended to be more diverse with respect to representation of IPOC groups, most notably Latinx and Asian households (**Table 4.5**). The sample was 3.9% Arab and 94% of the Arab population lived in a CT with a DIR value > 1.0 (data

not shown). Of the CTs with a DIR less than 1.0, 84.6% (n=253) had DIRs lower than 0.5; CTs in this interval were home to the majority (81.0%) of White households in the sample (**Table 4.6**).

The distribution of occupied foreclosures was positively skewed (data not shown) and indicated substantial inequality in foreclosure burden across CTs. A median of 3.0 occupied foreclosures per CT (on average per year) and a household incidence rate of 0.26% suggest that such events were rare occurrences for most sample CTs (**Table 4.5**) (n=155 CTs had no foreclosures either year; data not shown). However, a quarter of CTs experienced at least 25 occupied foreclosures on average each year, impacting 3.22% of households. In terms of these foreclosures human toll, among CTs with foreclosure burdens at or above the 75th percentile, an average of at least 68 residents per year were dispossessed by tax foreclosure, or 30 of every 1,000 CT residents. In the most burdened 10% of CTs, foreclosure rates (per 100 households) were at least 5.4% per year on average, with at least 53 of every 1,000 CT residents impacted. **Figure 4.3** shows the rate of the population affected (per 1,000) by tax foreclosures across Wayne county CTs.As described above, patterns were largely structured by municipal boundaries and conspicuously corresponded with the racial patterns shown in **Figure 4.2**.

Figure 4.3 *CT-level population affected (dispossessed) by tax foreclosures, 2014-2015 average*



Notes: Top-range interval values correspond to decile values; since the 10th and 20th percentile value were both 0.0, these intervals are combined. Intervals include top-range values up to one decimal point.

Finally, **Table 4.5** shows that the 15-indicator UHEI composite variable centered on a mean of zero; given its substantial overlap in component variables, the UHEI-SDOH distribution closely overlapped. The UHEI-health distribution demonstrated somewhat wider spread.

Urban health inequity

To describe the degree to which health inequity was racialized in Wayne county, **Figure 4.4** shows the UHEI distribution shaded to represent CTs with DIRs less than or greater than 1.0. Disproportionately Black and predominantly White neighborhoods in Wayne county had largely distinct UHEI distributions, with conditions harming the former and benefitting the latter. Mean UHEI values among disproportionately Black (-0.51, n=294) and predominantly White (0.50, n=299) CTs differed substantially (p<0.001), by approximately 1 standard deviation (SD).

Figure 4.4 *UHEI distribution in the Wayne county sample (n=593), shaded by DIR (less than or greater than 1.0)*

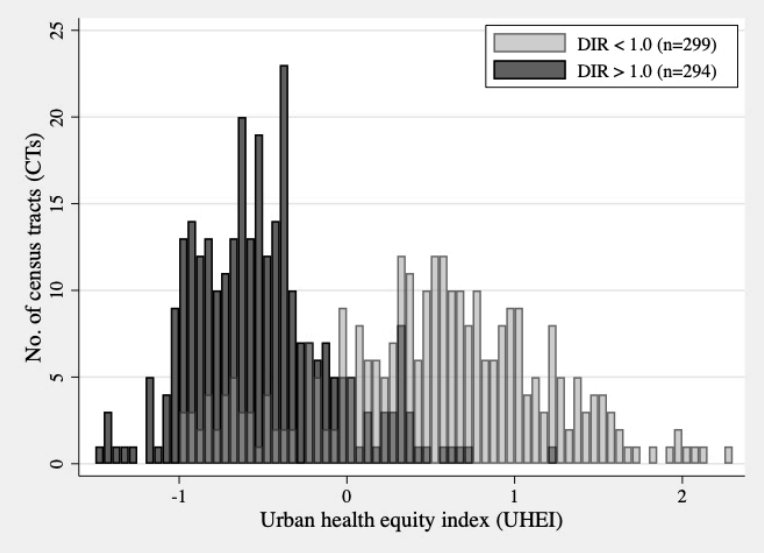
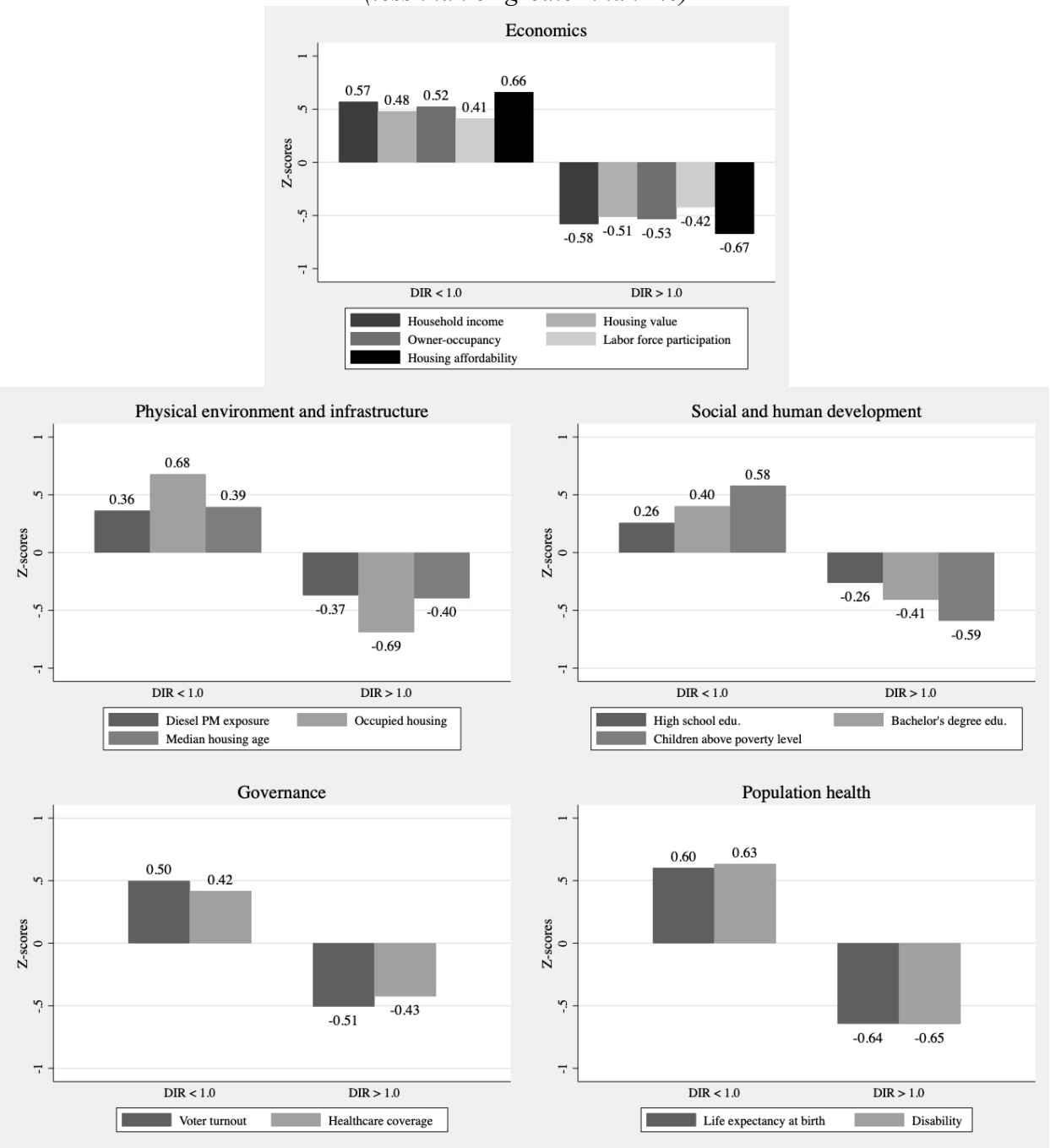


Figure 4.5 displays differences in mean z-score values for UHEI indicators in each health equity domain, between CTs grouped as having DIRs less than or greater than 1.0. All indicators demonstrated racialized trends consistent with the composite UHEI (all differences were significant, p<0.001), but some measures indicated stronger race-related differentials than others. Across indicators, the largest mean z-score differences (greater than 1 SD; listed in order of magnitude) were for occupied housing (1.37, n=593), housing affordability (1.34, n=593), disability (1.28, n=593), life expectancy (1.25, n=554), children living above the poverty level (1.17, n=591), household income (1.15, n=593), and owner-occupancy (1.05, n=593).

Figure 4.5 *Mean z-score values for UHEI indicators in each domain for CTs grouped by DIR (less than or greater than 1.0)*



On average across domains, the largest mean differences were observed for population health. Expressed as raw measures, the mean level of disability in predominantly White CTs was 11.9% (n=299) compared to 21.5% (n=294) among disproportionately Black CTs, and mean life expectancy at birth was 77.0 (n=286) and 71.7 (n=268) for the two groups, respectively.

Table 4.7 presents mean values of the UHEI indicators across the quintile groups of UEHI-clustered CTs (mapped in **Figure 4.6**). All indicators demonstrated stepwise patterns in the anticipated direction (advantaging CTs with higher UHEI values; $p<0.001$).

Table 4.7 *Mean characteristics of CTs categorized by UHEI quintiles ordered low (health disadvantaged) to high (health advantaged)*

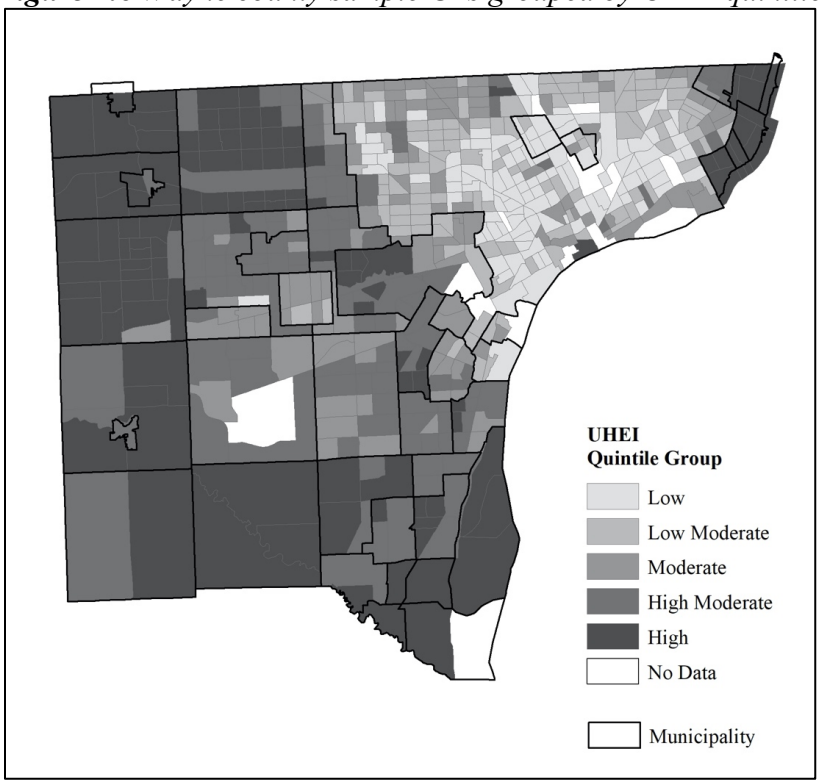
	Economics				
UHEI quintile	Median household income (US$)	Median housing value (US$)	Owner-occupancy (Percent)	Labor force participation (Percent)	Housing affordability (Percent)
Low	20,292	36,620	42.9	48.2	47.1
Low moderate	25,786	49,000	47.9	54.0	50.7
Moderate	35,026	63,901	56.8	57.7	58.0
High moderate	51,828	97,003	70.6	62.2	69.7
High	83,223	199,336	82.0	65.1	76.9
Total (county)	43,177	90,093	60.0	57.4	60.5
	Social & human development			Governance	
UHEI quintile	High school edu. (Percent)	Bachelor's degree edu. (Percent)	Children above poverty level (Percent)	Voter turnout (Percent)	Healthcare coverage (Percent)
Low	71.3	8.2	30.9	42.1	83.5
Low moderate	78.9	10.6	42.3	47.6	85.2
Moderate	83.5	16.4	55.4	53.6	88.0
High moderate	89.0	20.6	80.4	62.9	91.2
High	94.8	43.0	93.8	73.1	95.6
Total (county)	83.5	19.7	60.5	55.8	88.7
	Physical environment & infrastructure			Population health	
UHEI quintile	Diesel PM exposure (µg/m3)	Occupied housing (Percent)	Median housing age (Year)	Life expectancy at birth (Years)	Disability (Percent)
Low	0.337	61.6	1944	70.6	24.4
Low moderate	0.310	71.2	1948	72.2	20.5
Moderate	0.307	84.7	1954	73.4	17.3
High moderate	0.287	91.8	1962	76.1	13.4
High	0.255	94.3	1970	79.8	7.6
Total (county)	0.299	80.7	1955	74.5	16.7

