MATERNAL MORTALITY IS A RACIAL JUSTICE ISSUE: THE IMPACT OF POLICY PACKAGES AND CITY COMPOSITION ON AGGREGATE LEVEL MATERNAL MORTALITY AND RACIAL DISPARITIES IN MATERNAL HEALTH OUTCOMES

by

Abigail L. Nawrocki

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STATEMENT OF COMMITTEE APPROVAL

Dr. Robin Stryker, Chair

Department of Sociology

Dr. Shawn Bauldry

Department of Sociology

Dr. Patricia Thomas

Department of Sociology

Dr. Andrea DeMaria

Department of Public Health

Approved by:

Dr. Shawn G. Bauldry

This project is dedicated to Kelsey, who deserves a minor in Sociology after all the drafts she's read and all the "quick" thoughts I have run past her

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CHAPTER 1: INTRODUCTION

Statement of the Problem

The United States is currently facing a maternal mortality crisis with disproportionate impacts on Black and Brown women. Indeed, approximately 700 women die of complications related to childbirth in the U.S., numbers that have more than doubled over the past 25 years (American College of Obstetricians and Gynecologists 2019; March of Dimes 2019; Petersen et al. 2019). While maternal mortality rates (MMRs) in the U.S. have continued to rise, MMRs in other industrialized countries are in decline (American College of Obstetricians and Gynecologists 2019; March of Dimes 2019; Petersen et al. 2019).

Overall, maternal health is an established indicator of the overall health of a nation and the local community (American College of Obstetricians and Gynecologists 2019). Maternal mortality rates (MMR) in the United States are higher than in other industrialized countries despite outspending every other country in the world on medical care, which has been the case since the 1990s (American College of Obstetricians and Gynecologists 2019; Petersen et al. 2019). Finally, the Centers for Disease Control and Prevention (CDC) also reports that nearly three in five (60 percent) of pregnancy-related deaths are preventable (March of Dimes 2019; Petersen et al. 2019).

As stated, maternal mortality is a highly racialized issue in the United States. In fact, the CDC reports that women of color are three to four times more likely to experience maternal mortality than white women (American College of Obstetricians and Gynecologists 2019; Petersen et al. 2019). These rates remain consistent even when controlling for socioeconomic status (SES), meaning that wealthy women of color are not free from the risks of maternal mortality (March of Dimes 2018, 2019; Petersen et al. 2019).

Historically, racialized and gendered ideologies about reproduction have been paired with reproductive policies and social movements in ways that consistently and systematically exacerbate disparities in maternal health outcomes. Eugenics and forced sterilization laws targeted women of color, using state power to assert control over the reproductive ability of these marginalized women in ways that negatively impacted their health and relationship with the healthcare system (Roberts 1997; Ross 2017c; Stern 2005). The transition to births attended by

physicians came at the expense of women of color birth workers and mothers and was enacted by policy change rooted in dominant discourses undermining women of color's expertise, bodies, and reproductive rights (Bonaparte 2016; Diaz-Tello 2016; Oparah and Black Women Birthing Justice 2016; Owens 2017). Eugenic ideologies that frame the reproduction of women of color as something to be controlled also influenced the adoption of welfare family cap policies and compulsory birth control and sterilization practices for low-income women, who were disproportionately women of color (Roberts 1997; Romero and Agénor 2017).

Although social movements did arise to address issues of reproductive rights, second-wave feminism, the natural birth movement, and the pro-choice movement all engaged in white supremacist rhetoric and advocacy. These centered the needs and experiences of wealthy white women to the detriment of women of color, whose bodily autonomy was differently threatened (Oparah and Black Women Birthing Justice 2016; Ross 2017c).

Current disparities in maternal health outcomes are rooted in racist, white supremacist ideologies surrounding reproductive control and are perpetuated through policies and practices at each level of society. In particular, Social Determinants of Health (SDH) refer to the conditions in spaces where people live, work, etc., that affect a wide range of health risks and outcomes. These social conditions are influenced by the distribution of resources, power, and wealth at the global, national, and local levels and result in health disparities (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). Research has demonstrated that social and economic policies can be used to alter SDH, and their effects must be considered in the design of intervention programs and health policy packages (Osypuk et al. 2015). Several studies and reports have expressed the need for more research investigating the relationship between SDH and maternal and reproductive health, mainly as it concerns policy initiatives that would improve adverse maternal and obstetric outcomes like mortality and morbidity (Creanga et al. 2015a).

Policies have been implemented explicitly to control women's reproductive freedom, and these have disproportionately impacted women of color. The result of this history has been a legacy of state oppression and inequity for women of color at the expense of these women's maternal and reproductive health. Therefore, I argue that in confronting the historical, systemic realities of reproductive oppression by the state as well as the contemporary maternal mortality crisis, policy changes that respond to empirical research recommendations to mitigate adverse reproductive health outcomes must be enacted and further researched. Research must be done

that examines the impact of reproductive ideologies on such policy changes and the effect that both policies and ideologies may have on maternal mortality overall and racial disparities in maternal mortality. This research must also consider the impact of white supremacist ideologies as enacted through and represented by social determinants of health.

Statement of Project Aims & Contributions

In this dissertation, I aim to examine how policy packages focusing on improving reproductive conditions impact adverse maternal outcomes at the local level. I use the National Institute of Reproductive Health's Local Reproductive Freedom Index (NIRH LRFI) to advance scholarship and policy advocacy on how policies included in that index may lessen the overall maternal mortality rate while also perhaps diminishing the disparity in maternal mortality between women of color and white women in 50 major U.S. cities. I argue that policy may be an effective—though under-studied—avenue for reducing the risk of maternal mortality because policies can be used to target specific social factors that research has demonstrated place individuals at higher risk of a negative outcome. However, these policy avenues usefully can be considered as interconnected policy packages rather than merely as single-policy interventions. Additionally, current research in this area suggests that there is a clear need for more research that combines SDH with policies aimed at improving health outcomes for reproducing individuals, particularly for communities of color (Creanga et al. 2015b; Kozhimannil, Vogelsang, and Hardeman 2015; Osypuk et al. 2015). As such, I situate maternal mortality, and specifically racial disparities in maternal mortality, among social determinants of health. Overall, I argue that to successfully decrease aggregate maternal mortality rates and lessen racial disparities in reproductive health, it is essential to center the experiences and needs of women of color and use a critical lens when evaluating measures assessing reproductive freedom.

This dissertation has both scholarly and applied significance because insights gained through this project assist in addressing maternal mortality, a growing social problem in the United States disproportionately impacting women of color. Additionally, this dissertation contributes to understanding and explaining maternal mortality patterns and racial disparities in those patterns across the 50 cities for which the NIRH LRFI provides policy measures. Further, this dissertation makes theoretical contributions that help extend the bounds of Fundamental Cause Theory (FCT) from the individual level to the aggregate level, as well as makes explicit

links between FCT, SDH, and Reproductive Justice Theory to provide a theoretical lens through which to evaluate policies that may impact city-level maternal health outcomes. Finally, this dissertation will also benefit local policy makers seeking to contribute to shifting reproductive ideology and policy in ways that both reduce maternal mortality and center the needs and experiences of marginalized groups.

Theoretical Background & Rationale

Throughout this dissertation, I utilize three primary theoretical perspectives to situate my project: Social Determinants of Health (SDH), Fundamental Cause Theory (FCT), and Reproductive Justice. As previously established, SDH highlights how the distribution of resources, power, and wealth influences social conditions at the global, national, and local levels and result in health disparities, including disparities in maternal mortality (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.).

Relatedly, FCT focuses on resources that determine people's abilities to avoid risks for morbidity and mortality (Phelan and Link 2015). Fundamental causes are associated with multiple health outcomes through various risk-factor mechanisms, making them dynamic and their influence far-reaching (Phelan and Link 2015). Phelan and Link (2015) highlight that because social and economic resources can be used differently depending on the situation, fundamental causes can impact disease or health outcomes even when risk factor profiles dramatically shift. They argue, therefore, that the effect of a fundamental cause cannot be succinctly explained by the specific risk factors that happen to link it to a health outcome at any given time (Phelan and Link 2015).

Through their research, Phelan and Link (2011; 2015) demonstrate that both differential socioeconomic status (SES) and racism are fundamental causes of health disparities. Specifically, Phelan and Link (2015) offer the following interrelated premises: first, racism is a fundamental cause of racial disparities in SES (Phelan and Link 2015). Second, SES is a fundamental cause of inequalities in health and mortality (Phelan and Link 2015). Third, racism is a fundamental cause of racial differences and mortality independent of SES (Phelan and Link 2015). My project will consider both SES and racial measures, and I consider them under the framework of fundamental cause.

FCT also links to another theoretical inspiration for this project, Reproductive Justice Theory, which pertains specifically to reproductive health. Reproductive Justice Theory arose in response to the state's ongoing reproductive oppression and to how Black women's reproductive needs differed from and were ignored by liberal, white feminist initiatives utilizing the Reproductive Rights framework. The framework emphasizes the right to bodily autonomy, to have or not have children, and to raise and parent the children one does have in safe, healthy, supportive communities (Ross 2017a; Ross and Solinger 2008a). Reproductive Justice recognizes the necessity of responding to current inequities with political and social mechanisms for change (Ross 2017a; Ross and Solinger 2008a), making policy packages a particularly apt mechanism for approaching contemporary reproductive ideologies and maternal health outcomes.

Reproductive Justice is a necessary theoretical framework to draw on alongside SDH and FCT when discussing policy packages and reproductive ideologies that most effectively improve maternal mortality rates for women in major U.S. cities. The Reproductive Justice framework integrates the role policy and ideology play in controlling women of color's reproductive autonomy both historically and contemporaneously. As both FCT and Reproductive Justice frameworks would suggest, aggregate policy and institutional/organizational and ideological factors must be considered both historically and in the current context as potential mediating mechanisms that may help explain the aggregate effects of city-level racial composition and percent poverty. The fact that the 50 cities in my project differ in both racial composition and percent of the population in poverty, and also in policies, organizations, and routines that deliver reproductive care allows me to develop and examine the implications of these theoretical relationships in detail.

Reproductive Justice theorists do not explicitly link their diagnostic and prognostic reform framework to the scholarly explanatory framework of FCT. However, there are grounds to view Reproductive Justice as concretizing considerations highlighted by thinking in terms of social determinants of health as these contribute to FCT's assertion that racism and SES disparities are fundamental causes of the persistence in reproductive health disparities by race. Reproductive Justice as a framework is inherently intersectional and able to engage with the multitude of mechanisms that constrain and influence our reproductive lives, and thus reproductive health. In this way, FCT acts as the more general explanatory theory of health

disparities into which I fit Reproductive Justice and Social Determinants of health to provide a theoretical framework helpful in identifying historically and contemporary specific constraints on and opportunities for achieving maternal health and for achieving racial equality in maternal health.

Data & Methods

Because there is no singular data source best suited to address my project aims, this dissertation draws on data from multiple sources. First, the NIRH LRFI operates as my measure of the relevant policy package. This particular index offers a total of 34 indicators of reproductive policies divided into six broad categories: protection of abortion access, support for young people, funding and coverage for reproductive health care, support for families, initiatives and programs to support healthy and just communities, and opposing state or federal restrictions on reproductive autonomy (NIRH 2019). The NIRH LRFI also compiles these 34 measures into a single composite measure called the Star Score. The latest version of the NIRH LRFI conceives of its Star Score measure as evaluating the level of reproductive freedom for 50 cities across the United States.

Second, Data on Maternal Mortality Rates (MMRs) comes from the CDC WONDER Underlying Cause of Death Database. This database contains mortality and population counts for all counties in the U.S. from 1999-2018. The data are based on death certificates that identify demographic data and a cause of death, and for this project, I use data from causes of death specifically related to pregnancy and childbirth. Additionally, the maternal death data can be indexed by race and Latinx/non-Latinx ethnicity to construct racial gaps in maternal mortality.

Lastly, I draw on data from the American Community Survey to organize demographic data about the population, particularly poverty rates and racial composition, of my focal cities. These two measures will act as aggregate level analogs for fundamental causes at the individual level. Thus, poverty rates and racial composition of the 50 cities in the NIRH LRFI that I analyze in this dissertation are uniquely crucial to bolstering my theoretical argument relating reproductive policy packages and maternal mortality outcomes at the city level.