Note: Total refers to 593 of the 611 Wayne county CTs included in the sample.

Below, I compare low- and high-UHEI CTs to illustrate health inequity (all pairwise comparisons were significant, $p<0.001$; unless otherwise stated, low- and high-UHEI CTs included 119 and 118 CTs, respectively, and sample means were based on the full sample (n=593)). Low-UHEI CTs were located mostly in Detroit, but also Highland Park, Hamtramck, Ecorse, and

Westland cities; high-UHEI CTs were scattered throughout suburban Wayne county, but concentrated in Livonia city, Canton charter township, and the Grosse Pointe suburbs (**Figure 4.6**).

Figure 4.6 *Wayne county sample CTs grouped by UHEI quintile*



In the economics domain, low-UHEI CTs had a median income of $20,292, less than half the county median ($43,177) and just a quarter of the income of households in high-UHEI CTs ($83,223). Median home values in high-UHEI CTs ($199,336) were more than twice the county median ($90,093, n=580) and more than five times higher than the home values in low-UHEI CTs ($36,620, n=110). Rates of homeownership in high-UHEI CTs (82.0%) were nearly double that of low-UHEI CTs (42.9%). Labor force participation was 48.2% in low-UHEI CTs compared with 65.1% among high-UHEI CTs. Housing costs were affordable for less than half of households in low-UHEI CTs (47.1%), but affordable for most households in high-UHEI CTs (76.9%).

In the social and human development domain, just 71.3% of adults over age 25 in low-UHEI CTs had a high school degree compared to 94.8% among high-UHEI CTs. Educational inequity was even more severe for bachelor's degree attainment: the percentage of college-educated adults in high-UHEI CTs (43.0%) was more than 5 times higher than the percentage in low-UHEI CTs (8.2%). A full 93.8% of children 6 years or younger in high-UHEI CTs lived above poverty level, compared to less than one third of children in low-UHEI CTs (30.9%, n=118).

In the governance domain, voter turnout was 31.0 percentage points higher and healthcare coverage was 12.0 percentage points higher among high-UHEI CTs compared to low-UHEI CTs. In the physical environment and infrastructure domain, mean levels of diesel PM exposures in low-UHEI CTs were about 30% higher than the levels observed among high-UHEI CTs. Just 61.6% of housing units in low-UHEI CTs were occupied, 94.3% of housing was occupied in high-UHEI CTs. Housing in low-UHEI CTs was about 26 years older than in high-UHEI CTs (n=114).

Population health measures were consistent with trends documented for the social determinants of health. While mean life expectancy at birth for the sample was 74.5 years (n=554), life expectancy for low-UHEI CTs was an estimated 70.6 years (n=105)–approximately 9 years shorter than the mean life expectancy in the most advantaged CTs (79.8, n=111). Inequity in the mean level of disability was also pronounced; more than a quarter of the population in low-UEHI CTs (24.4%) lived with a disability, more than 3 times the level among high-UHEI CTs (7.6%).

Using the Index of Dissimilarity, **Table 4.8** quantifies the extent to which Black and White households resided in neighborhoods with inequitable urban health conditions (based on the quintile distribution of the UHEI). While nearly a quarter of all Black households lived in a low-UHEI CT, just 3.0% of White households did. In contrast, White households were 10 times more likely than Black households to live in the county's most health-advantaged CTs. Overall, the majority (57.0%) of Black households lived in a CT characterized by relative health disadvantage, while the majority (75.5%) of White households lived in a CT characterized by relative advantage. This spatial inequity is captured by the Index of Dissimilarity (60.6). In sum, these results revealed substantially racialized spatial patterns of urban health inequity in Wayne county.

Table 4.8 *Index of Dissimilarity between Black and non-Latinx White households based on the quintile distribution of UHEI ordered low (health disadvantaged) to high (health advantaged)*

	Black HHs		White HHs		Black & White HHs	
UHEI quintile	Number of HHs	Pct. of total HHs	Number of HHs	Pct. of total HHs	Number of HHs	Absolute difference pct.
Low	61,293	23.4	10,438	3.0	71,731	20.4
Low moderate	88,190	33.6	18,223	5.2	106,413	28.4
Moderate	73,787	28.1	57,482	16.3	131,269	11.8
High moderate	28,669	10.9	121,301	34.5	149,970	23.6
High	10,445	4.0	144,169	41.0	154,614	37.0
Total (county)	262,384	100.0	351,613	100.0	613,997	121.2
Index of Dissimilarity						60.6

Notes: X^2 = 249,252 (df = 4, p<0.001). Black and White households refer to those where the householder identified as "Black or African American alone" or "White Alone, not Hispanic or Latino" on the ACS. The Dissimilarity Index is half of 121.2, or 60.6. Total refers to 593 of the 611 Wayne county CTs included in the sample. HHs=Households

Disparate impact

The next stage of analysis sought to quantify disparate impact by assessing the extent to which occupied foreclosure burdens more adversely impacted Black neighborhoods relative to 1) what would be expected based on their distribution in Wayne county and 2) predominantly White neighborhoods. **Table 4.9** shows the distribution of households and occupied foreclosures across CTs in the five DIR intervals. A full 92.9% of all occupied tax foreclosures occurred in CTs with DIRs greater than 1.0; 81.5% of occupied foreclosures occurred in CTs with DIRs greater than 2.0, despite this interval containing just less than a third (30.2%) of the county population (and 71.2% of Black households, see **Table 4.6**). In sharp contrast, just 4.6% of all occupied foreclosures occurred in CTs with DIRs less than 0.5, despite this interval containing half (50.6%) of all households (and 81.0% of White households, see **Table 4.6**).

Table 4.9 *Distribution of households and occupied foreclosures across DIR intervals*

DIR interval	n	Number of households	Pct. of total households	Number of occupied foreclosures	Pct. of all foreclosures
0.0–0.5	253	337,744	50.6	824	4.6
0.5–1.0	46	57,592	8.6	453	2.5
1.0–1.5	26	33,738	5.1	434	2.4
1.5–2.0	38	36,905	5.5	1,629	9.0
>2.0	230	201,194	30.2	14,685	81.5

Notes: Occupied foreclosure counts refer to 2014-2015 totals. The total number of households in the sample was 667,173; the total number of occupied foreclosures in the sample was 18,025.

Table 4.10 shows the results of negative binomial regression models that used the continuous DIR to predict and compare CT-level occupied foreclosure burdens at DIR interval cut points. In Model A, the IRR indicated that the foreclosure rate increased by a factor of 4.37 (p<0.001) for every single unit increase in the DIR. Whereas the model predicts that a CT with a Black household population proportionate to the county (DI=1.0) would experience an annual foreclosure rate of 0.57% (95% CI: 0.50, 0.64), the predicted foreclosure rate in a CT with twice as many Black households (DIR=2.0) was 2.49% (95% CI: 2.16, 2.83). In a CT where nearly all households were Black (DIR=2.5), the predicted foreclosure rate was 5.21% (95% CI: 4.32, 6.11), more than 9 times the rate expected to be observed if there were no disparate impact (DIR=1.0), and about 40 times the rate predicted if there were no Black households in the CT (DIR=0.0; 0.13%, 95% CI: 0.11, 0.15).

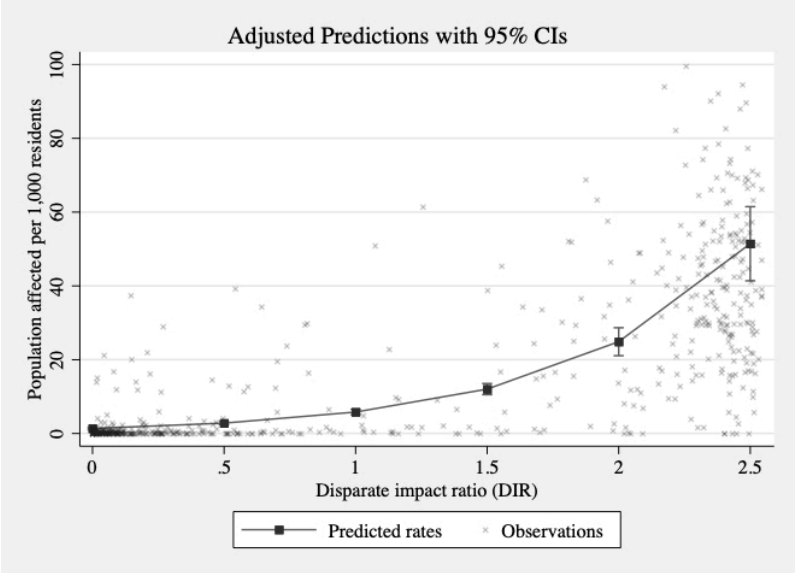
Table 4.10 *Negative binomial regression results using the continuous DIR to predict and compare CT-level occupied foreclosure burdens at DIR interval values*

	Model A: Occupied foreclosures				Model B: Population affected			
DIR value	Rate	95% CI	Rate ratio DIR=1.0 (ref)	95% CI	Rate	95% CI	Rate ratio DIR=1.0 (ref)	95% CI
0.0	0.13	[0.11 0.15]	0.23	[0.19 0.27]	1.36	[1.10 1.62]	0.23	[0.19 0.28]
0.5	0.27	[0.23 0.31]	0.48	[0.41 0.55]	2.82	[2.40 3.24]	0.48	[0.41 0.56]
1.0	0.57	[0.50 0.64]	1.00	[0.88 1.12]	5.82	[5.10 6.54]	1.00	[0.88 1.12]
1.5	1.19	[1.06 1.33]	2.09	[1.86 2.33]	12.04	[10.53 13.54]	2.07	[1.81 2.33]
2.0	2.49	[2.16 2.83]	4.37	[3.79 4.96]	24.88	[21.09 28.67]	4.27	[3.62 4.92]
2.5	5.21	[4.32 6.11]	9.15	[7.58 10.71]	51.43	[41.39 61.48]	8.83	[7.11 10.56]

Model A: n=593; constant=0.001; LR chi^2=398.96 (p<0.001). IRR=4.37 (p<0.001).
Model B: n=593; constant=0.001; LR chi^2=341.72 (p<0.001). IRR=4.27 (p<0.001).

As the population affected was based on the CT-level count of occupied foreclosures, the IRR in Model B (4.27, p<0.001) was similar to Model A (**Table 4.10**). Results are shown in **Figure 4.7**, which reveals a scalar increase in the population dispossessed by foreclosure (per 1,000 CT residents per year) predicted based on the DIR (overlaid with a scatter plot of observations). The predicted annual rate of dispossession ranged from 1.36 (95% CI: 1.10, 1.62) for CTs with no Black households (DIR=0.0), to 51.43 (95% CI: 41.39, 61.48) for CTs where nearly all households were Black (DIR=2.5). In other words, dispossession due to tax foreclosure occurred at 38 times the rate in all-Black CTs compared to all-White CTs (or any CT without Black households).

Figure 4.7 *Rate of the population affected (dispossessed) by foreclosure (per 1,000 CT residents per year 2014-2015) predicted by the DIR, overlaid with a scatter plot of observations*



Note: For legibility this figure excludes 5 Detroit CTs with dispossession rates exceeding 100.

Since the models in **Table 4.10** allowed only for comparisons of predicted rates based on specified DI values, a second set of negative binomial models used the DIR intervals as a categorical predictor to estimate and compare average occupied foreclosure burdens for CTs in each DIR interval (**Table 4.11**).

Table 4.11 *Negative binomial regression results using DIR intervals to predict and compare average occupied foreclosure burdens for CTs within each DIR interval*

	Model C: Occupied foreclosures						Model D: Population affected					
DIR interval	Rate	95% CI		Rate ratio DIR<0.5 (ref)	95% CI		Rate	95% CI		Rate ratio DIR<0.5 (ref)	95% CI	
0.0–0.5	0.1	[0.1	0.2]	1.0	[0.8	1.2]	1.5	[1.2	1.8]	1.0	[0.8	1.2]
0.5–1.0	0.6	[0.3	0.8]	3.9	[2.4	5.4]	5.8	[3.3	8.2]	3.7	[2.1	5.4]
1.0–1.5	0.7	[0.4	1.1]	5.0	[2.5	7.5]	7.3	[3.1	11.4]	4.8	[2.1	7.5]
1.5–2.0	2.7	[1.6	3.8]	18.6	[11.0	26.2]	26.6	[14.2	39.0]	17.3	[9.2	25.4]
>2.0	4.0	[3.3	4.6]	27.5	[23.0	32.1]	39.3	[31.9	46.8]	25.6	[20.8	30.5]

Model C: n=593; constant=0.001; LR chi^2=401.80 (p<0.001). IRR=2.27 (p<0.001).
Model D: n=593; constant=0.001; LR chi^2=343.14 (p<0.001). IRR=2.24 (p<0.001).

The results of Model C show that the mean occupied foreclosure rate in the highest DIR interval (DIR>2.0; where householders were on average 93.0% Black (see **Table 4.6**)) was 4.0% (95% CI: 3.3, 4.6), compared to a mean of just 0.1 (95% CI: 0.1, 0.2) among CTs in the lowest interval (DIR<0.5; where householders were on average 83.8% White). Stated differently, the average annual rate of dispossession in primarily Black CTs was 39.3 (95% CI: 31.9, 46.8) per 1,000 residents, compared to a rate of 1.5 (95% CI: 1.2, 1.8) per 1,000 in primarily White CTs. Model D shows that on average, populations residing in primarily Black CTs were 25.6 (95% CI: 20.8, 30.5) times more likely than populations in primarily White CTs to be dispossessed by foreclosure each year.

Disparate impact and health inequity

The final stage of analysis sought to explore the association between foreclosure burden and health inequity, remaining attentive to the aforementioned evidence that racialization shapes the distribution of both these constructs simultaneously. **Table 4.12** shows a correlation matrix of the main variables used in regression analysis. As expected, substantial multicollinearity was observed. The UHEI-SDOH was strongly and positively associated with the UHEI-health measure (r=0.79, p<0.001). While occupied foreclosure burden was negatively associated with UHEI-health (r=-0.58, p<0.001), this association was obscured by an even stronger negative association

between the DIR and UHEI-health (r=-0.74, p<0.001); as already demonstrated, foreclosure and the DIR significantly overlapped (r=0.71, p<0.001).

Table 4.12 *Correlation matrix of main regression variables*

			1	2	3	4
1	UHEI-health	r	1.00			
		P sig.	-			
2	UHEI-SDOH	r	0.79	1.00		
		P sig.	0.000	-		
3	Occupied foreclosure burden	r	-0.58	-0.61	1.00	
		P sig.	0.000	0.000	-	
4	DIR	r	-0.74	-0.69	0.71	1.00
		P sig.	0.000	0.000	0.000	-

P sig. <0.05

Table 4.13 shows the results of linear regression models.[74] As shown by the increase in R^2 between Model 1 and Model 2, the inclusion of the DIR explained a substantial portion of population health inequity in the sample (R^2=0.584). The results of Model 2 show that the negative association between the DIR (b=-0.608, p<0.001) and UHEI-health maintained significance after accounting for covariates. The inclusion of UHEI-SDOH in Model 3 explained an even greater proportion of health inequity in the sample (R^2=0.723) and led the DIR coefficient (b=-0.202, p<0.001) to reduce to a third of its magnitude compared to Model 2, suggesting that racialized distributions of the social determinants of health accounted for much of this relationship. The coefficients for the DIR interval in Model 2a (not shown) indicated that the UHEI-health subscore in primarily Black CTs (DIR>2.0) was 1.36 SDs (p<0.001) lower than the UHEI-health subscore in primarily White CTs (DIR<0.05) after accounting for covariates.

Model 4 shows a significant negative association between foreclosure burden (b=-0.164, p<0.001) and UHEI-health after accounting for covariates, indicating that patterns of occupied foreclosures more adversely impacted neighborhoods with higher disability burdens and shorter lifespans. The inclusion of UHEI-SDOH in Model 5 shows that this association held, but decreased in magnitude (b=-0.027, p<0.05), after accounting for the strong association between UHEI-SDOH (b=0.902, p<0.001) and UHEI-health. After accounting for racialization with the inclusion of the DIR in Model 6, the occupied foreclosure variable no longer contributed to the model.

[74] When CTs with majority-Arab populations were omitted from the sample, adjusted coefficients for key study variables remained largely unchanged, though the effect of foreclosure in Model 5 was insignificant.

Table 4.13 *Linear regression results regressing UHEI-health on DIR, UHEI-SDOH, and occupied foreclosure burden*

Dependent variable: UHEI-health		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Covariates							
Population size (logged)	Coef.	0.917	0.369	0.124	0.553	0.133	0.124
	P sig.	0.000	0.000	0.027	0.000	0.025	0.029
Pct. of pop. age 18-64	Coef.	0.002	-0.005	-0.004	-0.005	-0.004	-0.004
	P sig.	0.748	0.403	0.414	0.443	0.460	0.416
Pct. households IPOC	Coef.	0.012	-0.005	0.014	0.008	0.020	0.014
	P sig.	0.000	0.006	0.000	0.001	0.000	0.000
Independent variables							
DIR	Coef.		-0.608	-0.202			-0.203
	P sig.		0.000	0.000			0.000
UHEI-SDOH	Coef.			0.761		0.902	0.761
	P sig.			0.000		0.000	0.000
Occupied foreclosure burden	Coef.				-0.164	-0.027	0.001
	P sig.				0.000	0.035	0.946
Constant		-7.475	-1.855	-0.586	-3.808	-0.924	-0.591
Mean VIF		1.03	1.23	1.92	1.15	1.45	2.08
R^2		0.265	0.584	0.723	0.426	0.708	0.723
n		593	593	593	593	593	593

Discussion

Summary of findings

This ecological study examined racialized spatial patterns of occupied tax foreclosure burdens and urban health inequity across census tracts in Wayne county in the mid 2010s. Health inequities across CTs in Wayne county were severe and substantially racialized; across all indicators and domains of urban health equity assessed, patterns disadvantaged Black households and neighborhoods and benefited White ones. Differences in proxy measures of population health, as indicated by life expectancy and disability, were particularly stark.

It was in this context that tax foreclosures dispossessed nearly 50,000 Wayne county residents in 2014 and 2015 alone, disparately impacting neighborhoods where Black households were overrepresented relative to their distribution county-wide and relative to predominantly White neighborhoods. Occupied foreclosure burdens were higher in neighborhoods characterized by shorter lifespans and higher rates of disability; the adverse association between occupied foreclosure burden and population health persisted after accounting for key social determinants of health but disappeared after accounting for the influence of racialization.

Discussion of findings

Applying a lens of legal epidemiology and the concept of disparate impact to the administration of tax foreclosure law in Wayne county, this study lends new knowledge on the enduring connection between racialized housing policy and urban health inequity. Consistent with expectations grounded in critical race theory, structural racialization was evident in the spatial distribution of occupied tax foreclosure burdens and urban health equity; inequities were so severe that experiences of foreclosure and health among Black and White communities barely overlapped. The results expand upon prior evidence to demonstrate that the state's tax foreclosure process functioned as a legal instrument of discriminatory, mass dispossession in this jurisdiction (Atuahene, 2018; Parnell, 2016); as tax foreclosure ravaged Black communities, neighboring White communities were mostly untouched. This study adds to the literature by demonstrating how the disparate impact of tax foreclosures mapped onto preexisting inequities in life expectancy and disability, threatening to exacerbate entrenched disparities in population health.

This study offers an analytic alternative to the DEP, which approaches the relationship between housing and health in a race-conscious manner that is attentive to their structured and reciprocal interconnectedness. Consistent with prior studies, this research revealed a racially specified dual housing market–not only characterized by disparate foreclosure patterns, but also racialized inequity in housing values, age, affordability, and tenure, exposure to environmental hazards, social and economic conditions, educational and employment opportunities, and healthcare access–factors that affect health and asset accumulation within and across generations (Saegert et al., 2011; Saegert & Evans, 2003). Ecological, five-year estimates of life expectancy and disability were not conceptualized as health "outcomes" thought to vary with the exogenous "risk" of tax foreclosures, but rather the cumulative consequence of these factors operating across the lifespan and throughout history–an expectation that regression models largely substantiated.