With the city as the level of analysis, the sample size of this project is reasonably small (N=50). Working with a small N informs the ways I analyze my data in this project. In addition to more traditional bivariate and multivariate regression analysis, I engage in deep descriptive

analysis of the relationships among my variables. In doing so, I take advantage of my small sample size by looking at individual cases and cases in small, thematic groups. This approach also allows me to gain a more nuanced understanding of the patterns emergent in these relationships.

Description of Chapters

The remainder of this dissertation is divided into seven additional chapters. Chapter 2 discusses the contemporary context of maternal mortality in the U.S. and reviews previous studies addressing maternal mortality. I also situate my project within Fundamental Cause Theory (FCT) as a critical component of the relationship between social determinants of health and health policy. In Chapter 3, I introduce the relevant socio-historical origins of contemporary realities in maternal health, emphasizing racial disparities, including racial disparities in maternal mortality. Of particular importance in this chapter is my discussion of the emergence of Reproductive Justice theory and its utility in my project. Chapter 4 introduces the NIRH LRFI as the focal policy package measure for this dissertation and details the data sources and methodological approaches I implement in my analytic chapters. Because of the descriptive, exploratory nature of my project, I do not conduct formal hypotheses testing. As such, my analytic chapters will include expectations for individual explanatory variables more informally within each analytic chapter rather than a traditional hypothesis section at the front end of my dissertation.

Chapters 5, 6, and 7 constitute the analytic chapters of this dissertation. Chapter 5 analyzes the relationship between policy packages and maternal health outcomes, namely maternal mortality rates (MMR) and racial gaps in maternal mortality rates (racial gaps). For this analysis, I focus on the NIRH LRFI's composite policy measure, the Star Score, to evaluate the impact of variability in Star Scores on my 50 focal cities' MMR and racial gaps. Chapter 6 explores which policy measures in the NIRH LRFI are particularly important for understanding the relationship between Star Score, and Maternal Mortality Rates (MMR), and racial gaps in maternal mortality, respectively. In addition to understanding how well the NIRH LRFI works as a package, this chapter demonstrates the importance of individual policy measures for reducing adverse aggregate maternal health outcomes. In Chapter 7, I expand on the analyses conducted in Chapters 5 and 6 by integrating insights from FCT to evaluate the extent to which city

composition factors impact MMRs and racial gaps in maternal mortality and also policy packages and individual policies, as well as the focal relationships between policy packages and maternal health outcomes. Here, I analyze the impact of poverty rates, and racial demographics of the city, which FCT and SDH suggest are crucial components driving health disparities on individual levels and which I argue act as analogs of FCT on the city level. This dissertation concludes in Chapter 8, where I summarize the key findings from my project, highlight the contributions and limitations of my research, and discuss needed future research in this area.

CHAPTER 2: THEORETICAL FRAMEWORK

Introduction

This chapter will establish the empirical and theoretical sociological background essential to positioning my research project. Specifically, I begin by establishing the scope of the problem of maternal mortality in the United States. I will highlight prior studies addressing maternal mortality and aim to situate my project within the Social Determinants of Health (SDH) literature. In doing so, I will delve into Fundamental Cause Theory (FCT) as a critical component informing the relationship between policies as social determinants of health and maternal mortality outcomes. I will conclude with a conversation on the elements of Fundamental Cause Theory that I find particularly useful in positioning the current project.

Scope of Maternal Mortality in the U.S.

Each year, approximately four million women give birth in the United States (American College of Obstetricians and Gynecologists 2019; March of Dimes 2019; Petersen et al. 2019). Maternal health is an established indicator of the overall health of a nation and the local community (American College of Obstetricians and Gynecologists 2019). However, around 700 women die of complications related to childbirth each year, numbers that have over doubled over the past 25 years (American College of Obstetricians and Gynecologists 2019; March of Dimes 2019; Petersen et al. 2019). Further, over 500,000 women experience maternal morbidity, or life-threatening complications related to childbirth each year (March of Dimes 2019). Overall, maternal mortality rates (MMR) in the United States are higher than in other industrialized countries despite outspending every other country in the world on medical care, which has been the case since the 1990s (American College of Obstetricians and Gynecologists 2019; Petersen et al. 2019).

In 2018, the March of Dimes created a report on maternity care deserts in the United States. Maternity care deserts are defined as counties where maternity health care services are either absent or limited due to lack of service provision or inaccessibility (March of Dimes 2018). The March of Dimes also reports that 1.1 million women live in care deserts in large metropolitan/urban areas where one in eight women do not have health insurance (March of

Dimes 2018). In addition to being a geospatial issue, maternal mortality is also a racialized issue. The Center for Disease Control (CDC) reports that women of color are three to four times more likely to experience maternal mortality than white women (American College of Obstetricians and Gynecologists 2019; Petersen et al. 2019). These rates remain consistent even when controlling for socioeconomic status (SES), meaning that wealthy women of color are not free from the risks of maternal mortality (March of Dimes 2018, 2019; Petersen et al. 2019).

The American College of Obstetricians and Gynecologists (ACOG) reports that the leading causes of death include complications related to preeclampsia, eclampsia, and cardiovascular disease (American College of Obstetricians and Gynecologists 2019; March of Dimes 2018). Finally, the CDC also reports that nearly three in five (60 percent) of pregnancy-related deaths are preventable (March of Dimes 2019; Petersen et al. 2019).

Modeling & Measuring Maternal Mortality Rates

Social scientific research has been dedicated to understanding and disrupting negative trends in obstetric outcomes for women. Many of these studies are exclusively epidemiological, while others take a more social approach to the investigation of maternal mortality. Further, in their overview of the work conducted within the Division of Reproductive Health at the Centers for Disease Control, Creanga et al. (2014) acknowledge the continued need for research that examines the predictors and causes of maternal mortality. They note that an increasing number of pregnant women have chronic health conditions that may present a higher risk of adverse outcomes. They also echo other research that states that the risk of mortality is three to four times higher for Black women than white women, and they add that specific causes of maternal mortality like ectopic pregnancy contribute to even greater risk (Creanga et al. 2011, 2014). Additionally, Creanga et al. (2011) discuss the methodological difficulties of explaining the racial disparities in maternal mortality. Data limitations result in many authors concluding that a multitude of factors causes these disparities and that rates are unlikely to reduce with any single intervention (Creanga et al. 2014).

Aoyama and colleagues (2018) conducted a meta-analysis of 38 different studies assessing 12 maternal mortality risk prediction models. The authors identify the CIPHER (Collaborative Integrated Pregnancy High-dependency Estimate of Risk) model and the Maternal Severity Index as the highest performing models. These models apply, respectively, to critically

ill obstetric patients and hospitalized obstetric patients (Aoyama et al. 2018). Both models account for the existence of chronic health conditions and cardiovascular factors, consistent with other studies. However, the models only account for medical conditions that put patients at higher risk for mortality rather than accounting for social or demographic factors (Aoyama et al. 2018).

Several studies do address the socio-structural and demographic predictors of maternal mortality. Goffman et al. (2007) reviewed hospital charts from 1995 and 2001 and conducted multiple logistic regression analyses to identify risk factors for maternal mortality and near-miss maternal morbidity. They found that the most common causes of maternal death are hemorrhage, pre-eclampsia, and eclampsia; these findings are consistent with other research (Goffman et al. 2007). Further, the authors identified race and ethnicity as the strongest predictors of maternal death, and Black and Hispanic mothers faced the highest risk even when controlling for SES (Goffman et al. 2007). Gravidity (the number of times someone has been pregnant), being over age 35, being obese, having a chronic medical condition, and having a prior c-section were also significant predictors. In short, research highlights the importance of social factors in understanding both racial disparities in maternal health and maternal mortality rates overall (Goffman et al. 2007).

Similarly, Reid and Creanga (2018) sought to determine hospital characteristics and measures of quality associated with SMM (Severe Maternal Morbidity) in Maryland. While this study focused on morbidity rather than mortality, it identified social factors at the organizational and individual levels that increase the risk for obstetric patients. The authors found that risk ratios were higher if the patient was under 20 or over 35, non-white, non-Hispanic, unmarried, used multiple substances, had higher gravidity, and had chronic medical and mental health conditions (Reid and Creanga 2018). This finding is consistent with other studies that Black women are at higher risk for detrimental maternal health outcomes than other demographics, mainly white, non-Hispanic women. At the hospital and community levels, the authors found that lower SES communities and hospitals with more inadequate clinical care and patient experience had higher morbidity rates (Reid and Creanga 2018).

Another set of studies examines the impact of health behaviors on post-partum health. Liu et al. (2015) found that prenatal care utilization significantly reduces the probability of post-partum maternal hospitalization during the first six months after birth. The benefits of prenatal

care are found only for women with vaginal delivery, and the authors do not find similar benefits for women with cesarean sections (Liu et al. 2015). Additionally, Nicoloro-SantaBarbara et al. (2017) found that pregnant women's relationship with their midwives predicted better maternal self-care and prenatal health behaviors.

Finally, other studies exploring predictors of maternal mortality include policy indicators relevant to the focus of the current project. Durrance and Hankins (2011) examined the utility of the Affordable Care Act's extension of direct access to OBGYNs for improving maternal health behaviors. Ultimately, the intention was to promote prenatal care through policies providing greater access to OBGYNS, which proponents argue can identify several prenatal problems, prevent delayed treatment for complications or delayed prenatal care utilization, or promote healthy prenatal behaviors (Durrance and Hankins 2011). Ordinary least square (OLS) models of state-level direct access legislation over time were used to study the effects, and the authors found no statistically significant relationships. However, the study still offers important hypotheses about why direct access legislation may influence maternal mortality rates (Durrance and Hankins 2011). The authors acknowledge that Medicaid recipients currently account for a large portion of U.S. births and are not subject to the direct access mandate compared to their private insurance counterparts. The authors recommend looking for other policy avenues to improve maternal health.

In sum, there have been several approaches to understanding the causes and predictors of maternal mortality. Leaning on insights from Durrance and Hankins (2011) and Creanga et al. (2014), I will argue that policy may be an effective—though under-studied—avenue for reducing the risk of maternal mortality because policies can be used to target specific social factors that research has demonstrated place individuals at higher risk of a negative outcome. However, these policy avenues usefully can be considered as interconnected policy packages rather than merely as single-policy interventions. Additionally, I situate maternal mortality and racial disparities in maternal mortality within the literature on social determinants of health.

Social Determinants of Health

Social determinants of health (SDH) are primarily understood as the conditions in spaces where people live, work, etc., that affect a wide range of health risks and outcomes. These conditions are influenced by the distribution of resources, power, and wealth at the global,

national, and local levels and result in health disparities (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). SDH are grouped into five "place-based" domains: economic stability, education, social and community context, health and health care, and neighborhood and built environment (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). These five domains encompass conditions such as access to healthcare services, socioeconomic conditions, and community-based resources (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.).

Economic stability refers to the connection between health and financial resources and captures the inclusion of poverty, housing stability, employment, and food security (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). Education refers to access and quality of education related to health, such as educational attainment, early childhood education and development, and language and literacy skills (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). Social and community context draws on the connections between community/social setting characteristics and health, including civic participation, discrimination, workplace conditions, and incarceration (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). Health and healthcare refer to people's understanding of and access to health services and their own health, including health insurance coverage and health literacy (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.). Finally, neighborhood and built environment emphasize the connection between where people live and their health, including factors such as availability of healthy food options, air and water quality, and crime and violence in a neighborhood (Centers for Disease Control and Prevention n.d.; World Health Organization n.d.).

Social and economic policies can be used to alter SDH, and their effects must be considered in the design of intervention programs and health policy packages (Osypuk et al. 2015). Indeed, policies pertaining to health care, such as those that increase access to insurance, are intimately connected to SDH. Several studies and reports have expressed the need for more research investigating the relationship between SDH and maternal and reproductive health, mainly as it concerns policy initiatives that would improve adverse maternal and obstetric outcomes like mortality and morbidity (Creanga et al. 2015a).

For instance, a 2014 report by the Center for Reproductive Rights captures the work of Bold Futures[1] in moving away from teen pregnancy prevention models toward models and strategies that aim at preventing unintended pregnancies for all and incorporate insights from SDH (Center for Reproductive Rights 2014). Additionally, Kozhimannil et al. (2015) released a report on Medicaid coverage for doula services in Minnesota and found that the standard doula training curriculum does not provide sufficient instruction on SDH (Chen n.d.; Kozhimannil et al. 2015). As part of their project, Kozhimannil et al. (2015) provided DONA[2] training to 12 doulas from under-represented communities and provided support for obtaining their certification. The authors also conducted evaluations and debriefing interviews. Kozhimannil et al. (2015) report that the feedback reflects that the DONA curriculum was not inclusive of the issues that women in marginalized communities utilizing Medicaid experience while pregnant, such as stillbirths and infant deaths, potential language barriers, low social supports, low health literacy, and lack of economic resources among others. This suggests a clear need for more research that combines SDH with policies aimed at improving health outcomes for reproducing individuals, particularly for communities of color.

Fundamental Cause Theory

Because the factors of race and class position entail differential resources and thus are strongly related to all five categories of place-based factors implicated in SDH, Fundamental Cause Theory (FCT) likewise has implications for women's reproductive health, including rates of maternal mortality. Fundamental Cause Theory (FCT) provides an essential perspective aligning with social determinants of health and has important implications for health policy.

Sociologists Jo Ann Phelan and Bruce Link introduced FCT, and their theoretical work in this area extends from their examination of socioeconomic status (SES) as a fundamental cause of health inequalities. Broadly, fundamental causes exemplify particular flexible resources, and social groups with better resources are advantaged regarding certain outcomes (Phelan and Link 2015). In detail, fundamental causes theory focuses on resources that determine people's abilities to avoid risks for morbidity and mortality (Phelan and Link 2015). Additionally, fundamental

[1] This is an Albuquerque, NM nonprofit organization focusing on Reproductive Justice that organizes and provides policy initiatives by and for young women of color in New Mexico. It was formerly known as Young Women United.
[2] The acronym refers to Doulas of North America.

causes are associated with multiple health outcomes through various risk-factor mechanisms, making them dynamic and their influence far-reaching (Phelan and Link 2015). Phelan and Link (2015) highlight that because social and economic resources can be used differently depending on the situation, fundamental causes can impact disease or health outcomes even when risk factor profiles dramatically shift. They argue, therefore, that the effect of a fundamental cause cannot be succinctly explained by the specific risk factors that happen to link it to a health outcome at any given time (Phelan and Link 2015). SES has been associated with mortality for centuries. While the specific diseases and risk factors change over time as, for instance, poor sanitation in low-SES communities has been eradicated, new prominent causes of death emerge and are driven by risk factors that are more common in lower-SES communities, such as poor diet (Phelan and Link 2015). In a contemporary context, consider that concerning heart disease, a person with greater resources can live in communities where environmental risks are lower. Such a person can better maintain a heart-healthy lifestyle and get access to the best medical treatment, among other benefits.

Race & Racism as a Fundamental Cause

Phelan and Link (2015) return to the idea of fundamental cause to explore the persistent connections between race, health, and mortality in the U.S. They ask whether systemic racism is a fundamental cause of health inequalities between white Americans and Black Americans, and they suggest that the answer is 'yes.' Fundamental Cause Theory as it pertains to systemic racism has several interrelated premises. First, racism is a fundamental cause of racial disparities in SES (Phelan and Link 2015). Second, SES is a fundamental cause of inequalities in health and mortality (Phelan and Link 2015). Third, racism is a fundamental cause of racial differences and mortality independent of SES (Phelan and Link 2015). Research has provided substantial evidence supporting all three premises (Freese and Lutfey 2011; Lutfey and Freese 2005; Phelan and Link 2015).

Further, in Phelan and Link's (2015) argument that racism is a fundamental cause of racial health disparities independent of SES, the authors discuss the relationship between race and disease outcomes with specific attention to stress, medical care, and neighborhood effects. Additionally, Phelan and Link (2015) explain race's relationship to flexible resources independent of SES, highlighting prestige, power, beneficial social connections, and freedom. In

connecting their previous work on SES to their focus on racism, Phelan and Link (2015) assert that systemic racism influences flexible resources via multiple, replaceable mechanisms.

Phelan and Link (2015) argued that the persistent nature of systemic racism operates primarily through mechanism replacement, which ensures that those groups with superior resources can maintain their status/privilege and perpetuate disparities in health outcomes. In exemplifying the linkage between systemic racism and mechanism replacement, the authors identify how the progression in the United States from slavery, to the Jim Crow South, to mass incarceration highlights that the oppression of Black Americans—and subsequent consequences for health outcomes—has been sustained over time, despite efforts to end discrimination against people of color (Alexander 2020; Phelan and Link 2015; Roberts 2014). Phelan and Link (2015) explain that the abolition of slavery (1865) and Black men gaining the right to vote (1870) eliminated two central mechanisms linking systemic racism to racial difference. However, new mechanisms arose to maintain white privileges, such as terrorism by the Ku Klux Klan, Jim Crow laws, and legal discrimination in housing, schooling, and employment, among others (Alexander 2020; Pager 2007; Pager and Shepherd 2008). Even the passage of the Civil Rights Act of 1964, which many believed to represent the end of segregation and discrimination as mechanisms connecting racial differences in SES to systemic racism, has not indeed severed that tie as it has been inconsistently enforced as with hiring and judicial decisions in litigation (Aline C Gubrium et al. 2016; Phelan and Link 2015; Roberts 2014).

One type of flexible resource influenced by systemic racism comprises structural factors. These, in turn, include white-dominated government organizations and prominent institutions such as the educational system, criminal justice system, mass media, and institutions that shape housing, such as mortgage lending and real estate practices (Hill Collins 2009; Phelan and Link 2015; Roberts 1997; Ross 2017a, 2017c). Second, systemic racism shapes individual resources such as money, power, prestige, and beneficial social connections, such that on average, people of color have less of these (Hill Collins 2009; Phelan and Link 2015; Roberts 2014; Ross 2017a; Saperstein, Penner, and Light 2013). Finally, systemic racism gives rise to social psychological advantages for white people because of white supremacist ideas that: (1) white people are superior to other racial groups; (2) white people should be in charge of society; and (3) white people should be separated from Black people (Burton et al. 2010; Golash-Boza 2016; Hill Collins 2009; Phelan and Link 2015; Ross 2017b). These white supremacist ideals negatively

impact the mental and physical health of Black people and other persons of color (Burton et al. 2010; Golash-Boza 2016; Hill Collins 2009; Phelan and Link 2015; Ross 2017b).

Because of systemic racism perpetuating discrimination in housing/neighborhood effects, criminal justice, and education, for example, people of color are repeatedly barred from the advantages associated with these institutions and disproportionately subject to disadvantages associated with these institutions (Alexander 2020; Crenshaw 1991; Hill Collins 2009; Pager 2007; Pager and Shepherd 2008). For example, higher education promotes higher income and thus the capacity to afford better quality health care and is associated with more knowledge of good health practices and health-related risks (Durrance and Hankins 2011; Pager and Shepherd 2008; Phelan and Link 2015; Price 2010a). Additionally, through homophily, more highly educated people are linked to other highly educated people who can be resources for them in information gathering about where and how to get the best treatment for acute and chronic conditions. Further, hospitals in predominantly Black neighborhoods have fewer board-certified physicians, higher rates of negligent adverse outcomes and mortalities, and fewer technological resources (Creanga et al. 2011; Hodnett et al. 2012; Phelan and Link 2015; Price 2010b; Reid and Creanga 2018). Meanwhile, Black people, especially Black men, are disproportionately swept into the criminal justice system (Alexander 2020; Pager 2007), where they experience living conditions inimical to physical and mental health, and from which they emerge "marked" with a criminal record restricting further restricting their opportunities for employment, adequate housing, and government benefits.

Further, in housing, historical practices such as redlining maintained segregation in cities and made it difficult for people of color to accrue equity. Segregated Black neighborhoods also contain two to three times as many fast-food outlets, while containing two to three times fewer supermarkets than white neighborhoods of comparable SES (Phelan and Link 2015; Phelan, Link, and Tehranifar 2010; Ross and Solinger 2008b; Thomson et al. 2016). Majority Black and Brown, low-income neighborhoods are also subject to greater victimization by crime while also subject to biased policing and excessive use of force. Not only do crime rates themselves pose a direct threat to the well-being of the people who live in high crime neighborhoods, but over-policing, especially concerning drugs, disproportionately sweeps people of color into the criminal justice system while also subjecting them to police brutality against Black and brown bodies (Alexander 2020; Pager 2007). The death rate from homicide for Black Americans is

more than five times higher than white Americans (Elliott and Reid 2019; Pager 2007; Phelan and Link 2015; Roberts 1997). Minority neighborhoods also have rates of toxic environmental exposure that are five to 20 times higher than white neighborhoods, regardless of neighborhood SES, which contributes to disease and poor birth outcomes (Hoover et al. 2012; Phelan and Link 2015; Price 2010a; Ross 2007).

Finally, in conjunction with the burden of structural, racialized barriers to health and well-being, BIPOC are met with additional barriers to success, in particular social stressors, that threaten their physical and mental health (Elliott and Reid 2019; Hill Collins 2009; Phelan and Link 2015; Stryker 2012). In particular, Phelan and Link (2015) draw on research demonstrating that experiences of discrimination are a social stressor that is unpredictable, spans the life course, and occurs in multiple contexts. Stressors create a stress response that can be particularly harmful to health. Further, Black Americans are more likely than white Americans to be exposed to a traumatic event, contributing to chronic stress. Additionally, research has shown that Black Americans with a strong racial identity have higher levels of cumulative wear and tear on the body's systems due to repeated adaptation to stressors. This is in keeping with the weathering hypothesis stating that Black individuals experience early psychological and health deterioration as a result of the cumulative stress of living in a racist society as a minority (Phelan and Link 2015).

Dovidio and Gaertner (1998) introduced the term 'aversive racism,' which refers to white people's implicit bias against Black people, even if they do not say racially prejudiced things. Research has demonstrated that exposure to aversive racism and discriminatory behavior toward Black people encumbers interpersonal interactions and collaboration between white and Black people (Phelan and Link 2015). Steele (1997) introduced the term 'stereotype threat,' defined as the anxiety high-achieving young Black Americans experience related to the possibility of confirming negative stereotypes about their group. Research on stereotype threat has revealed a relationship between the anxiety caused by stereotype threat and decrements of performance on achievement tests, which stifles academic achievement and perpetuates differences in outcomes based on race (Phelan and Link 2015).

In another example, Eberhardt (2020) shows that Black people suffer adverse mental health consequences when police kill Black people in their state, consequences not suffered by white people within the same state. Being the target of racism negatively affects self-esteem and

a sense of worth and dignity (Eberhardt 2020). Racial targeting creates stress, shortening telomeres and leading to a shorter or lesser quality of life (Eberhardt 2020). Racism also diminishes one's sense of status in society, which is linked to stress and reduced self-esteem (Eberhardt 2020). As such, racial differences expose people differentially to the very social determinants that influence the quality of health, including differential mortality and morbidity. Together, flexible resources work to advantage white people at the expense of Black people at every level of society, from the macro/structural to the micro/interactional (Hill Collins 2009; Phelan and Link 2015; Roberts 1997; Ross 2017a; Washington 2006).

Overall, empirical research demonstrating that racism is a fundamental cause of health disparities is highly consequential for the effectiveness of interventions aiming to lessen racial disparities in mortality (Hill Collins 2009; Phelan and Link 2015; Roberts 1997; Ross 2017a; Washington 2006). Phelan and Link (2015) assert that racial inequalities in health cannot be permanently eliminated by addressing related risk factors for death. Instead, they argue that long-term reduction of racial inequalities in health needs to address racism as a root cause of the inequities (Phelan and Link 2015). This is because health inequalities resulting from a fundamental cause cannot be eradicated by addressing any given set of intervening mechanisms(Phelan and Link 2015). Systemic racism, by which I mean any racialized disadvantage in resources to people of color operating independent of conscious prejudice or ill intent of white people, ensures that those in power stay in power. Thus, the knowledge, money, power, prestige, and connections that constitute flexible resources ensure that mechanisms are replaced in ways that maintain the status quo in favor of the privileged at the expense of the marginalized (Crenshaw 1991; Hill Collins 2009; Phelan and Link 2015; Roberts 1997; Ross 2017a; Washington 2006).