In this separate and unequal context, it would be imprudent (and arguably reckless) to regard race as a mathematical "confounder," or attempt to isolate any "race effect" separate from socio-spatial conditions endogenous to racism (Pager & Shepherd, 2008); in this study, the former act would erase any relationship between foreclosure and health, while the latter would minimize the true extent of foreclosure's racialized impact. Nor would examining race as a modifier be appropriate; here, comparing the "effect" of foreclosure on health between differently racialized neighborhoods would be misleading, since the slope of the foreclosure-health relationship is a

function of within-group variation (and thus does not account for non-overlapping distributions). Instead, this study acknowledges the primacy of structural racialization in stratifying contemporary patterns of housing and health and seeks to understand more about how racialized geographies and colorblind policies interact to (re)construct these overlapping hierarchies. Hence, race-related "multicollinearity" is not regarded as a statistical problem (Vatcheva et al., 2016), but as evidence for systemic disparities in social power that are of fundamental importance to health inequity. Potential for "reverse causality" between foreclosure and health is not seen as a source of selection bias, but a troubling social and policy outcome with public health consequence (Smith & Easterlow, 2005). Given the dire state of housing and health inequities in the US–and robust evidence documenting the connection between them (Downing, 2016; Tsai, 2015; Swope & Hernández, 2019; Mehdipanah et al., 2019; Gibson et al., 2011; Marí-Dell'Olmo, 2016; Evans et al., 2003)–this study takes little interest in the question of whether a causal relationship between foreclosure and health exists in communities where health has been historically compromised (or which direction the relationship operates); it is of greater significance that such a relation exists at all, that it is racially discriminatory, and that it is driven by policy (and is thus modifiable).

This paper is among the first to articulate a social-ecological framework linking tax foreclosures and health and examine this relation at the neighborhood level (Sealy-Jefferson & Misra, 2019). Prior public health studies that have used measures of tax delinquency and tax foreclosure have conceptualized these indicators as proxies for neighborhood disinvestment and housing abandonment (Sealy-Jefferson & Misra, 2019; Zuberi et al., 2015). This study's focus on occupied foreclosures highlights disinvestment not as a passive act of resource withdrawal, but as an active, policy-driven process of dispossession with myriad implications for population health. The overlap between tax foreclosure and other racially patterned inequities in socioeconomic resources, political power, and built-environmental factors situates tax foreclosure within a web of structurally violent processes that reproduce the embodied harms of segregation. Consistent with prior literature, the finding that foreclosure burdens were associated with poorer population health (even after accounting for key social determinants) suggests that housing dispossession, including tax foreclosure, has deleterious consequences for health not just of individuals who have been directly affected, but also for communities where these events are concentrated.

This same finding (and the observation that the association between foreclosure and health disappeared after accounting for racialization) informs a complementary perspective on housing

and health inequities, one which considers how population-level health histories and conditions (through their interaction with housing markets and institutions) may (re)structure racialized geographies of housing opportunity and dispossession (Easterlow et al., 2000; Smith & Easterlow, 2005; Saegert et al., 2011). These findings point to health as "an axis, rather than just an outcome, of inequality" (Smith & Easterlow, 2005: 179) and suggest that direct and indirect forms of systemic health discrimination may not only be an important, but overlooked, cause of foreclosure (Pollack & Lynch, 2009; Robertson et al., 2008; Houle & Keene, 2015), but also a key dimension of structural racialization in the US housing system (Smith, 1990; Keene et al., 2014).

There are several theoretical reasons that suggest tax foreclosure functions differently than other forms of dispossession, with especially grave implications for health inequity. The first set of reasons relates to *who* experiences tax foreclosure or is exposed to high rates in their community (as well as who is not). Historically rooted and contemporarily upheld disadvantages faced by Black residents make them particularly vulnerable to the health consequences of foreclosure; not just because they are more likely to experience foreclosure at the household and neighborhood level, but also because they are more susceptible to its economic and social fallout. As shown through this research, Black communities that suffered high rates of foreclosure were also more likely to experience social, economic, and physical stressors in the neighborhood environment that have known relevance for health (Hill et al., 2005; Elliott, 2000)–conditions worsened by the extraction of wealth and the incursion of blight and speculation brought by tax foreclosure.

What this study does not capture are the many health-protective collectivities developed by Black communities to mitigate and resist structurally rooted disadvantage (Geronimus, 2000). Social-structural features of neighborhoods including the quantity and quality of social ties, the level of reciprocal exchanges, and the degree of social cohesion among residents may counteract stressful cues in the environment (Ross & Jang 2000; Kruger et al., 2007). Most of the population dispossessed during the study period were homeowners; in contrast to mortgage foreclosure, tax foreclosure mostly affected those who owned their home outright (Eisenberg et al., 2020a). In addition to serving as Black households' primary means for accumulating and transmitting intergenerational wealth, homeownership offers a backbone of residential and economic stability to community-based networks of mutual aid and support (Nam et al., 2015; Rohe & Stewart, 1996). Thus, by increasing exposure to community stressors and limiting access to stress-buffering social resources, tax foreclosure can only serve to widen existing health disparities.

The second set of reasons relates to *when*; in Wayne county and elsewhere, tax foreclosures succeeded a wave of mortgage foreclosures and the recession (Akers & Seymour, 2018). These compounding burdens, and the social and economic dislocations they precipitated, are constituent of tax foreclosure's public health toll. In Wayne county, the state's accelerated foreclosure process provided little flexibility for those experiencing financial hardship; a 2015 survey showed that more than 80% of homeowners seeking foreclosure assistance faced a hardship in the past year, with 53% experiencing job loss or income reduction (Yu, 2015). This research implies that lack of protections (i.e., tax relief policies, social safety nets) for those on the social and economic margins increases these populations' health vulnerability during times of economic downturn.

The third set of reasons pertains to *why* tax foreclosures happened where they did; in contrast to other forms of housing dispossession (e.g., landlord eviction, mortgage foreclosure), tax foreclosures are acts of government. The legislation that reformed Michigan's tax foreclosure process was crafted by the Hudson Institute, a free market think tank, as part of a statewide effort to devolve state responsibility to local governments, rollout market-centric policies, and constrain local intervention (Akers, 2013). Contrary to its stated intent, the law's systemic bias favoring deregulation and private investment did not spur development nor stabilize neighborhoods, but intensified processes of abandonment and decline in the most disenfranchised municipalities (an observation borne out in the overlap between voter turnout and foreclosures in this analysis). Displacement and housing market distress translated directly into capital accumulation for speculators; while fewer than half of Detroit properties offered at the Wayne county tax auction sold, investors accounted for 88% of tax auction sales (Akers & Seymour, 2019; Akers, 2013).

As further result of the neoliberal shift in urban governance, tax foreclosure has been used to enhance short-term revenues in response to fiscal stress (Botein & Heidkamp, 2013). Between interest, fees, and auction proceeds, Wayne county generated $123 million in tax delinquency "surplus" during the 2014 and 2015 fiscal years alone, which it used to erase a deficit that had forced the county under financial state oversight (Kurth et al., 2017). This profoundly impacted Wayne county's majority-Black municipalities, where populations were not only more vulnerable to tax delinquency and foreclosure, but also where local institutions (e.g., tax assessment divisions, foreclosure prevention infrastructures) were chronically eroded (Donald et al., 2014). The geographic layering of risks observed in this study lends further insight on how neoliberal policy–in housing and across sectors of society (e.g., labor, healthcare)–passes on racialized costs in the

form of homeowner debt, urban austerity, and health vulnerability to poor communities (Libman et al., 2012; Saegert el al., 2009; Seamster, 2019; Labonté & Stuckler, 2016; Phinney, 2018).

Hence this study adds to a growing epidemiological literature linking housing dispossession to health, albeit in a manner more fixated on the upstream role of housing policy, and how a historically specific and spatially entrenched set of social relations can shape the health impact of emergent housing crises. Couched within a growing literature on "serial displacement," the racially disparate impact of tax foreclosures is not an aberration, but consistent with a lineage of prior policies that privileged the material interests of Whites while contributing to the repeated extraction of social, economic, and human assets–including health–from Black communities (New York Academy of Medicine, 2009; Saegert et al., 2011; Fullilove & Wallace, 2011). In Wayne county, the segregationist policies (e.g., racial covenants, redlining, exclusionary zoning) that denied access to capital and homeownership to Black communities, depressed property values, and eroded the fiscal base of local governments made those same communities more vulnerable to subprime mortgage penetration, housing market collapse, and subsequent over-taxation. While the case of Wayne county is severe, evidence for racialized regressivity is evident in property taxation systems across the US (Berry, 2021; Avenancio-León & Howard, 2019). Hence foreclosures are just the tip of the iceberg, revealing a more pervasive system of institutionalized White supremacy within the property tax; left unchecked, this system will continue to destabilize and strip wealth from Black communities while maximizing benefits for White households, White jurisdictions, and investors who profit from foreclosure sales and the tax debt securitization (Grotto, 2021).

Limitations

This study has several limitations. Its ecological, cross-sectional design provides insight on the spatial associations between key constructs but precludes in-depth analysis of the dynamic, multi-level interrelationships of theoretical interest. Namely, the DIR provides a crude, static measurement of structural racialization, which is conceptualized as a historical, continual, multi-system process (powell, 2013b). While a benefit of the DIR is its simplicity and ability to detect patterns of anti-Blackness, a weakness is that it provides only an indirect proxy of Whiteness; more refined operationalizations of White supremacy may more astutely investigate the fundamental causes of Black dispossession. The prevalence of non-White racialized ethnicities (i.e., Latinx, Arab, and Asian populations) in CTs grouped as "predominantly White" is problematic and unable

to account for the important and complex processes by which White supremacy and/or ethnic density shape life outcomes and bias results (including the extent of the "Black-White" disparity).

This study was restricted to the foreclosing governmental unit of Wayne county, obscuring social and historical processes at higher scales (e.g., metropolitan, state-wide) which comprise the broader geography of structural racialization and that marginalize Wayne county as a whole. Data showing few foreclosures in other Detroit MSA counties informed the study focus, but indicate that the results may not only underestimate the full extent of anti-Black discrimination and health inequity in the region, but also the manner by which structural racialization can harm the health and wellbeing of White and other non-Black populations. Findings from Wayne county may not be generalizable to all contexts but can help elucidate the racialized consequences of spatially concentrated tax foreclosures that are likely to exist, but be less observable, in places where segregation, tax foreclosure incidence, and health inequities are less pronounced.

This study's reliance on aggregate CT-level measures introduces an unknown level of bias due to statistical imprecision (i.e., wide margins of error), construct invalidity, and confounding by poorly measured or unmeasured factors (Diez Roux, 2014; Napierala & Denton, 2016). Indeed, if this study's theoretical framework is correct, the measure of foreclosure burden likely captures a contingent legacy of housing market discrimination that may overestimate the relationship between foreclosure and health; this is suggested by McClure et al.'s (2017) study of Detroit, which found evidence that historic redlining (measured using a digitized 1939 Home Owners Loan Corporation map) confounded the relationship between slower post-recession foreclosure recovery and poorer self-rated health. Still, the use of novel, administrative property data to operationalize policy-induced dispossession, and this measure's ability to predict health variation not captured by a range of other social determinants, lends new insight on the sociopolitical context of inequality that makes "race" such a powerful predictor of health status (Mullings, 2002; Jones, 2001).