As a reminder, SES is also a fundamental cause of health disparities not only in its linkage with race, but also independently, and thus, similarly, eliminating specific risk factors that in a particular time and place are associated with SES differences will not eliminate health inequalities associated with inequalities in SES. Rather, economic inequality itself must be reduced, as is the case with reducing racial inequality and racism in itself. My project will consider some SES measures, and I consider them under the framework of fundamental cause similar to my racialization measures.

Implications of FCT for Policy

FCT has several implications for health policy relevant to the current project (Phelan et al. 2010). The first implication is the importance of redistribution of resources in the population to reduce the degree of resource inequality by race/ethnicity because doing so will reduce inequalities in health (Phelan et al. 2010). Example target policies might include minimum wage policies, public housing assistance policies, head-start programs, or even parental leave (Phelan et al. 2010). Second, prioritize identifying factors that put people at risk of risks, such as power differences in social relationships, to avoid enacting ineffective interventions that aim to change behaviors but ignore the more pressing social factors at play (Phelan et al. 2010). These interventions may include targeting changes in neighborhood environments that create scarcity in the availability and accessibility of healthy foods, rather than attempting to change individual behaviors deeply influenced by SDH (Phelan et al. 2010). Finally, prioritize the development of interventions that automatically benefit individuals irrespective of their resources or behaviors. Such interventions could include providing health screenings in schools, workplaces, and other community settings rather than solely through private physicians (Phelan et al. 2010).

Critiques of FCT

Freese and Lutfey (2011) offer important critiques of FCT while also building on the perspective. Their critiques help situate my project within the SDH and fundamental cause frameworks. The focal critique of FCT from Freese and Lutfey is that FCT tends to emphasize mechanisms that necessitate individual agency in mobilizing resources but ignores or underemphasizes non-agentic mechanisms (Freese and Lutfey 2011; Lutfey and Freese 2005). A typical example of the difference between agentic and non-agentic mechanisms is seatbelts and airbags in cars (Freese and Lutfey 2011; Lutfey and Freese 2005). Agentic mechanisms, like seat belts, are available in all cars but rely on the individual to put their seat belts on to be effective (Freese and Lutfey 2011; Lutfey and Freese 2005). In contrast, non-agentic mechanisms, like airbags, are effective without relying on individuals acting in favor of their health or safety[3] (Freese and Lutfey 2011; Lutfey and Freese 2005).

[3] However, Freese and Lutfey do point out in their book chapter (2011) that there are airbags above the minimum standard which can be purchased to further reduce the risk of death and serious injury in a crash, so even in this example, we could still expect to see disparities along d SES lines.

Freese and Lutfey (2011) argue that FCT employs individual-based agency narratives that are predicated on assumptions that institutions are static, as opposed to dynamic, entities. The authors assert that consideration of institutional agency is a necessary component to FCT because this perspective accounts for how institutions interact differently among people with different SES to affect health outcomes (Freese and Lutfey 2011; Lutfey and Freese 2005). Specifically, Freese and Lutfey argue that focusing on access and individual utilization of resources "limits consideration of some of the more sociological aspects of institutions and how they might interact with individual actions and resources to amplify disparities" (Freese and Lutfey 2011:17). Rather, institutions operate in dynamic ways to maintain power and undermine disenfranchised actors (Freese and Lutfey 2011; Lutfey and Freese 2005). In sum, Freese and Lutfey argue that it is imperative to introduce interventions that do not rely on individual agency or leave room for institutions to deliver disparate resources, services, or treatment.

In their 2005 ethnographic study of two diabetes clinics—one of which served a high SES patient population and the other of which served a low SES patient population—Freese and Lutfey (2005) found that many mechanisms were operating within and beyond the clinic as well as within and externally to patients that impacted the perpetuation of health disparities based on SES (Lutfey and Freese 2005). Freese and Lutfey (2005) found that such "within the clinic" factors as continuity of care, in-clinic educational resources, and division of labor among physicians operated as mechanisms helping to account for health disparities between the two diabetes clinics. Freese and Lutfey identified several important factors external to the individual patient outside of the clinic setting, such as financial and occupational constraints and social support networks. Lastly, they identified important factors within the patients themselves, such as the costs of compliance to the treatment regimen and the relative magnitude of the advised lifestyle adjustments. Additionally, they documented 'compensatory inversions' wherein resources were disproportionately distributed to the patients who needed them the least (Lutfey and Freese 2005). Plainly, they found that the same patients who are most likely to educate themselves about diabetes outside the clinic are also the patients who have access to the best educational resources inside the clinic (Lutfey and Freese 2005).

Overall, the arguments and research of Freese and Lutfey (2011) establish the need for corrective interventions that do not require agency on the part of marginalized populations. These more non-agentic mechanisms would eliminate the need for individuals to exercise their

agency to receive services/care, which the authors recognize come with tradeoffs that necessitate careful consideration (Lutfey and Freese 2005). They expose a need for a more equitable distribution of resources that compensates for the pre-existing barriers faced by marginalized groups (Lutfey and Freese 2005).

Freese and Lutfey also highlight difficulties in implementing policies based on FCT. For example, individual and institutional mechanisms work in tandem to increase the efficacy of policies and interventions (Lutfey and Freese 2005). However, policies that reduce agency by establishing mandates introduce issues of health paternalism, and thus there must be careful consideration of tradeoffs (Lutfey and Freese 2005). Specifically, Lutfey and Freese (2005) document evidence of practitioner bias that framed lower SES patients as having a lower cognitive ability, and thus, these patients may have received less-sophisticated care regimens than what the patients could manage (Lutfey and Freese 2005).

Synthesis of Theoretical Framing of Argument

SDH and FCT have become increasingly important frameworks to employ when analyzing and crafting policy solutions to racial and class-based health disparities issues. These inter-related perspectives are integral to my current project seeking to understand how maternal health disparities can be alleviated through policy interventions. The current, policy-focused project integrates insights from both SDH and FCT by showing how race and SES/class are associated with the place-based domains of mechanisms signaled by SDH and by showing what SDH and FCT suggest about reasons for health disparities, including in women's reproductive health, and what these frameworks imply for designing more versus less effective policy interventions. Phelan and Link (2015) provide multiple empirical examples of racism as a fundamental cause of health disparities, and many of these examples are meaningful for my own arguments regarding the relationship between policy packages and racial disparities in maternal mortality. Generally, the authors provide evidence that racism is a fundamental cause of health disparities and has a fundamental association with health independent of SES. This finding is consistent with literature acknowledging that Black women are still at a disproportionately high risk of maternal mortality when controlling for SES (American College of Obstetricians and Gynecologists 2019; Petersen et al. 2019). This is also consistent with other works, such as Washington (2006), tracking the impacts of systemic racism in healthcare generally as well as in

reproductive health care for women of color (Owens 2017; Roberts 1997; Ross 2017c; Stern 2005; Washington 2006).

Additionally, through examining longitudinal studies of health outcomes independent of SES, Phelan and Link (2015) can demonstrate that as prevention or treatment information arises, a mortality advantage also emerges for white individuals over Black individuals. This finding has significant implications for how I approach the potential long-term impacts of policy packages on racial gaps in maternal mortality. However, looking to both policy packages and single policy interventions could prove helpful to understand further how individual policy measures and combinations of policy measures may or may not be beneficial in decreasing the racial gap in maternal mortality rates.

FCT was created as one approach associated with social determinants and helps us think about mechanisms focusing on the individual level. However, my project is at the aggregate, city-level of analysis. In that way, my work is not a direct elaboration or test of FCT. Rather, it is informed by FCT. I can analogize some aggregate-level modeling to FCT's emphasis on mechanisms. I also adopt FCT's caution regarding how mechanisms can change while fundamental causes of health disparities remain. In particular, I draw on FCT's acknowledgment of how mechanisms perpetuate existing disparities, which speaks to the difficulty of designing effective interventions and composing appropriate policy packages. Additionally, I draw on the perspective to argue that while working to eliminate racial inequality would be the panacea, intervening mechanisms necessitate thinking about issues of access and health disparities holistically.

FCT also links to another theoretical inspiration for this project, Reproductive Justice Theory, which pertains specifically to reproductive health and will be discussed in greater depth in Chapter 2. There I will argue that Reproductive Justice is a necessary theoretical framework to draw on alongside SDH and FCT when discussing policy packages and reproductive ideologies that most effectively improve maternal mortality rates for women in major U.S. cities. The reproductive justice framework integrates the role that policy and ideology play in controlling women of color's reproductive autonomy both historically and contemporaneously. As both fundamental cause and reproductive justice frameworks would suggest, aggregate policy and institutional/organizational and ideological factors must be considered both historically and in the current context as potential mediating mechanisms that may help explain the aggregate

effects of city-level racial composition and percent poverty. Again, historical mechanisms that help explain racial disparities across cities will be discussed in Chapter 2. The fact that the 50 cities in my project differ in racial composition and in policies, organizations, and routines that deliver reproductive care allows me to develop and examine this idea in detail.

Policy packages and institutional factors can be viewed as aggregate-level social determinants that set the context in which the individual-level mechanisms involving agentic mobilization of flexible resources, including networks, knowledge, and money, happen. It is also possible that some policies and institutional factors may mediate these agentic mechanisms and relationships. For example, if cities with higher proportions of people of color are more likely to have policies that provide reproductive services to teens, these, in turn, could lessen racial disparities both directly and indirectly. However, if cities with higher proportions of people of color are less likely to have policies that provide reproductive services to teens, these policies could still lessen racial disparities directly, but the indirect route from the racial composition of the city to the policy to racialized health outcome would exacerbate racial disparities. These potential relationships will be fully elaborated in Chapter 7. In sum, I will be exploring the net effects of a set of crucial SDH variables, including policies and city-level demographics. Although I will not conduct formal tests of mediation, I will also explore the idea of indirect effects in which policies may be mediating mechanisms between city demographic composition in terms of race and poverty and aggregate maternal mortality or racial disparities in reproductive health. The latter is done in analogy to the logic of FCT though it does not elaborate or test FCT itself.

CHAPTER 3: LITERATURE REVIEW OF REPRODUCTIVE JUSTICE AND REPRODUCTIVE POLICY

Introduction

As previewed in the introductory overview and Chapter 2, this chapter will discuss the relevant socio-historical origins of contemporary realities in maternal health, emphasizing racial disparities, including racial disparities in maternal mortality. First, I will discuss how policies and ideologies around reproduction have worked in tandem to police reproducing bodies and restrict bodily autonomy, particularly for people of color. I will then discuss the various reproductive ideologies that emerged to combat the state-sanctioned restrictions and violence against women's bodies. Next, I will explain this project's focus on Reproductive Justice as the ideal reproductive framework for future policy decisions, as it best pairs with the more general fundamental cause and social determinant perspectives on health outcomes and with the reality of racial differences in maternal health (see Chapter 2). Next, I will discuss one example of a contemporary policy attempting to address maternal health disparities; this will emphasize the importance this project places on the 'local' or 'city-level' as the unit of analysis. Finally, I will end by discussing the community-based response of increased use of doulas to address the problem of maternal mortality. More information on the research and policy work that has been done to measure and alleviate poor maternal health outcomes will be covered in Chapter 4.

Historical Roots of Racial Disparities in Maternal Health

Racist Ideologies & Policies: Eugenics & Forced Sterilization Policies

Terminology for selective breeding to weed out undesirable traits in the population, termed 'eugenics,' was first introduced by Francis Galton in the 1880s (Carey 2012; Roberts 1997; Ross 2017c; Stern 2005). Eugenics was based on the notion that intelligence and other characteristics (later welfare dependence and poverty) could be genetically inherited through reproduction and quickly became the dominant racial frame of the time (Carey 2012; Roberts 1997; Romero and Agénor 2017; Ross 2017c; Stern 2005). The eugenics movement targeted people with mental illnesses, people of color, criminals, poor people, and people with physical

disabilities deemed biologically/genetically inferior to wealthy, white, non-disabled individuals (Carey 2012; Stern 2005). For example, early movements to legalize birth control in the 1900s capitalized on the 'eugenics craze,' arguing that birth control would help limit reproduction among "unfit" mothers, mainly referring to Black and Puerto Rican women (Carey 2012; Stern 2005).

Motivated by eugenic ideology, states introduced forced sterilization laws that authorized doctors to sterilize people deemed 'unfit to reproduce' without their consent (Carey 2012; Roberts 1997; Ross 2017c). In 1907, Indiana became the first state to pass one of these laws, and the laws spread across the country until 32 states had compulsory sterilization laws (Roberts 1997; Ross 2017c). Forced sterilization laws and practices represent the social and reproductive control of minority populations, and particularly people of color, by the state (Carey 2012; Roberts 1997; Ross 2017c; Stern 2005). Women of color were not consenting to these procedures and were often not informed that they would be receiving them (Carey 2012; Roberts 1997; Ross 2016; Stern 2005). Additionally, doctors often described tubal ligations to patients as reversible processes (Carey 2012; Roberts 1997; Ross 2016, 2017c; Stern 2005). In Latina populations in Los Angeles, California, many women were coerced into these sterilization procedures under threat of losing their immigration rights and parental rights (Carey 2012; Romero and Agénor 2017).

These practices continued in the U.S. into the 1970s and are still ongoing in incarcerated populations (Roberts 1997; Ross 2017c). Currently, prisons are the second largest provider of reproductive health services in the U.S. (Ross 2016, 2017c). The relationship between eugenics and forced sterilization laws exemplifies ways in which reproductive ideologies and policies have historically been partnered in efforts to constrain the reproductive rights of marginalized women, and particularly women of color.

Racialized Medical Practices: Medicalization of Childbirth

State-sanctioned policies endow doctors with extensive power over women of color's reproductive autonomy. Doctors became these reproductive authorities and agents of the state by co-opting childbirth oversight from women of color birth workers (Bonaparte 2016; Davis 2019b; Oparah and Black Women Birthing Justice 2016). For example, during the Victorian Era, James Marion Sims, now regarded as the father of modern gynecology, performed numerous

invasive, exploratory procedures on over a dozen enslaved women to develop the surgical techniques necessary to repair vesicovaginal fistulas, which are tears in the vaginal wall caused most commonly by prolonged labor or sexual assault (Bonaparte 2016; Oparah and Black Women Birthing Justice 2016; Ross 2016). These procedures were performed without anesthesia, both because of their rarity during the period and because of the eugenics-based conceptualization that women of color have a higher pain tolerance than other humans (Davis 2019b; Oparah and Black Women Birthing Justice 2016; Owens 2017; Roberts 1997; Ross 2016). Significantly, this notion went completely unchallenged in medical practice until the 1940s and has had negative ramifications for contemporary doctor-patient interactions (Owens 2017; Roberts 1997; Washington 2006).

Sims capitalized on the fame and success of his procedures and founded the nation's first maternity hospital in New York City; the hospital specifically attended to wealthy, white women (Bonaparte 2016; Oparah and Black Women Birthing Justice 2016; Ross 2016). This maternity hospital began the transition to births in hospitals and is an example of what Harriet Washington (2006) refers to as 'medical apartheid.' Medical apartheid captures the notion that the women whose bodies were non-consensually experimented on were crucial for medical advancement but were simultaneously excluded from the benefits resulting from that abuse (Washington 2006). Washington (2006) also links the historical implications of medical apartheid to systemic distrust of doctors by patients of color that, in turn, may have ramifications for the health outcomes of patients of color.

Before births were conducted in hospitals and predominantly attended by white, male physicians, births were mainly attended by granny midwives, particularly in the rural southeastern United States. (Bonaparte 2016; Oparah and Black Women Birthing Justice 2016). Granny midwives were enslaved women birth experts who were well-respected within their communities (Bonaparte 2016). They attended approximately 80 percent of Black and white births in the Southern U.S., providing a variety of holistic birth services such as preconception counseling and prenatal care, the actual delivery, and postpartum services (Bonaparte 2016; Oparah and Black Women Birthing Justice 2016). Granny midwives were able to offer better privacy and continuity of care compared to hospital wards, and they also trained other women of color to provide these services for both women of color and white women (Bonaparte 2016;

Oparah and Black Women Birthing Justice 2016). Additionally, they provided training to many new physicians on how to attend births (Bonaparte 2016).

The transition came as more physicians realized they could have a lucrative career by practicing gynecology and obstetrics; however, they first needed to establish themselves as experts within the broader society (Davis 2019b; Diaz-Tello 2016; Owens 2017; Washington 2006). Physicians lobbied politicians to enact policies that professionalized medical practice in this arena, restricting who could attend to childbirth and excluding granny midwives from practicing in hospitals (Bonaparte 2016; Diaz-Tello 2016; Oparah and Black Women Birthing Justice 2016; Owens 2017). Physicians also frequently published articles in American Medical Association journals undermining the authority, expertise, and quality of care offered by doulas and granny midwives (Bonaparte 2016; Oparah and Black Women Birthing Justice 2016). These articles implemented racist, sexist, and ageist language, implying that women of color birth workers were uneducated, dirty, and practicing witchcraft (Oparah and Black Women Birthing Justice 2016). They additionally claimed that hospitals were cleaner and safer; however, hospital maternal and infant health outcomes were not better compared to home births (Diaz-Tello 2016; Oparah and Black Women Birthing Justice 2016). Hospitals experienced higher maternal mortality rates than home births because of communicable diseases and poor hygiene practices in hospitals (Oparah and Black Women Birthing Justice 2016).

Physicians poached best practices in response to these adverse outcomes, such as washing hands and using clean towels between each birth, from women birth workers to improve hospital outcomes (Oparah and Black Women Birthing Justice 2016; Owens 2017). By the mid-20th century, most births were occurring in hospitals, but segregation laws and other geographic factors often made it difficult for women of color to access hospitals to give birth (Bonaparte 2016; Diaz-Tello 2016; Owens 2017). In the process of medicalizing childbirth, women of color's expertise and their access to reproductive services were challenged, limited, and ignored, and those barriers were reinforced by both policy and shifting ideology around reproduction.

Contemporary Contributions to Disparities in Maternal Health

Reproductive Control in Social Policy

As time progresses, new mechanisms shaping reproduction emerge, but disparities for low-income women and women of color persist in ways consistent with fundamental cause theory (FCT). Temporary Assistance to Needy Families' (TANF) family cap policies are another form of state-orchestrated reproductive control implemented to restrict low-income women's reproduction, disproportionately impacting women of color. The family cap denies additional aid to accommodate the expanding families of poor women who become pregnant while on welfare (Briggs 2017; Romero and Agénor 2017; Sawyer, Thoroughgood, and Ladge 2017; Stern 2005). This policy was an explicit attempt to control poverty by controlling reproduction; it operates on the assumption that poor women decide whether to have a child based on whether they will receive more income from the state (Briggs 2017; Romero and Agénor 2017; Stern 2005). Research finds that this is an unsuccessful approach to poverty control (Bridges 2011; Briggs 2017; Roberts 1997). The family cap was also a state-sanctioned mechanism to penalize low-income women for having children, and because of the association between race and SES, the family cap further marginalized women of color (Bridges 2011; Briggs 2017; Roberts 1997; Stern 2005). Studies have demonstrated that states with higher proportions of people of color were more likely to adopt the family cap, and 24 states across the U.S. adopted this policy (Roberts 1997; Romero and Agénor 2017).

In the mid-1900s, compulsory use of particular birth control methods, such as the Pill, Depo-Provera, and Norplant, or forced sterilization were implemented as criteria for women of color to receive welfare or other federal assistance or as an alternative to incarceration as mandated by the courts (Roberts 1997; Romero and Agénor 2017). In the 1950s, 1960s, and 1970s, government programs forcibly sterilized a minimum of 25 percent of indigenous women ages fifteen to forty-four and annually sterilized approximately 100,000 low-income women (Romero and Agénor 2017). Activists such as Fannie Lou Hamer, who was forcibly sterilized via hysterectomy in 1961, worked to link reproductive rights with voting rights for Black women in the southern U.S. (Brooks 2014). Along with other voting rights activists of color, she argued that Southern politicians were the gatekeepers keeping forced sterilization practices legal and that because women of color were often restricted from voting, they were barred from electing

representatives who would restore reproductive control to these marginalized women (Brooks 2014).

These contemporary linkages between government policies and the severe, long-lasting impacts on women's reproductive and maternal health in the U.S., particularly women of color, suggest the importance of considering policies as a mechanism for positive social change. Moreover, with the persistence of dramatic racialized economic and political inequalities, particular attention must be paid to the myriad ways new mechanisms may arise through policy that perpetuate racial and SES disparities in maternal health.

In the following section, I will outline how women have organized to bring attention to problematic policies and practices in reproductive and maternal healthcare in the U.S. This section sets the stage for reviewing the impacts and implications of present-day reproductive policies on reproductive and maternal health outcomes.

Response to Reproductive Disparities: Reproductive Rights, Justice, and Freedom

Reproductive rights, freedom, and justice are the three prominent frameworks in contemporary discourse on reproduction in the U.S. To different extents and capacities, all three draw on human rights frameworks acknowledging the role of the state in ensuring both positive and negative rights regarding issues of reproduction and reproductive health (Ross 2017a; Ross and Solinger 2008a; Smith 2017). Positive rights focus on the government's responsibility for responding to the needs of society, in this case, the needs of reproducing bodies; they ensure that people can exercise their freedoms and enjoy the benefits of society (Briggs 2017; Ross and Solinger 2008a). On the other hand, negative rights restrict the government from interfering unnecessarily with people's autonomy, focusing on the government's responsibility not to create obstacles or 'undue burden' to freedom of choice (Briggs 2017; Ross and Solinger 2008a). Simply, where negative rights emphasize that governments should not impose themselves in ways that create obstacles to reproductive care, positive rights emphasize that governments should act to remove existing barriers to reproductive care as they arise and in a preventative manner (Briggs 2017; Ross and Solinger 2008a).

Several social movements emerged throughout the mid to late twentieth century to confront the legacy of state-imposed reproductive constraints. In the following paragraphs, I outline the social movements that centered the needs and experiences of white women to the

detriment of women of color. I then introduce Reproductive Justice as a movement, theory, and praxis that centers the needs of the most marginalized in its approaches to social justice and change.

Reproductive Rights, Pro-Choice, & Natural Birth

The reproductive rights framework is primarily a liberal, white feminist framework that relies heavily on litigation strategies to achieve its goals and protect its past achievements (Ross and Solinger 2008a). Reproductive rights emerged in the late 1960s and early 1970s, focusing primarily on legalizing abortion and contraception and maintaining legal access to these services (Ross et al. 2017; Ross and Solinger 2008a). The goals of second-wave, white, liberal feminism, which employed the reproductive rights framework, were reproductive rights and the right to liberty, equality, and privacy (Ross and Solinger 2008a). In keeping with the focus on abortion and contraception, the reproductive rights movement has championed a single-issue, pro-choice stance since its inception. In this stance, the law is regarded as the sole, essential mechanism for women's liberation (Price 2010b; Ross 2007; Ross and Solinger 2008a; Smith 2017). The choice rhetoric, established in the 1973 Supreme Court decision *Roe v. Wade*, focuses on the liberal ideal of individual rights giving women the 'right to choose' under the framing of privacy about reproductive decisions (Price 2010b; Ross 2007; Ross and Solinger 2008a; Smith 2017).

Additionally, the Pro-Choice movement formed as second-wave feminists of the 1960s and 1970s sought the legalization of abortion. The Reproductive Rights framework champions *Roe v. Wade* and the pro-choice rhetoric, which work in tandem to reify capitalist framings of reproduction, individual rights, and bodies (Ross et al. 2017; Ross and Solinger 2008a). The pro-choice rhetoric frames reproductive decision-making as an individual decision and navigates reproductive issues similarly to consumers making decisions in a marketplace (Price 2010b; Ross 2007; Ross and Solinger 2008a; Smith 2017). However, *Roe v. Wade* and similar court decisions focus primarily on negative rights—people have the right to privacy from the government regarding their decision to have an abortion—and do little to provide positive rights to women who need guaranteed access to reproductive information and services regarding their healthcare options (Price 2010b; Ross 2007; Ross and Solinger 2008a). As a result, rights like choice and privacy are broadly only accessible to white, wealthy women who have the resources to afford

abortions and private healthcare which prescribes contraception (Ross and Solinger 2008a; Smith 2017).