CTs are the most widely used small-area geography and provide more reliable ACS estimates than block groups (US Census Bureau, 2018). Still, they are administrative units that may not represent neighborhood boundaries and can obscure within-unit heterogeneity or result in modifiable area unit problem (Lee et al., 2008). The Dissimilarity Index is sensitive to the size of spatial units (Darden & Tabachneck, 1980) but provides an appropriate and interpretable measure of spatial unevenness within a single geographic area (Darden & Rubalcava, 2018). Situating patterns at the neighborhood-level within municipal contexts aided interpretation of results.

This study's novel use of administrative, parcel-level tax foreclosure data was not without error, including potential inaccuracy in occupancy status reported by the Wayne County Treasurer or imprecision in parcel-matching and geocoding processes. A limitation of this data was that it was not specific to residential foreclosures; however, the number of total occupied foreclosures estimated in this study was slightly *lower* than the number of occupied residential foreclosures reported by City of Detroit officials, suggesting that the presence of commercial and industrial tax foreclosures in the study data did not meaningfully influence observed trends (City of Detroit Office of the Assessor, 2018). CT-level average household size offered only a rough estimate for the affected population.

A strength of the UHEI measure is that it used community-informed indicators and an established methodology for measuring neighborhood inequality (Mehdipanah et al., 2019, 2021; Darden & Kamel, 2000; Darden et al., 2010). Despite its comprehensiveness, it is an imperfect measure of the social etiology and consequences of geographic health inequities and is unable to account for many qualitative aspects (e.g., cultural, institutional, organizational) of neighborhoods that are relevant to health. This measure weighted all variables equally and was most heavily influenced by indicators in the domains of economics and social and human development, reflecting dominant assumptions (i.e., economism, developmentalism) about health that are biased towards White norms and behaviors (Geronimus & Thompson, 2004). Further, these measures were unable to account for the non-equivalence of socioeconomic status across differently racialized groups (Williams et al., 2010).

While the National Center for Health Statistics (NCHS) reports that abridged period life tables used to compute life expectancy estimates are statistically reliable, just 6% of estimates were based on observed death rates for all ages (74% were based on a combination of observed and model-predicted rates; 13% were based only on predicted rates) (Arias et al., 2018); 7% of sample CTs were excluded from the U.S. Small-area Life Expectancy Estimates Project (USALEEP) dataset and therefore population health subscores were based only on rates of disability.

Implications for future research

This study implies that legal epidemiological research grounded in critical race theory can help reveal how structural racialization operates though laws and policies to compound severe inequities in population health in segregated urban areas. Its findings warrant further studies on the potential and limitations of fair housing law for attaining racial equity in housing and health.

This study can also inform future efforts to conceptualize and measure complex relationships between health, race, and space, including how racism and "healthism" intersect to reproduce inequitable housing opportunities, life chances, and health trajectories (Whitesel, 2017).

Theory suggests that tax foreclosure is just one of many facially neutral policies contorted by segregation; this study invites inquiry into others, suggesting that disparate impact analysis, administrative property records, and local adaptations of the WHO's Urban HEART tool are useful tools in this endeavor. As the process of racialization is contingent upon place, population, time, and context, critical race legal epidemiology may be enriched by research questions inspired by local phenomena, informed by community-based knowledge, and rooted in praxis (Geronimus et al., 2020; Ford & Airhihenbuwa, 2010a). Hypotheses for this study are based in the work of Detroit-based housing activists and movement lawyers (Steinberg et al., 2015; Atuahene, 2018), as well as my personal involvement in foreclosure prevention advocacy, and qualitative interviews with homeowners at risk for tax foreclosure (Eisenberg et al., 2018; 2020a).

Importantly, critical race legal epidemiology can inform action to challenge identified injustices. While the empirical goal of this analysis was not to establish "robust causality," academics are well positioned to collaborate with civil rights organizations and community-based groups to develop disparate impact claims for litigation. While pursuing fair housing statute as a legal lever for racial health equity may be worthwhile in certain situations, strict legal criteria for establishing FHA violations is illustrative of how antidiscrimination doctrine "regularizes racism" by rationalizing many systemic forms of subordination (Bell, 1992a: 104). Further, the future utility of disparate impact remains in question since the Trump administration issued an overhaul of HUD's disparate impact standard (the "2020 Rule"), introducing new pleading requirements and defenses that fair housing organizations say would present "virtually insurmountable barriers" to presenting and winning cases[75] (National Low Income Housing Coalition, 2020).

The *Morningside v. Sabree* case demonstrates the limits of the law in racial justice work, but also the potential for legal analysis and public-facing scholarship to galvanize movements. Despite strong statistical evidence for the racially disparate impact of overassessment and tax foreclosures in Wayne county, the *Morningside* plaintiffs' 2016 motion to halt the foreclosure of

[75] On October 25, 2020, a Massachusetts federal court issued a stay and nationwide preliminary injunction, enjoining HUD from enforcing the 2020 Rule and keeping the 2013 Rule in place until further order of the court. In January 2021, President Biden issues an executive order directing HUD to review the new rule (Andreano et al., 2021).

improperly assessed owner-occupied homes failed, ultimately to be dismissed by Michigan's supreme court after a delay of two years (and two tax foreclosure cycles) due to lack of subject matter jurisdiction. In the interim, the facts presented in the case garnered national and local media attention and scholarly investigations, which brought increased scrutiny to state and local officials (e.g., Atuahene, 2017, 2018, 2019; Akers & Seymour, 2018; Mendes & Moore, 2017; Betancourt, 2017). Importantly, the framing of disparate impact and systematic overassessment emphasized the social conditions) that produced the crisis (and broke with previously stigmatizing narratives), providing the organizing basis for a coalition of housing advocates, social justice organizations, and community-based groups that remains active in efforts to reform assessment practices, prevent foreclosure, and compensate residents (www.illegalforeclosures.org).

Future studies should continue to expose the harms of colorblindness in research and in law. Ultimately, efforts to address the root causes of anti-Black discrimination and dispossession by US housing policies will be unsuccessful unless paired with efforts to repair the harms of past injustice and root out the mechanisms through which White populations and institutions accumulate material gains from the system of segregation.

Chapter 5. Conclusion

This dissertation conceptualized segregation as a system of spatial White supremacy, comprised of a set of institutions and processes that reconstruct relational patterns of Whiteness, anti-Blackness, and health inequity. To better understand this system, three quantitative papers explored the role of municipal institutions, fiscal inequities, and property tax foreclosure law in upholding patterns of population health that favored predominantly White suburbs and neighborhoods at the expense of Black communities in metropolitan Detroit after the 2007-09 economic recession. In doing so, this dissertation challenged dominant theoretical and methodological paradigms in public health while offering new insight on how structural racialization works through institutions, policies, and governance structures to perpetuate a racialized metropolitan hierarchy of population health. After summarizing the major findings from these studies (Chapters 2-4) below, I discuss this project's broader contributions to housing and health research and insight on policy directions. I close with some remarks on what this research means for policy and the necessary transformation of our social and metropolitan structures.

Dissertation summary

In Chapter 2 I described Black-White health inequities in the DMA at the municipal-level and explored how much of the variation in excess death across municipalities could be explained by the advantages associated with suburban Whiteness. I found that while White residents on average experienced a mortality profile favorable to that of the tri-county region as a whole, Black residents experienced patterns of excess death nearly 40% higher than what would be expected if they shared the same mortality profile as the DMA population–roughly 60% higher than Whites. These inequities were in part attributable to a mortality advantage conferred to populations living in the DMA's predominantly White suburbs. Whereas the privileged health status associated with relative spatial Whiteness held for White and Black municipal populations, it accrued unequally to the net benefit of Whites, both by virtue of their predominance in the benefited population, and by the stronger negative relationship between geographic Whiteness and White excess mortality than Black excess mortality. As suggested by past research linking political fragmentation,

segregation, and Black-White mortality disparities, these findings raise important questions about the role of municipal institutions in structuring intra-metropolitan patterns of health inequity.

I explored this role further in Chapter 3 by assessing whether patterns of White supremacy evident in the accumulation and deprivation of fiscal resources contributed to inter-municipal health inequities in the DMA. I found that municipal fiscal disparities were substantial and starkly racialized; whereas Black populations remained concentrated in fiscally poor places, predominantly White suburbs benefited from more advantaged fiscal profiles as a whole and across all fiscal classes. The Slope Index of Inequality revealed steep fiscal gradients in excess death across municipalities; the absolute difference in the rate of excess death associated with relative fiscal advantage was 330 and 387 per 100,000 persons for White and Black municipal populations, respectively, with the most staggering rates of excess death documented among a cluster of fiscally poor majority-Black cities. As an independent predictor, fiscal health explained a substantial degree of variation in excess death among both White and Black municipal populations and mediated the protective relationship between spatial Whiteness and health; the largest health benefits were afforded to a subset of affluent and overwhelmingly White suburbs that held a disproportionate share of the region's fiscal resources. Consistent with theoretical expectations, these findings revealed a relational system of spatial White supremacy whereby the privileges afforded to a minority of affluent White suburbs with respect to wealth and longevity were intimately connected to the burdens of poverty and early death elsewhere in the region, with disproportionate consequences for the health of Black communities.

In Chapter 4 I focused on the DMA's central county of Wayne, where I leveraged the legal concept of disparate impact to assess evidence for structural racialization in the spatial distribution of occupied tax foreclosures and urban health equity across census tracts in Wayne county. Across all indicators and domains of urban health equity assessed, conditions harmed Black households and neighborhoods and benefited White ones; the largest racial inequities were observed in the domain of population health, which included measures of life expectancy and disability. It was in this context that implementation of the state's tax foreclosure law dispossessed about 50,000 Wayne county residents between 2014 and 2015. Examining novel data from the Wayne county treasurer, I found that occupied foreclosure burdens were concentrated in neighborhoods where Black households were overrepresented: the predicted occupied foreclosure rate in neighborhoods where nearly all households were Black was nearly 40 times the rate predicted for neighborhoods

where there were no Black households. Consistent with the expectation that structural racialization would shape concurrent inequities in housing and health, I found that occupied foreclosure burdens were higher in neighborhoods characterized by shorter lifespans and high rates of disability; the adverse association between occupied foreclosure burden and population health persisted after accounting for key social determinants of health, but disappeared after accounting for racialization.

Implications for housing and health research and policy

Taken together, the findings from Chapters 2-4 build on an interdisciplinary body of knowledge to lend insight on some of the contemporary institutions and laws that reproduce White supremacy and its embodied consequences in US metropolitan areas. Moreover, these chapters begin to address conceptual and methodological gaps in the housing and health literature identified in Chapter 1. This dissertation can provide direction for future public health research and policy aimed at investigating and destabilizing the structure and function of racism in US metropolitan areas, even as the system adapts across time and contexts.

This dissertation suggests that research on racial health inequities, particularly as they are afflicted upon Black populations in high-poverty urban areas, may benefit from more critical analysis of metropolitan segregation as an active system of state-sanctioned White supremacy (Martin & Varner, 2017). As each paper has shown, historical consciousness is necessary for understanding institutionalized forms of oppression and contemporary health inequities, but current-day patterns of White supremacy are more than just the "residual outcome of past racial violence" (Bonds, 2020: 783). As stated by Baldwin (1965: 42): "[history] does not refer merely, or even principally, to the past…history is literally *present* in all that we do."