Focusing exclusively on abortion rights and using the "right to choose" frame only to refer to the right to choose not to have a child erased the needs of women of color who were fighting for their right to have children without being forcibly sterilized or losing access to state social support (Roberts 1997; Ross 2016, 2017c, 2017a). Moreover, the Reproductive Rights movement perpetuated the racist and classist rhetoric about fertility and who is fit to be a mother by not advocating to broaden rights for marginalized women, particularly women of color, to access contraception and abortion services as well as fertility and pregnancy support (Ross 2017c; Ross and Solinger 2008a).

The U.S. natural birth movement emerged in the 1950s and 1960s as college-educated white women sought their right to a natural birth experience outside of a hospital and is also based in the Reproductive Rights framework (Oparah and Black Women Birthing Justice 2016; Ross 2017c). These women framed medicalized birth practices of hospitals as a patriarchal invention by male doctors (Bonaparte 2016; Derkas 2017; Oparah and Black Women Birthing Justice 2016). Natural birth advocates also encouraged women to do their self-examinations as a means of removing power from the patriarchal, male-dominated gynecological field (Bonaparte 2016; Oparah and Black Women Birthing Justice 2016). However, focusing so exclusively on the patriarchal nature of the modern reproductive arena disregards the racial origins of the fields of obstetrics and gynecology, as it is significant that these doctors are not only male but also white (Davis 2019b; Oparah and Black Women Birthing Justice 2016; Roberts 1997; Ross 2017b; Smith 2005).

In all, white women co-opted the conversation on reproductive rights in the mid-20th century. In their movement, the white, middle-class majority knowingly and unknowingly overlooked the history of, as well as current realities regarding, forced sterilization (Oparah and Black Women Birthing Justice 2016; Ross 2016, 2017c; Smith 2005; Stern 2005). This reinforced the prioritization of the needs and experiences of white, middle-class women at the expense of the needs of women of color (Ross 2017a, 2017c; Smith 2005).

Consequently, women of color were continually marginalized in groups attempting to expand access to reproductive care services and bodily autonomy. Meanwhile, white women successfully got their needs met, namely the legalization of abortion and the oral contraceptive

pill. These political conversations and social movements had a significant impact on reproductive policies and subsequent reproductive options for women, focusing on the needs of a privileged demographic. Overall, these movements likely diminished aggregate maternal mortality and enhanced maternal health along race and class lines, such that the gap in maternal mortality rates of Black and brown women compared to white women increased, even if overall rates of maternal mortality improved.

Reproductive Justice

In response to ongoing reproductive oppression by the state and to how their reproductive needs differed from and were ignored by liberal, white feminist initiatives utilizing the Reproductive Rights framework, the Caucus of Black Feminists assembled for the first time in 1994 at a pro-choice conference to create the Reproductive Justice framework (Ross 2017c, 2017a). Whereas for white, wealthy women, easy access to options that prevented pregnancy was a priority, women of color had to fight for their right not to be sterilized without their consent (Ross et al. 2017; Ross and Solinger 2008a).

Reproductive Justice expands on the Reproductive Rights framework, incorporating the interconnected social and non-biological issues that impact reproductive bodies and parenting experiences in relation to the state and other power groups. These issues typically are not raised in pro-choice/anti-abortion discussions (Ross and Solinger 2008a). The framework emphasizes the right to bodily autonomy, to have or not have children, and to raise and parent the children one does have in safe, healthy, supportive communities (Ross 2017a; Ross and Solinger 2008a). Reproductive Justice argues that safe and dignified fertility management, childbirth, and parenting constitute fundamental human rights that need to be addressed by the state (Briggs 2017; Ross 2017a; Ross and Solinger 2008a). Specifically, Reproductive Justice endorses the need for both positive and negative rights regarding the state's "obligation to help create the conditions for women to exercise their decisions without coercion and with social supports" (Ross and Solinger 2008a, pg. 169). Reproductive Justice begins to call attention to the root causes of inequality in economic and political power.

In expanding the bounds of the Reproductive Rights framework, Reproductive Justice contributes several critiques of "choice" rhetoric (Price 2010b; Ross 2017a; Ross and Solinger 2008a). While 'choice' is about the liberal ideal of individual rights, Reproductive Justice is

about the whole person, whole family, and whole community and about altering power relations and shifting resources to those who are marginalized or oppressed (Ross and Solinger 2008a). As does the Reproductive Rights framework, Reproductive Justice acknowledges that choice, privacy, and liberty are all critical to reproductive autonomy. However, the Reproductive Justice framework extends the argument by asserting that these are insufficient, especially when considered in isolation from society's sexism, racism, xenophobia, and economic exploitation, among other factors (Ross et al. 2017; Ross and Solinger 2008a).

Choice rhetoric obscures how policies and laws punish certain reproductive bodies while rewarding others for reproducing (Price 2010b; Ross et al. 2017; Ross and Solinger 2008a; Smith 2017). Reproductive Justice also critiques the *Roe v. Wade* decision for failing to criticize the government's promotion of social conditions that created such significant disparities in reproductive health care and access (Ross and Solinger 2008a; Smith 2017). For example, low-income women of all races and ethnicities could not exercise choice in the same way because they did not have the means to access things like abortion, adoption, and perhaps even motherhood (Ross 2017a; Ross and Solinger 2008a).

Like Reproductive Rights, the Reproductive Justice framework also acknowledges the necessity of abortion access. However, Reproductive Justice adds that when access to abortion services is isolated from other social justice issues, the intertwined systems in people's lives that constrain or influence their reproductive decisions are disregarded (Ross et al. 2017; Ross and Solinger 2008a; Smith 2017). Reproductive Justice advocates for the:

> network of opportunities, support, and services that would allow all women to meaningfully exercise the abortion right in a context that supports their reproductive health, economic justice, motherhood, and the well-being and safety of individuals and their communities (Ross and Solinger 2008:122).

Further, while the Reproductive Rights framework regards the law as the pinnacle mechanism for women's liberation, the Reproductive Justice framework posits that changing laws and policies is just one of several vital mechanisms, along with community-based and grassroots initiatives, that will bring about the systemic changes women need to truly achieve reproductive autonomy (Ross 2017a; Ross and Solinger 2008a).

By emphasizing domains outside of the law, including abortion, Reproductive Justice links back to the overarching societal inequalities and social determinants of health (SDH) that are the focus of FCT. The policies and ideologies that the reproductive justice movement and this

project highlight shape the network of opportunities, supports, and services that shape maternal health outcomes, including maternal mortality. These changes in policies and ideologies based in a Reproductive Justice framework pertain not only to the health system but also to other key systems that influence maternal health, such as those discussed in Chapter 1, under the rubric of social determinants of health. In this way, Reproductive Justice calls for an expansion and increased investment in networks of opportunities, support, and services that provide mechanisms linking race and class to maternal health in critical ways. Such mechanisms may mitigate or eliminate racial and class disparities rather than exacerbate or reinforce them. By implementing policies with Reproductive Justice framings, we might expect to see improvements in aggregate maternal mortality rates, and perhaps also mitigation of class and race disparities because of the connection among Reproductive Justice, attention to class and race, and attention to the various social determinants of health that link class and race to maternal health disparities as outlined in FCT.

Reproductive Freedom

Reproductive Freedom encompasses an array of reproductive rights seen through the lens of Reproductive Justice; it uses a Reproductive Justice frame to inform its advocacy but does not invoke the label of Reproductive Justice (Price 2010b). Reproductive Freedom draws on Human Rights discourse around the body and its need for bodily autonomy and integrity (Tanyag 2017). This framework, like Reproductive Justice, expands on the Reproductive Rights framework by putting the onus on the state to provide both positive and negative reproductive rights and provide select community-level outreach initiatives (Price 2010b). Operating at the intersection of health, rights, and justice, Reproductive Freedom emphasizes the freedom of each person to control their reproductive and sexual lives, the ability to choose whether and when to have children, and the support persons need to raise their families (Tanyag 2017).

Reproductive Freedom is taking root predominantly at the organizational level, such as in reproductive organizations' mission statements rather than at the level of a society-wide general discursive framework guiding reform. Drawing on conversations with my contact at the National Institute of Reproductive Health (NIRH), Jenny Mistry, many organizations advocating for reproductive rights find the Reproductive Rights framework too limited and too focused on a single issue (abortion). These reproductive advocacy organizations are also predominantly white

organizations headed by majority-white executive boards. Thus, they do not explicitly use the Reproductive Justice theoretical framework because they seek to avoid appropriating a discursive framework made for and by women of color (Price 2010b). Additionally, these organizations are not engaging in community initiatives to the extent that reproductive justice organizations do.

In short, Reproductive Freedom enacts a more holistic, intersectional framework than Reproductive Rights, but the framework is not as all-encompassing and anti-capitalist as Reproductive Justice (Price 2010b; Tanyag 2017)[4]. It is important to note that in not being as all-encompassing, some critical domains of SDH may be overlooked, and this may perpetuate disparities in maternal and reproductive health. While Reproductive Freedom approaches reproductive rights issues using Reproductive Justice as its lens for understanding the social context for reproduction and its impact on marginalized communities, it does not explicitly integrate insights from the radical birth movement, which emphasizes the disparities in reproductive outcomes driven by obstetric racism[5] (Davis 2019a). Nor does Reproductive Freedom highlight the importance of doulas and other birth workers in improving maternal outcomes.

Reproductive Frames & Policy

Because it situates a wide variety of social issues within the reproductive context and centers those most marginalized by state policy, Reproductive Justice is a vital frame to use when assessing how governing bodies and policies holistically address issues impacting reproductive control for the most marginalized populations (Ross 2016, 2017c, 2017a). Consistent with FCT, by taking a holistic approach to the social determinants of health that influence people's reproductive lives, the reproductive justice movement has allowed greater visibility of reproductive violence and oppression at the hands of the state while simultaneously

[4] However, many organizations may identify as a Reproductive Rights organization, but actually use a Reproductive Freedom framework. Conversely, organizations like NARAL: Pro-Choice America have recently rebranded their organizational values calling them 'Reproductive Freedom,' but they did this to introduce a more politically neutral frame for abortion, without the integration of other rights or justice issues.

[5] Attributed to Dr. Dána-Ain Davis, 'obstetric racism' exists at the intersection of obstetric violence and medical racism that emerges during prenatal care, labor, and birthing and is a threat to positive outcomes for obstetric patients, specifically Black women. It includes, among other things, lapses in diagnosis, neglect, disrespect, dismissal, causing pain, and coercion (Davis 2019a) .

promoting grassroots and community-based solutions and responses to reproductive disparities and inequalities for people of color. In this way, Reproductive Justice aids in outlining the specific mechanisms and concrete factors that create or mitigate racial disparities in maternal health outcomes, including mortality.

The Reproductive Justice framework has developed over time to include specific policy recommendations, and it has been used as a unifying perspective to oppose policies that restrict reproductive autonomy. The Reproductive Justice movement situates its reproductive politics within a human rights framework, meaning that applying an intersectional approach to reproductive politics can aid in achieving human rights (Ross and Solinger 2008b). The Center for Reproductive Rights (2014) makes several state-level policy recommendations to broadly improve reproductive justice for pregnant women. The Center recommends policies acknowledging reproductive health risks from environmental toxins, which disproportionately impact Latina and Black women. The Center also recommends addressing the health needs of pregnant women facing addiction, increasing supports and training to health care providers responding to gender violence, providing access to doulas, enforcing women's autonomy over their end-of-life care directives, and providing for reproductive health care and rights of incarcerated women (Center for Reproductive Rights 2014).

Specific to the issue of the maternal mortality crisis, the Center for Reproductive Rights recommends that states create and fund maternal mortality review committees, require mandatory case reporting of pregnancy-related deaths to the state health department, and ensure the use of the U.S. standard death certificate, which includes indicators of pregnancy-related death (Center for Reproductive Rights 2014). Grounded in the Reproductive Justice perspective, these policy recommendations are critical to use as a lens for assessing existing gaps in reproductive and maternal policies and disparities in maternal and reproductive health.