In metropolitan Detroit and across the US, the "life and death meaning" of White supremacy is on full display (Mullings, 2002: 32); egregious burdens of poverty, dispossession, and excess death deprive Black and poor communities of dignity and life on a daily basis while neighboring White suburbs with unbridled access to urban resources remain insulated from suffering. These relations result from more than "just the flight of people, jobs, and wealth" from Black communities, but "active acts of commission" (Ansell, 2017: xiii). As Bonds (2020: 784) writes: "The possessive geographies of white supremacy are produced through rationalizations and structures of possession, through disciplined, systemic, and white collective action, and the relentless extraction of value from communities of color."

As conceptualized by Saegert et al. (2011), health is an asset that has been repeatedly extracted from Black communities through the process of serial displacement; this dissertation emphasizes that this process is, fundamentally, one of serial White accumulation (Harvey, 2008; Mullings, 2005). Each chapter has its own implications, but the findings are more significant taken together; i.e., the historical and political construction of racially-identified municipal space highlighted in Chapter 2 provided the groundwork for contemporary inequities in fiscal and population health in Chapter 3, which were necessary to understand the racialized impact and public health consequences of Wayne county's tax foreclosure crisis in Chapter 4. What this series helps demonstrate is that processes and patterns of Whiteness and anti-Blackness are inextricably linked; for example, this research suggests that we cannot fully understand or address tax foreclosure as a cause of dispossession in Detroit and other majority-Black cities unless we address the "mechanisms of the racial tax state" that redistribute wealth upward and enable White suburbs to hoard resources at the cost of poor and Black communities (Henricks & Seamster, 2017).

While undoubtedly systemic, apartheid patterns of municipal residence, fiscal inequity, and tax foreclosure in metropolitan Detroit are made possible through the economic and legal support of government; thus these oppressive conditions are not inevitable, but rather modifiable consequences of state constitutions, land-use regulations, fiscal policies, property tax laws, and the continued abdication of federal fair housing statute–decisions made or maintained by people in power and their electorates. There is a need for scholars to reckon with not only with the historical causes of racial health inequity, but also the sum of government activities (and their underlying intentions) that reproduce those inequities in the present. In an era of institutionalized racism, a framework of *policy-driven* White supremacy sheds light on the durability of these structures by recognizing that while the beneficiaries of oppression are not always its perpetrators, White people maintain an unjust system through our complicity (Wildman & Davis, 1997). To address the root causes of racial and health inequity, future investigations of White supremacy should seek not just to reveal patterns of privilege and deprivation, but the many acts, decisions, and policies that normalize White dominance and maintain White group interests (Leonardo, 2004).

Further, efforts to reveal and problematize these mechanisms can continue to undo the myth of White innocence that "both denies and enables White supremacy" (Brown, 2021: 7), while also pointing towards tangible policy interventions that public health scholars can join in sustained efforts with antiracist social movements to address (Brown & Fee, 2014). In 2020, local and state

governments across the US declared racism a public health crisis and at least 4,400 Black Lives Matter (BLM) protests took place in small cities and towns–mostly suburban communities that have grown more racially and socioeconomically diverse in recent decades (Reed, 2020; APHA, 2021). The confluence of COVID-19's devastating impact on Black communities and the brutal killings of George Floyd, Breonna Taylor, and countless other Black people by police officers has led many White Americans to open their eyes to the systemic nature and deadly toll of racism in US, a reality "evident in volumes of data, research and reporting, not to mention the lived experience of millions of African Americans each and every day" (Worland, 2020). As Baldwin (1962) states: "Not everything that is faced can be changed; but nothing can be changed until it is faced." Time will tell whether America's long overdue awakening to systemic racism will effectuate sweeping, structural change towards eradicating the long-standing epidemics of excess Black death and state-supported violence or if a wake of White apathy and backlash (Anderson, 2016) will reflect what Bell (1992b: 373) refers to as "'peaks of progress'…short-lived victories that slide into irrelevance as racial patterns adapt in ways that maintain white dominance."

Public health scholars, and specifically White scholars, have a special obligation to confront our violent entanglement with the life and death consequences of White supremacy (McCoy, 2020), so that we can leverage our resources, status, skills, and relationships to work with other White people "to see [our]selves as [we] really are, to cease fleeing from reality and begin to change it" (Baldwin, 1963: 10). As Brown (2021: 2-3) argues, a politics of "white antiracism involves taking responsibility for the effects of being socially defined as white…[by] holding white people accountable for perpetuating and benefiting from racial injustice, often without intending to or knowing they do." Public health scholars have the necessary theories and knowledge base to initiate accountability processes by educating and agitating our communities and elected officials about the racist harms with which we are complicit (for instance, by threading the causal link between slavery, segregation, police violence/mass incarceration, and public health inequity). Challenging the racism in ourselves, in institutions, and in others will require long-term processes of strengthening communities, practicing skills, and transforming values (Mingus, 2019; Thompson, 2003). This historical moment and the energy of the BLM movement provide both opportunity and imperative for White people and scholars to "move beyond allyship" and forge lifelong commitments to racial justice through actions that directly challenge and destabilize the systems of oppression that benefit them (Lee, 2020; Spaulding, 2020).

Further, this dissertation indicates that while metropolitan White supremacy harms Black and other non-White people, it also harms the health of most Whites. This is in line with past research which has found that more segregated and politically fragmented metropolitan areas suffer not only greater economic and health inequity, but also less economic growth and higher mortality rates as a whole (Orfield & Dawes, 2005; Cooper et al., 2001). Hearkening Gilmore's (2002a) definition of racism stated in Chapter 1,[76] municipalities and neighborhoods in the metropolitan Detroit are "made distinct" through the racialization process, but nonetheless "interconnected" by a system of private property, accumulation, and exploitative social relations that benefit the health of the few at the expense of the many (Bonds & Inwood, 2016; Leong, 2013). This evidence illustrates how the literal survival of poor and working-class people are intimately linked, but pragmatic solidarity and collective action are hampered by an ideological commitment to self-maximizing localism and unfettered racism, thereby reifying the hegemony of the favored quarter (Cashin, 2000). Future studies should recognize how "procedures of racialization and capitalism are ultimately never separable from each other" (Melamed, 2015) and resist assimilation perspectives where equality means "likeness to Whiteness" (Martin & Varner, 2017: 8) or where all people attain the "suburban ideal." Instead, future research should investigate the mechanisms of racial capitalism (Laster Pirtle, 2020).

Any effort to adopt a more critical analysis of Whiteness should not justify research or action that directs attention, resources, or urgency from the mechanisms of anti-Blackness, preserving the health of Black communities, or studies and interventions that focus explicitly on Black people. As Geronimus (2000: 869) states, a primary principle in a structural analysis of health is to "first do no (more) harm" by identifying and destabilizing policies that threaten to further erode the health of Black people and other oppressed groups. I argue that it is possible not just to retain but to sharpen the field's focus on anti-Black structural violence by acknowledging–theoretically and methodologically–how such harms are tied to structures and processes designed to promote the resources, power, and embodied supremacy of Whites (Ansell, 2017).

Like me, White scholars may be especially inclined to understand and reveal the structures through which our White identities become "physically embodied and socially embedded in their relations with others" (Brown, 2021: 8); yet we should be wary of how "a culture of dominance is

[76] Gilmore (2002a: 261) defined racism as "the state-sanctioned or extralegal production and exploitation of group-differentiated vulnerability to premature death, in distinct yet densely interconnected political geographies."

necessarily narcissistic" (hooks, 1989: 105) and work to mitigate how our efforts can further center Whiteness, the work of White scholars, or the health of White people (Malat et al., 2018). Efforts to "make Whiteness visible" (D. W. Sue, 2006: 28) may illuminate disciplinary blind spots, but negate the fact that Whiteness is only invisible to White people (Berg, 2012), presume a White audience, and colonize or subordinate traditions of Black thought (Roediger, 1998). White scholars should be aware of how "the moral framing that gives whites credit for being antiracist is parasitic on the racism that it is meant to challenge" and how we personally invest in "defin[ing] ourselves unproblematically as good whites" (Thompson, 2003: 7, 23). Whites' lived experiences are more likely to breed research questions and policy ideas that reflect social and moral viewpoints that are racially biased toward White norms and which perpetuate White supremacy (Geronimus & Thompson, 2004). Though White scholars may sensitively and strategically engage CRT in our research (Bergerson, 2003), CRT necessitates that we think carefully about how knowledge is controlled and produced and posits that the voice of those who experience oppression–"who have paid the greater price for their commitment to a just world"–should be prioritized (Matsuda, 1987: 399; Ford & Airhihenbuwa, 2010a). This is to say that critical self-awareness must be inherent to the study of Whiteness and White supremacy, but the reality that White scholars must confront is that our most well-intentioned efforts can work to benefit ourselves at the cost of affirming the lives and perspectives of people of color (hooks, 1989; Ford & Airhihenbuwa, 2010a).

To illuminate the "accumulated advantages associated with white propertied power" (Bonds, 2019: 580) in health equity research has implications for the design, measurement, and analysis of studies that public health scholars should consider. This dissertation supports the notion that regional (metropolitan) study frameworks with explicit attention to racial geographies can advance housing and health studies. Osypuk & Acevedo-Garcia (2010) contend that due to high levels of metropolitan segregation in the US, scholars "may introduce bias, restrict generalizability, and/or limit the policy relevance of study findings" (1) if they fail to adopt a regional approach which acknowledges the "racialized processes in housing and labor markets that produce racial disparities in neighborhood environments" (2).

This research suggests that when adopting metropolitan study frameworks, public health scholars should more explicitly consider how regional housing markets, opportunity structures, and neighborhood conditions are racialized through policy, politics, and local governance. This means that scholars must consider how political structures and activities shape the distribution of

health, resources, and power across metropolitan neighborhoods. Here, novel methods (e.g., the use of municipalities as units of analysis in Chapter 2 and Chapter 3) and data (e.g., the use of taxable property wealth and voter turnout as social determinants of health in Chapter 3 and Chapter 4) provided new insight on the political geography of health inequity. Future public health studies may examine how population health patterns vary in relation to more direct measures of local governments' fiscal and service environments (e.g., see Hendrick, 2004), land-use and tax policies (e.g., zoning laws, tax rates) and electoral politics (e.g., party affiliations). While past research has examined the relationship between political fragmentation, segregation, and health inequity across US metropolitan areas (Hart et al., 1998; Hutson et al., 2012), future work may investigate how regional governance structures (e.g., presence or absence of regional institutions, policies, and planning efforts) or the fiscal, economic, and environmental consequences of political fragmentation (e.g., economic inefficiency, fiscal decentralization, environmental degradation) may influence Black-White health disparities (Kim & Jurey, 2013). Such inquiries may draw on theories and methodologies rooted in CRT, legal epidemiology, and political geography to investigate relationships between race, health, law, and politics at the local and metropolitan levels though policy surveillance, mapping, and evaluation (Burris et al., 2016a, 2016b). The emergence of small-area health estimates and adoption of governmental open data policies by local and state governments in recent years have made these efforts more feasible than ever. By shifting the focus from the social and physical environments of neighborhoods to the fiscal and policy environments that create them, scholars may increase the impact of their study findings by providing clear evidence that advocates, organizers, and elected officials can act upon.

As Chapter 3 of this dissertation showed, municipalities that face the most significant assaults to public health are also those with the most limited fiscal capacities to address them, as local governments have become both victims and perpetrators of urban austerity (Donald et al., 2014). While more research is certainly needed on how fiscal distress and austerity policies influence public health, this research implies that these harms cannot be fully understood or addressed without mitigating the damages of metropolitan fragmentation and redistributing the power and wealth of the "favored quarter" (Cashin, 2000). As public health is a transdisciplinary field with a major focus on equity, scholars committed to racial health justice are well-positioned to build the evidence base for equity-based regionalism, including structural reforms in the areas of metropolitan finance, land-use policy, and governance discussed in Chapter 3.

This dissertation specifically implies that metropolitan frameworks that consider the racialized interplay of housing markets and policy should guide future social epidemiological literature linking housing dispossession to health. As stated in Chapter 1, two major components of the housing and health literature–research linking segregation to racial health equity and research linking housing instability to health outcomes–remain largely separate, and problematically so. Investigating policy-driven patterns of racialized dispossession is timely as the nation remains gripped by an affordable housing "crisis" that disproportionately impacts communities of color (JCHS, 2020), but doing so does not simply entail adopting spatial methods or incorporating "race" variables. Rather, it means reconceptualizing research questions and study designs such that they align with the first principle of "segregatory realism" laid out by Martin & Varner (2017: 7), which states: "Residential segregation is in line with the design and demands of the society. There is, consequently, no crisis in housing."

This work encourages scholars who seek to research and resist systems of oppression to challenge and reimagine traditional methods of social epidemiology. This dissertation relied exclusively on ecological study designs and aggregate spatial variables in a particular region (metropolitan Detroit), lending new insight on local dynamics, global constructs, and population-level phenomena that tend to go overlooked by traditional methods that rely on national samples and individual-level data. Still, historic systems of oppression are more than the sum of distinct constructs or relationships that can be discerned quantitatively. For instance, it is problematic to interpret the ecological constructs of interest to this research (e.g., Whiteness and property wealth in Chapter 3; disability and foreclosure in Chapter 4) as divisible from one another, or presume that the data I used to measure them are accurately doing so. Hence, ecological variables are crude and sometimes inappropriate proxies for contingent, interconnected, and ever-changing social conditions/lived realities, which can bias study results in unpredictable ways depending on the sample and variables analyzed (Geronimus et al., 1996). Future work should question the assumptions and interpretations of conventional study approaches, including the relationships posited by this research, using diverse samples and mixed (quantitative and qualitative) methods.

A major takeaway from this dissertation is that the racial and spatial relations that uphold segregation and health inequity are fundamentally relations of property. Notions of property go overlooked in public health research because they are so engrained in US law and society, but geographers and critical race scholars are have long considered property a primary institution

through which racial hierarchies are reproduced in societies based in logics of settler colonialism and colorblindness (Bonds, 2019; Bonds & Inwood, 2019; Harris, 1993). As Harris (1993: 1731) states: "When the law recognizes, either implicitly or explicitly, the settled expectations of whites built on the privileges and benefits produced by white supremacy, it acknowledges and reinforces a property interest in whiteness that reproduces Black subordination." In this dissertation I discussed how federal subsidies and state incorporation laws merged White identity with access to suburban homeownership, autonomous local government, and the right to exclude (Tyson, 2014); how fiscal zoning and the property tax granted a minority of elite White suburbs the right to use and enjoy health-relevant resources at the expense of the majority and of Black populations (Cashin, 2000, 2001); and how colorblind tax foreclosure policy denied this context to reify a status quo of racialized dispossession (Atuahene, 2018). In identifying how these policy-driven processes reinforced the association between Whiteness and better relative health, I positioned health as a benefit possessed and enjoyed more readily by those who claim a property interest in Whiteness–a benefit obtained through the historic exclusion and ongoing domination of Black people and others deemed "non White"–rather than a human right of all.

Closing remarks

The success of efforts to redress the embodied violence of policy-driven White supremacy in metropolitan areas and the country are contingent on our ability to address the underlying social processes that reproduce it (Phelan & Link, 2015; Bailey et al., 2017; Gee & Ford, 2011; powell, 2007, 2008). Black reparations offer a vehicle for reckoning with and deconstructing the state's systemic enforcement of White supremacy, redistributing wealth, and reversing the "hegemonic use of the law to legitimate and reinforce race-based subordination" (Williams, 2005: 434)–thus providing a pathway towards racial health justice (Williams & Collins, 2004; Basset & Galea, 2020). Addressing the fundamental causes of health inequity must not only entail repairing for past harms and reforming current structures, but radically reimagining our institutions, our economies, our communities, and ourselves to guarantee a healthier, more equitable future for all.

Appendix

Table A.1 *DMA and sample population characteristics, 2010*

[1] MDCH bridged-race estimates							
Metropolitan component	Total pop.	White		Black		Other races	
		Pop.	Pct.	Pop.	Pct.	Pop.	Pct.
DMA	3,859,925	2,677,893	69.4	1,007,786	26.1	174,246	4.5
Full sample	3,849,453	2,661,223	69.1	1,017,000	26.4	171,230	4.4
Excl. Detroit	3,135,676	2,563,025	81.7	415,382	13.2	157,269	5.0
City sample	2,706,774	1,659,220	61.3	927,131	34.3	120,423	4.4
Excl. Detroit	1,992,997	1,561,022	78.3	325,513	16.3	106,462	5.3
[2] US Census counts							
Metropolitan component	Total pop.	Non-Latinx White		Non-Latinx Black		Latinx/other races	
		Pop.	Pct.	Pop.	Pct.	Pop.	Pct.
DMA	3,863,924	2,511,271	65.0	967,157	25.0	385,496	10.0
Full sample	3,849,532	2,500,297	65.0	964,624	25.1	384,611	10.0
Excl. Detroit	3,135,755	2,444,693	78.0	378,051	12.1	313,011	10.0
City sample	2,706,853	1,536,676	56.8	885,057	32.7	285,120	10.5
Excl. Detroit	1,993,076	1,481,072	74.3	298,484	15.0	213,520	10.7

[1] MDCH data bridges multiple-race group population counts to four single-race categories (White, Black, American Indian or Alaska Native, and Asian or Pacific Islander). 'White' and 'Black' refer to these bridged-race categories. 'Other races' refers to bridge-race groups other than White or Black, i.e. American Indian or Alaska Native, and Asian or Pacific Islander. Data is undifferentiated by ethnicity.

[2] 'Non-Latinx White' and 'Non-Latinx Black' groups refer to those who identified as "White alone" or "Black or African American alone", without Hispanic or Latino heritage, respectively on the US Census. 'Latinx/other races' includes all other racial/ethnic groups (those who identified as Hispanic or Latino, Asian alone, American Indian or Alaska Native alone, Native Hawaiian or other Pacific Islander alone, some other race alone, or two or more races).

Table A.2 *Negative binomial regression assessing the relationship between municipal Whiteness and excess death counts for the all race, White, and Black total sub-samples*

Variable		All races		White		Black	
		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Relative spatial Whiteness							
Whiteness LQ	IRR	0.451	0.529	0.461	0.465	0.622	0.492
	P sig.	0.000	0.000	0.000	0.000	0.000	0.000
Covariates							
Land area (sq. miles)	IRR		0.999		0.996		1.001
	P sig.		0.472		0.016		0.657
Population size (logged)	IRR		0.966		0.993		0.936
	P sig.		0.339		0.859		0.292
Pct. of <65 pop. age 45-64 (Race-specific)	IRR		0.959		0.960		0.961
	P sig.		0.000		0.000		0.005
Type of municipality (Ref.=Twp.)	IRR		1.115		1.069		1.188
	P sig.		0.089		0.312		0.056
Pct. of pop. IPOC	IRR		0.980		0.980		0.998
	P sig.		0.006		0.003		0.812
Constant		2.198	11.895	2.103	11.538	1.896	10.886
Log likelihood		-446.35	-429.29	-424.87	-406.92	-215.47	-203.88
Pseudo R^2		0.051	0.087	0.042	0.082	0.039	0.091
n		108	108	108	108	108	108

P sig.<0.10

Table A.3 *Characteristics of municipalities from the all race, White, and Black total sub-samples in the full sample and city sample*

	Full sample					**City sample**				
	Mean	SD	Median	Min.	Max.	Mean	SD	Median	Min.	Max.
	All races total (n=96)					**All races total (n=59)**				
<65 Avg. 3-yr. deaths (AR)	106	328	52	10	3,214	136	415	66	12	3,214
<65 Population size (AR)	34,324	66,361	18,937	3,181	631,852	39,059	82,828	18,132	3,408	631,852
<65 SMR (AR)	0.90	0.40	0.82	0.33	2.10	1.03	0.43	0.99	0.34	2.10
Total population size	39,517	75,269	20,969	3,739	713,777	45,085	93,872	20,103	3,991	713,777
Pct. non-Latinx White	78.5	19.8	85.7	2.9	96.4	73.0	22.8	81.8	2.9	93.1
Pct. non-Latinx Black	12.4	18.6	4.5	0.4	93	16.9	22.0	7.8	0.8	93.0
Pct. IPOC	9.1	4.9	7.2	3.2	27.9	10.1	5.5	8.3	4.0	27.9
Whiteness LQ index	1.21	0.31	1.32	0.05	1.48	1.12	0.35	1.26	0.05	1.43
Pct. of pop. below poverty	12.4	9.1	9.5	2.4	46.7	15.3	10.3	12.5	4.0	46.7
Median household income (US$)	60,424	20,140	56,334	20,298	111,681	52,002	18,057	48,563	20,298	101,094
Property tax base per capita (US$)	37,735	15,520	35,471	10,763	93,425	34,415	16,086	30,369	10,763	93,425
Median housing value (US$)	154,175	69,249	137,250	49,600	346,900	125,978	60,262	113,900	49,600	339,600
Composite fiscal health score	-0.48	3.00	-0.56	-8.16	6.67	-1.62	2.92	-1.65	-8.16	6.67

Note: Variables labeled (AR) indicate counts or values for all races.

Table A.3 continued.