Reproductive Justice and FCT

Placing FCT and Reproductive Justice into conversation with one another allows me to formulate my theoretical argument best. Reproductive Justice as a framework is inherently intersectional and able to engage with the multitude of mechanisms that constrain and influence our reproductive lives, and thus reproductive health. Reproductive Justice theorists do not explicitly link their diagnostic and prognostic reform framework to the scholarly explanatory

framework of FCT. However, there are grounds to view Reproductive Justice as concretizing considerations highlighted as social determinants of health as these contribute to FCT's assertion that racism and SES disparities are fundamental causes of persistence in reproductive health disparities. Thus, FCT acts as the more general explanatory theory of health disparities into which I fit Reproductive Justice as a framework to identify historically and contemporary specific constraints on and opportunities for achieving maternal health and for achieving racial equality in maternal health.

The history I have outlined in this chapter is a crucial piece of this conversation because these are the legacies that must be eradicated and the prior/current attempts to eradicate them. The Reproductive Justice framework for reform signals both inappropriate policies and ideologies of the past and new ideologies and policies that must be put in place in the present. This means that when we combine Reproductive Justice with fundamental cause theory, we gain insight into policies as mechanisms that may exacerbate or alleviate maternal mortality rates, as well as racial disparities in maternal mortality. In the following section, I outline a contemporary federal policy that attempts to integrate Reproductive Justice ideals in ways consistent with my theoretical argument. I will discuss the benefits and limitations of various reproductive policies related to my central focus on improving maternal mortality outcomes at the local/city level.

Policy Response to Reproductive Disparities: The Rural MOMS Act

U.S. Senate Bill 2373 (S.2373), the Rural MOMS Act, was introduced in July 2019 to amend the Public Health Service Act. The Rural MOMS Act builds off previous legislation, the MOMS Act (S.116) introduced in January of 2019. S.116 was intended to improve maternal and obstetric care in states generally through grant money for training, evaluation, and implementation of maternal safety bundles[6]. S.2373 establishes grants for both rural obstetric networks and provider training programming to improve maternal and obstetric care in rural areas (U.S. Senate 2019a). While the MOMS Act (S.116) mandates that states prioritize funds to low-income, at-risk, and rural populations, S.2373 is earmarked exclusively for improving maternal and obstetric care in rural populations (U.S. Senate 2019b, 2019a).

[6] Maternal safety bundles are standardized best practices for maternal morbidity and mortality prevention (U.S. Senate 2019b)

Rural obstetric networks are collaborative improvement and innovation networks focused on providing evidence-based maternal, postpartum, and labor and delivery care to pregnant individuals in rural areas to improve outcomes in birth and maternal mortality and morbidity (U.S. Senate 2019a). The Rural MOMS Act proposes allocating $3,000,000 per fiscal year for 2020-2024 for Rural Obstetric Network Grants (U.S. Senate 2019a). These rural obstetric networks will use grant funding to:

1. help pregnant people in rural areas connect with prenatal, labor and birth, and postpartum care;
2. identify successful prenatal, labor and birth, and postpartum delivery models for rural individuals;
3. develop models for collaboration between health facilities with and without obstetric health units;
4. provide training and guidance for health facilities without an obstetric health unit;
5. collaborate with academic institutions to give regional expertise and research on access, outcomes, needs assessments, and other data and
6. measure and address inequities in birth outcomes among rural residents with emphasis on Black and Indigenous residents (U.S. Senate 2019a).

Provider Training Programming Grants are awarded to medical residents and fellows, other clinical and non-clinical professionals, and academic units and programs, for which the Rural MOMS Act proposes allocating $5,000,000 per fiscal year from 2020-2024 (U.S. Senate 2019a). Grant funding is used to provide training programs specific to providing maternal care and services in rural community-based settings. Specifically, S.2373 outlines supporting: training for physicians, family medicine and obstetrics and gynecology residents, and fellows to practice maternal and obstetric medicine; training for licensed and accredited healthcare providers; and establishing, maintaining, or improving academic programs that develop evidence-based practices or recommendations for the design of programs or directly provide training for students/faculty (clinical experiences and research) to improve maternal care in rural areas (U.S. Senate 2019a). These programs need to include content on maternal mental health, maternal substance use disorder, social determinants of health specific to individuals in rural communities, and implicit bias (U.S. Senate 2019a). While this piece of legislation did not pass, it still stands

as a unique example of the ways in which federal policy could work to address disparities in maternal health.

Role of Federal Funding in Healthcare Access for All

Federal funding can present opportunities for accountability, increased resources, and standardization of data. According to Section six of S.2373, within a year of this Act being enacted, a report would be submitted to Congress outlining the gaps in maternal healthcare in the rural U.S., as well as the resources, funding, and forward steps recommended to best approach the issue (U.S. Senate 2019a). This reporting would help ensure that resources are being appropriately allocated and that program expectations are adequately outlined to meet long-term goals of improving care.

Federal funding can also be used to reduce variation in care and practices across states (Kozhimannil et al. 2019; Kozhimannil, Hardeman, et al. 2013). For example, there is currently significant variation across states regarding Maternal Mortality Review Committees (MMRCs) (Kozhimannil et al. 2019). These variations in how maternal health data are collected, reported, and made accessible prompted federal-level legislation to improve the evidence collected about maternal death in the U.S. (Hung et al. 2017; Kozhimannil et al. 2019). While regional and even state-level differences in maternal needs exist and need particular attention, a lack of a comprehensive, standardized mechanism for data sharing/tracking makes it difficult for states and other stakeholders to learn from one another and collaborate on improving maternal health conditions. Federal legislation and funding can intervene by helping create such mechanisms and expectations to allow uniform access to data that can then be used in studies and interventions aimed at improving maternal health outcomes (Center for Reproductive Rights 2014; Kozhimannil et al. 2019).

Further, federal policy can explicitly allocate national health services funding for improving healthcare for marginalized communities. For example, a high number of pregnant women in the U.S. give birth while insured by Medicaid, but experience gaps in care in the first year of the postpartum period, when a large proportion of maternal deaths are likely to occur (Hung et al. 2017; Kozhimannil et al. 2019; Kozhimannil, Hardeman, et al. 2013; Kozhimannil, Law, and Virnig 2013). Medicaid reimbursement of maternal health services, including doula care, is a key avenue for federal policy intervention that impacts a large number of women and

could shift how they experience birth and other maternal health services (Hung et al. 2017; Kozhimannil et al. 2019; Kozhimannil, Hardeman, et al. 2013; Kozhimannil, Law, et al. 2013). These types of policy interventions can impact a larger number of pregnant individuals in the U.S. compared to a state-level policy. While the MOMs Act has not passed, states and localities vary in whether and how much they provide concerning the specific provisions outlined in the Act. Thus, examining how state/local-level variability in maternal health outcomes is shaped by state/local-level variability in these policy factors would provide key empirical data bearing on the importance and potential impact of the Rural MOMs Act were it passed at the federal level. As will be seen in later chapters, there is currently wide variability in access to myriad maternal health services.

Federal Funding in Healthcare Deserts

In the context of maternal healthcare deserts[7], federal funding can provide accountability, explicit expectations, and resources. Federal funding provides accountability structures to ensure that care reaches deserts by mandating that the state, hospital, or program receiving funding allocate it toward areas with high volumes of low-income, at-risk, or rural populations (U.S. Senate 2019b, 2019a). Further, federal funding requires recipients to provide data on the efficacy of the programs for Congressional studies to continue to improve program goals and outcomes (U.S. Senate 2019a). Additionally, federal funding legislation establishes structures for national organizations, like the CDC, to provide additional supports and training to smaller, state/local-level organizations with fewer resources, funding, research, and experience implementing programs to improve services in healthcare deserts (U.S. Senate 2019b). Finally, federal funding and legislation can express explicit expectations for diversity and inclusion in the type of healthcare worker, the population served, and the competencies of the workers. For instance, S.2373 (U.S. Senate 2019a) includes language in the section on training demonstration programming, specifically including non-clinical practitioners like doulas, to provide maternal care services in rural community-based settings. S.2373 also establishes implicit bias training as a required competency of training programs, which helps ensure that providers are equipped to provide equitable care to their patients and clients (U.S. Senate 2019a).

[7] Maternity care deserts are counties in which access to maternity health care services is limited or absent.

Limitations of Federal Funding: A Call for Local Policy Advocacy

However, federal funding has limitations, specifically when considering narrowing racial/ethnic disparities in maternal health outcomes. Returning to the example of variation in Maternal Mortality Review Committees (MMRCs), Kozhimannil et al. (2019) recommend that MMRCs gain representation from voices who are disproportionately at risk for maternal mortality and morbidity, as well as from women and families who have been affected by near-miss morbidity and mortality. If the language cannot guarantee that representation or provide adequate structures, state or local government or organizations may need to intervene to establish those coalitions. Additionally, funding may not be able to account for regional, state-wide, or community-specific nuances essential for targeting systemic issues such as racism in healthcare. Finally, policy packages are needed on various levels to address both the national need and the needs of specific communities; they must be working in tandem to address a particular set of goals on the local, state, and federal levels. For these reasons, the current project focuses on city/local level policy efforts that can create localized impacts at the community level.

I argue that being accountable to the tenets of a framework like Reproductive Justice is a crucial component of effective community-level policy efforts and advocacy precisely because of its sensitivity to the idea that there are multiple mechanisms by which race and class assert themselves as fundamental causes of health disparities. It is crucial to be aware of how these mechanisms are interlinked and work on more than one at once to ensure that mitigating one mechanism does not just lead to its replacement by another mechanism producing the same disparity.

Community-Based Response to Reproductive Disparities: The Resurgence of Doulas

Community-based interventions to respond to climbing maternal mortality rates led to the resurgence of doulas, which the Center for Reproductive Rights advocates for, and research suggests is an integral piece of improving maternal health outcomes (American College of Nurse-Midwives 2012; Gruber, Cupito, and Dobson 2013; March of Dimes 2019). A 2019 March of Dimes position statement on doulas and birth outcomes reports that in 2012, six percent of births were attended by doulas and that in 2018, there were over 8,000 registered doulas in the United States. (March of Dimes 2019). Research has demonstrated that integrating

doula services is associated with better maternal outcomes (American College of Nurse-Midwives 2012; Gruber et al. 2013; Kozhimannil, Hardeman, et al. 2013; March of Dimes 2019; Southern Birth Justice Network and Forward Together 2019), better infant health outcomes (American College of Nurse-Midwives 2012; March of Dimes 2019; Sandall et al. 2016), better patient-doctor interactions, and lower healthcare costs, among other benefits (Ancient Song Doula Services et al. 2019; March of Dimes 2018; Southern Birth Justice Network and Forward Together 2019).

Despite these benefits, access to doula services during pregnancy is often left out of conversations and policy considerations about women's increased reproductive autonomy and rights. Additionally, most doulas are middle-class, white women providing care to other middle-class, white women, despite research that indicates that women of color and low-income women could serve to benefit the most from expanded access to doula care (Kozhimannil, Hardeman, et al. 2013; Oparah and Black Women Birthing Justice 2016; Ross 2016). Despite the prominence of white doulas and the history of women of color birth workers being systematically undermined and removed from the childbirth arena, several organizations, such as the National Black Doulas Association and the Black Mammas Matter Alliance, have formed to increase doula services among the Black community. Among other services, these organizations provide doula training, doula directories, and doula advocacy, all based on addressing U.S. disparities in maternal mortality (Black Mamas Matter Alliance n.d.; National Black Doulas Association n.d.).

While the scope of the current project will not look specifically at the impact of doula policy and services, I do consider them needed and currently overlooked components of policy packages. I also consider policies making doulas more accessible for people of color and low-income people a needed mechanism for decreasing city-level maternal mortality and racial gaps in maternal mortality. I cannot investigate the role of doula services and policies with my data, but I return to a fuller discussion of doula services and potential implications for policy packages and maternal health outcomes in Chapter 8.