	Full sample					City sample				
	Mean	SD	Median	Min.	Max.	Mean	SD	Median	Min.	Max.
	White total (n=95)					**White total (n=58)**				
<65 Avg. 3-yr. deaths (W)	62	63	42	10	351	70	73	41	11	351
<65 Population size (W)	23,414	21,223	13,476	2,786	93,163	23,539	23,262	12,363	2786	93,163
<65 SMR (W)	0.87	0.38	0.79	0.31	2.19	0.99	0.41	0.90	0.32	2.19
Total population size	39,809	75,614	21,412	3,739	713,777	45,659	94,587	20,758	3,991	713,777
Pct. non-Latinx White	79.3	18.3	86.2	7.8	96.4	74.2	21.0	82.1	7.8	93.1
Pct. non-Latinx Black	11.6	16.7	4.5	0.4	82.2	15.6	19.8	7.0	0.8	82.2
Pct. IPOC	9.1	4.9	7.3	3.2	27.9	10.2	5.5	8.5	4.4	27.9
Whiteness LQ index	1.22	0.28	1.33	0.12	1.48	1.14	0.32	1.26	0.12	1.43
Pct. of pop. below poverty	12.1	8.4	9.3	2.4	44.6	14.8	9.6	12.3	4.0	44.6
Median household income (US$)	60,846	19,814	56,647	24,888	111,681	52,549	17,715	48,765	24,888	101,094
Property tax base per capita (US$)	37,988	15,403	35,694	10,763	93,425	34,772	15,990	30,401	10,763	93,425
Median housing value (US$)	155,228	68,839	138,000	49,600	346,900	127,217	60,025	114,100	49,600	339,600
Composite fiscal health score	-0.40	2.91	-0.53	-7.85	6.67	-1.51	2.81	-1.62	-7.85	6.67
	Black total (n=30)					**Black total (n=25)**				
<65 Avg. 3-yr. deaths (B)	127	503	21	10	2,782	148	550	21	10	2,782
<65 Population size (B)	27,954	95,637	8,944	2,512	532,178	31,462	104,755	7,773	2,512	532,178
<65 SMR (B)	1.38	0.43	1.44	0.57	2.16	1.47	0.41	1.47	0.57	2.16
Total population size	74,506	125,933	47,831	7,903	713,777	76,254	137,876	38,144	7,903	713,777
Pct. non-Latinx White	58.6	24.4	66.5	2.9	90.1	56.2	26.0	64.4	2.9	90.1
Pct. non-Latinx Black	30.3	25	18.6	3.4	93	32.7	26.5	19.1	3.4	93.0
Pct. IPOC	11.0	5.8	9.3	4	27.9	11.1	6.0	9.3	4.0	27.9
Whiteness LQ index	0.9	0.38	1.02	0.05	1.39	0.86	0.40	0.99	0.05	1.39
Pct. of pop. below poverty	20.4	11.5	17.1	5.4	46.7	22.6	11.3	18.8	6.1	46.7
Median household income (US$)	45,538	16,190	44,833	20,298	90,865	41,628	12,545	42,136	20,298	69,527
Property tax base per capita (US$)	30,815	16,057	26,600	10,763	91,745	29,801	16,870	24,797	10,763	91,745
Median housing value (US$)	104,510	48,564	88,050	49,600	247,600	93,524	37,627	86,900	49,600	209,100
Composite fiscal health score	-2.86	2.83	-2.95	-8.16	3.31	-3.44	2.58	-3.04	-8.16	1.41

Note: Variables labeled (W) and (B) indicate counts or values specific to White and Black populations, respectively.

Table A.4 *Correlation matrix for the all race, White, and Black total sub-samples in the full sample and city sample*

			Full sample						City sample					
			1	2	3	4	5	6	1	2	3	4	5	6
			All races total (n=96)						**All races total (n=59)**					
1	SMR (AR)	r	1.00						1.00					
		P sig.	-						-					
2	Whiteness LQ	r	-0.67	1.00					-0.66	1.00				
		P sig.	0.000	-					0.000	-				
3	Composite fiscal health	r	-0.89	0.62	1.00				-0.88	0.62	1.00			
		P sig.	0.000	0.000	-				0.000	0.000	-			
4	Absence of poverty	r	-0.84	0.78	0.87	1.00			-0.81	0.78	0.88	1.00		
		P sig.	0.000	0.000	0.000	-			0.000	0.000	0.000	-		
5	Median household income	r	-0.85	0.56	0.96	0.79	1.00		-0.84	0.54	0.95	0.79	1.00	
		P sig.	0.000	0.000	0.000	0.000	-		0.000	0.000	0.000	0.000	-	
6	Property tax base per capita	r	-0.66	0.32	0.83	0.55	0.73	1.00	-0.63	0.28	0.79	0.51	0.66	1.00
		P sig.	0.000	0.002	0.000	0.000	0.000	-	0.000	0.034	0.000	0.000	0.000	-
7	Median housing values	r	-0.82	0.48	0.95	0.71	0.94	0.80	-0.81	0.44	0.92	0.69	0.92	0.75
		P sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000

Note: Variables labeled (AR) indicate values for all races. $p<0.10$.

Table A.4 continued.

			Full sample						City sample					
			1	2	3	4	5	6	1	2	3	4	5	6
			White total (n=95)						**White total (n=58)**					
1	SMR (W)	r	1.00						1.00					
		P sig.	-						-					
2	Whiteness LQ	r	-0.57	1.00					-0.54	1.00				
		P sig.	0.000	-					0.000	-				
3	Composite fiscal health	r	-0.85	0.58	1.00				-0.83	0.57	1.00			
		P sig.	0.000	0.000	-				0.000	0.000	-			
4	Absence of poverty	r	-0.80	0.74	0.87	1.00			-0.75	0.74	0.88	1.00		
		P sig.	0.000	0.000	0.000	-			0.000	0.000	0.000	-		
5	Median household income	r	-0.82	0.53	0.96	0.79	1.00		-0.81	0.50	0.95	0.79	1.00	
		P sig.	0.000	0.000	0.000	0.000	-		0.000	0.000	0.000	0.000	-	
6	Property tax base per capita	r	-0.63	0.28	0.82	0.54	0.72	1.00	-0.59	0.23	0.78	0.49	0.65	1.00
		P sig.	0.000	0.006	0.000	0.000	0.000	-	0.000	0.083	0.000	0.000	0.000	-
7	Median housing values	r	-0.79	0.47	0.95	0.72	0.94	0.80	-0.78	0.41	0.93	0.69	0.92	0.74
		P sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
			Black total (n=30)						**Black total (n=25)**					
1	SMR (B)	r	1.00						1.00					
		P sig.	-						-					
2	Whiteness LQ	r	-0.47	1.00					-0.43	1.00				
		P sig.	0.009	-					0.030	-				
3	Composite fiscal health	r	-0.82	0.62	1.00				-0.79	0.62	1.00			
		P sig.	0.000	0.000	-				0.000	0.001	-			
4	Absence of poverty	r	-0.75	0.70	0.93	1.00			-0.69	0.69	0.93	1.00		
		P sig.	0.000	0.000	0.000	-			0.000	0.000	0.000	-		
5	Median household income	r	-0.77	0.57	0.95	0.85	1.00		-0.78	0.63	0.96	0.90	1.00	
		P sig.	0.000	0.001	0.000	0.000	-		0.000	0.001	0.000	0.000	-	
6	Property tax base per capita	r	-0.56	0.28	0.72	0.50	0.56	1.00	-0.57	0.25	0.72	0.48	0.57	1.00
		P sig.	0.001	0.135	0.000	0.005	0.001	-	0.003	0.221	0.000	0.014	0.003	-
7	Median housing values	r	-0.79	0.48	0.90	0.74	0.94	0.57	-0.82	0.50	0.87	0.75	0.92	0.55
		P sig.	0.000	0.007	0.000	0.000	0.000	0.001	0.000	0.011	0.000	0.000	0.000	0.005

Note: Variables labeled (W) and (B) indicate values specific to White and Black populations, respectively. $p<0.10$.

Table A.5 *Multivariate regression results assessing the relationship between municipal Whiteness, fiscal health, and SMR for the all race total sub-sample*

		All races total				
Variable		Model 1	Model 2	Model 3	Model 4	Model 5
Covariates						
Land area (sq. miles)	Coef.	0.004	0.000	0.001	0.000	0.003
	P sig.	0.138	0.857	0.325	0.918	0.016
Population size (logged)	Coef.	-0.090	-0.089	-0.053	-0.059	-0.113
	P sig.	0.037	0.014	0.046	0.019	0.000
Pct. of <65 pop. age 45-64	Coef.	-0.034	-0.020	0.011	0.010	0.001
	P sig.	0.000	0.005	0.035	0.027	0.774
Type of municipality	Coef.	0.297	0.139	0.047	0.021	0.012
(ref=Twp.)	P sig.	0.000	0.016	0.310	0.580	0.755
Pct. of pop. IPOC	Coef.	-0.004	-0.014	0.003	-0.002	-0.001
	P sig.	0.651	0.071	0.636	0.720	0.921
Relative spatial Whiteness						
Whiteness LQ	Coef.		-0.8137		-0.334	-0.553
	P sig.		0.000		0.000	0.000
Fiscal health						
Composite fiscal health	Coef.			-0.125	-0.106	
(continuous)	P sig.			0.000	0.000	
Fiscal class (ref.=Poor)						
Modest	Coef.					-0.404
	P sig.					0.000
Affluent	Coef.					-0.639
	P sig.					0.000
Constant		2.722	3.476	0.913	1.498	2.925
Mean VIF		1.58	1.63	1.74	1.90	1.87
R^2		0.307	0.576	0.812	0.846	0.804
n		96	96	96	96	96

p<0.10

Table A.6 *Sensitivity analysis: multivariate regression results assessing the relationship between municipal Whiteness, fiscal health, and SMR in the White and Black total sub-samples, modified to examine poverty as an independent variable*

		White total				**Black total**			
Variable		Model A	Model B	Model C	Model D	Model A	Model B	Model C	Model D
Covariates									
Land area (sq. miles)	Coef.	-0.002	0.001	-0.001	0.001	-0.002	0.000	0.002	0.001
	P sig.	0.123	0.253	0.331	0.764	0.623	0.936	0.526	0.773
Population size (logged)	Coef.	-0.035	-0.068	-0.054	-0.087	-0.017	-0.036	-0.079	-0.057
	P sig.	0.296	0.029	0.089	0.019	0.866	0.623	0.326	0.524
Pct. of <65 pop. age 45-64	Coef.	0.000	0.006	0.006	0.000	0.000	0.017	0.031	0.029
(Race-specific)	P sig.	0.932	0.405	0.203	0.989	0.973	0.105	0.075	0.070
Type of municipality	Coef.	0.055	0.034	-0.012	-0.006	0.192	0.134	0.123	0.151
(ref=Twp)	P sig.	0.337	0.467	0.764	0.889	0.190	0.355	0.419	0.178
Pct. of pop. IPOC	Coef.	-0.013	0.010	-0.004	-0.004	0.002	0.020	0.022	0.028
	P sig.	0.047	0.116	0.521	0.579	0.805	0.004	0.029	0.058
Relative spatial Whiteness									
Whiteness LQ	Coef.			-0.161	-0.167			0.333	0.079
	P sig.			0.389	0.388			0.217	0.788
Poverty									
Absence of poverty	Coef.	-0.038		-0.020	-0.020	-0.024		-0.002	-0.006
	P sig.	0.000		0.020	0.027	0.001		0.861	0.603
Fiscal health (excluding poverty)									
Composite fiscal health	Coef.		-0.145	-0.084			-0.190	-0.222	
(continuous)	P sig.		0.000	0.000			0.000	0.002	
Fiscal class (ref=Poor)									
Modest	Coef.				-0.272				-0.453
	P sig.				0.000				0.031
Affluent	Coef.				-0.415				-0.828
	P sig.				0.000				0.010
Constant		4.710	1.153	3.163	3.929	3.365	0.656	0.502	1.427
Mean VIF		1.62	1.62	2.41	2.6	2.11	1.98	3.63	3.21
R^2		0.699	0.680	0.778	0.770	0.608	0.753	0.772	0.751
n		95	95	95	95	30	30	30	30

p<0.10

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