Conclusion

Several social trends and policies have created oppressive mechanisms contributing to present-day disparities in maternal mortality rates in the U.S. This chapter has discussed the racial implications of medicalizing childbirth, reproductive control in social policy as an

explicitly racialized mechanism disparaging the reproductive health and autonomy of women of color, racist ideologies such as eugenics, and social movements with interests in improving reproductive health for women generally that exclude and erase the experiences of women of color. Additionally, the chapter has discussed the reproductive justice movement as a response to problematic and exclusive reproductive rights and pro-choice movements and the introduction of key maternal mortality-focused legislation as impactful for maternal health outcomes. This context is critical for understanding and disrupting the rising racial disparities in—and the increasing overall rate of—maternal mortality.

The following chapters will explore attempts to measure reproductive freedom policies and predictors of maternal mortality, respectively. However, I argue that the two need to be considered jointly and that policy packages and reproductive ideologies are both implicated in contemporary issues in maternal health. Consistent with my discussion in the first three chapters of this dissertation, the following chapters will use data from the NIRH LRFI, CDC WONDER, and American Community Survey and a combination of regression analysis and deep descriptive dive to understand the impacts of policy packages, individual policy measures, and city composition factors on MMRs and racial gaps in MMR. Chapter 4 outlines my data and methods, then Chapters 5, 6, and 7 provide the results of my analyses. Although data limitations do not allow me to examine all the policy interventions I have discussed in this chapter, I will return to a discussion of many of these policy interventions, particularly doula policies, in Chapter 8 as important avenues for future data collection and research.

CHAPTER 4: BACKGROUND ON THE NIRH LRFI AND METHODS

Introduction

Drawing on the theoretical relationships among social determinants of health (SDH), fundamental cause theory (FCT), and Reproductive Justice outlined in Chapters 2 and 3, this chapter will focus on describing the current study's key measures and methodological approaches. My main argument frames reproductive policies as key social determinants that shape aggregate maternal mortality and racial differences in maternal mortality. First, I will emphasize the research that has already been done regarding modeling and measuring maternal health outcomes to guide policy and practice toward improving outcomes for women. I will then discuss the contemporary measures of reproductive policies that have been constructed to represent the level of reproductive autonomy individuals have in a given area. The National Institute of Reproductive Health's Local Reproductive Freedom Index (NIRH LRFI) will be of particular interest to this project and discussed in depth here. These sections will complete the background information needed to situate and introduce the project aims. Next, I discuss the data sources I use for this project, including key variables, measurement, and methodological approaches to analyzing my data. I end this chapter by discussing my deep descriptive approach to data analysis, including justification for this approach in this particular project.

Measures of Reproductive Policies

Policy is essential for impacting reproductive and maternal health outcomes, but few studies have considered the role of policies in their analyses. Fewer still have considered those policies as interconnected packages. Several attempts have been made to systematically assess the level of reproductive control afforded to individuals and the barriers to access imposed by various social institutions and governing bodies. The Center for Reproductive Rights issued a report in 2014 naming several factors that significantly impact maternal mortality rates in the United States. This report names low SES, lack of (adequate) health insurance, exposure to discrimination, and immigration status, as well as less prenatal care, preexisting chronic conditions, higher likelihood to develop pregnancy conditions such as ectopic pregnancy, and increased skepticism about the medical system; all of which negatively contribute to women's

obstetric health outcomes (Center for Reproductive Rights 2014). However, the report also acknowledges that the lack of adequate reporting on MMRs (maternal mortality rates) makes isolating the causes of racial disparities in MMRs a problematic task. This difficulty is because currently, it is not mandatory to report cases of pregnancy-related death to the state health departments, and many areas do not use the U.S. standard death certificate that includes pregnancy-related death indicators (Center for Reproductive Rights 2014).

Most recently, the National Institute for Reproductive Health (NIRH) re-introduced its Local Reproductive Freedom Index[8]. This index offers an assessment of the reproductive rights, justice, and health policies at the local level in the U.S. (NIRH 2019). While not explicitly created to address the maternal mortality crisis, the policies included in the index do reflect several of the explanatory factors and policy concerns outlined in previous research and in reports issued by organizations such as the Center for Reproductive Rights and March of Dimes.

First published in October 2017, the October 2019 edition of the NIRH Local Reproductive Freedom Index expanded from the 40 most populated cities to include ten additional municipalities across the country (NIRH 2019). The index offers a total of 34 indicators of reproductive freedom, and codes policies passed between January 1, 2010, until December 31, 2018, into six broad categories: protection of abortion access, support for young people, funding and coverage for reproductive health care, support for families, initiatives and programs to support healthy and just communities, and opposing state or federal restrictions on reproductive autonomy (NIRH 2019).

Table 1 identifies all 34 indicators divided by each of the six categories. The scoring on these indicators is used to assign each city a score on a 10-point scale condensed into a Star Score ranging from zero to five. Billings, Montana receives the lowest score (0.5), and San Francisco, California, gets the highest score (4.5) (NIRH 2019). The mean rating for all cities in the index is 2.3 stars (NIRH 2019). I discuss coding for the NIRH index further in my *Measures* section below.

[8] In an exploratory conversation with Jenny Mistry, the Associate Director of Local Advocacy for the NIRH, Ms. Mistry stated that the use of 'Reproductive Freedom' rather than 'Reproductive Rights' or 'Reproductive Justice' was both a strategic and values-based decision for the NIRH. The NIRH is not a Reproductive Justice organization, and while it supports the efforts of many Reproductive Justice organizations, the NIRH avoids co-opting the movement. Further, echoing my discussion of the Reproductive Rights Movement in the U.S., 'Reproductive Rights' is too limited a frame to capture all that the index comprises. For example, the index includes non-discrimination policies. Thus 'Reproductive Freedom' best encapsulates the intent and scope of the index.

Table 1. NIRH Local Reproductive Freedom Index Policy Indicators

Protecting Abortion Access
Clinic Safety Ordinance
Regulations on Deceptive Practices of Anti-Abortion Pregnancy Centers
Local protections for Abortion Clinics and Providers
Public Awareness about Access to Abortion Care
Anti-Discrimination Ordinances for Employees: Reproductive Health Decisions
Funding and Coverage for Reproductive Health Care
Funding for Abortion
Funding for STD/STI Testing and Prevention
Municipal Insurance Coverage of Abortion
Funding to Train Providers in Reproductive Health Care
Funding for Contraception
Funding for Community-Based Organizations to Provide Comprehensive Sexuality Education
Supporting Young People
Support for Pregnant and Parenting Youth
Funding for Comprehensive Sexuality Education
Comprehensive Sexuality Education Policy
Reproductive Health Care in School-Based Health Centers (SBHCs)
Supporting Families
Supportive Breastfeeding Policies
Paid Family Leave for Municipal Employees
Environmental Protections for Maternal and Reproductive Health
Anti-Discrimination Ordinances for Employees: Pregnancy and Family Status
Anti-Discrimination Ordinances for Housing: Pregnancy and Family Status
Building Healthy and Just Communities
Positive Public Awareness Campaigns on Sexual and Reproductive Health
Menstrual Equity Initiative
"Shield" Law for Victim Reporting
Paid Sick Leave
$15 Minimum Wage
Support for Immigrants to Access Reproductive Health Care
Advancing Democracy
Anti-Discrimination Ordinances for Employees: Gender Identity
Anti-Discrimination Ordinances for Housing: Gender Identity
Taking a Stand
Opposition to Deceptive Practices of Anti-Abortion Pregnancy Centers
Support for Abortion Coverage, Including the EACH Woman Act
Support for Anti-Discrimination

Strengths of the NIRH LRFI

Several of the policy considerations in the Local Reproductive Freedom Index address maternal mortality concerns expressed by the Center for Reproductive Rights, March of Dimes, and past studies. For example, first, city policies to train reproductive healthcare providers could be used to increase the quality of maternal care and bring attention to the specific needs of women of color. Second, policies supporting pregnant and parenting youth could insulate young mothers from some factors that make giving birth under 20 years old particularly dangerous. Third, another policy provision of note is supporting immigrant access to reproductive healthcare. This set of provisions may make it easier for undocumented minority women who may experience increased maternal and reproductive care barriers to access relevant services and may increase their likelihood of going to the doctor if they experience negative symptoms during or after pregnancy. Fourth, cities offering environmental protections address how pollution and climate change disproportionately put mothers of color at risk for adverse health outcomes. Finally, policy and ideological efforts to improve abortion access and decrease the care offered by pro-life, anti-abortion pregnancy centers may allow more women to gain a more comprehensive understanding of their reproductive options about pregnancy. Funding in this area would also work to ensure women are getting care that prioritizes their health, rather than only prioritizing the health and needs of the fetus.

However, none of these sets of policies exist in a vacuum. Instead, they exist in tandem with other policies. Grouping policies together in an overarching index represents a more holistic approach to understanding and addressing maternal mortality and racial disparities within maternal mortality. It will be useful to examine the impact of the index holistically and to look at single policy indicators as well. I do both in Chapter 5 and Chapter 6, respectively.

Limitations of the NIRH LRFI

While this index represents a significant advancement in our ability to answer research questions about the impact of policies and policy packages on overall maternal mortality and racial disparities in maternal mortality, the index also has various limitations. Indeed, the NIRH LRFI leaves out some measures that seem particularly important in shaping and informing racial disparities in maternal health and mortality. In the categories ‘supporting families’ and ‘funding

and coverage for reproductive health care,' there is no attention given to providing additional supports for healthcare or programs while pregnant (NIRH 2019). The 'funding and coverage for reproductive health care' section focuses mainly on providing abortion services, contraception services, and sexual education, whereas the 'supporting families' section primarily focuses on work policies (NIRH 2019). Both categories would lend themselves well to incorporating policy options related to doulas. For example, the March of Dimes suggests that having doula costs covered by insurance might be a viable way to decrease the racial disparities in maternal mortality rates (March of Dimes 2018, 2019).

Need for Research in this Area

Understanding the reproductive policies and policy packages that best increase reproductive freedom while also improving health outcomes such as maternal mortality rates is an urgent yet under-explored arena of social scientific study. Especially important is understanding which policies reduce racial gaps in maternal mortality and how these policies may do so. Reproductive policy packages not only give needed insight regarding variation in maternal mortality but also increase crucial understanding of the dominant reproductive ideologies in the various cities the NIRH index measures. Scholars recognize that laws and policies embody a diversity of values and ideologies (Danielson and Stryker 2014; Pedriana and Stryker 1997; Steensland 2006). This vein of research has also demonstrated that the embodiment of ideology in law and policy is a leading mechanism through which culture shapes state policies and their outcomes (Danielson and Stryker 2014; Pedriana and Stryker 1997; Steensland 2006). Thus, variation in reproductive ideologies is to some extent incorporated within variation in policies across the cities.

As will be explained further below, the current research responds to gaps in prior research by using the new NIRH LRFI measures to help predict variation in maternal mortality. In this way, I consider the NIRH LRFI as a package. Still, I also consider how individual policies may serve as social determinants that may operate to shape maternal health outcomes at a community level, controlling for racial composition (and poverty composition) of the community, and also as potential mechanisms that may reproduce or mitigate racial disparities in maternal mortality among communities.

Overall, cities with higher scores on the Local Reproductive Freedom Index have more policies providing reproductive services and resources to women. I expect that controlling for racial and poverty composition, cities with higher scores on the Local Reproductive Freedom Index will improve maternal health in ways that both lower the overall rates of maternal mortality and decrease racial disparities in maternal mortality rates in higher scoring relative to lower scoring cities. However—and consistent with the role that policies may play as mediating mechanisms with respect to fundamental causes such as race and SES—to the extent that cities with higher proportions of people of color or in poverty systematically score lower on the Local Reproductive Freedom Index, the pattern of improvements in reproductive health policies unintentionally could be helping to reproduce poor maternal health outcomes and racial disparities in maternal mortality.

Data Sources

Data for this project's quantitative analyses are compiled from four primary sources. All data are publicly available and have been appropriately de-identified. I received IRB Exemption for my quantitative analyses, and specifics on the exemption can be found in Appendix A.

CDC WONDER

Data on Maternal Mortality Rates (MMRs) comes from the CDC WONDER Underlying Cause of Death Database. This database contains mortality and population counts for all counties in the U.S. from 1999-2018. The data are based on death certificates that identify demographic data and a cause of death. The causes of death are organized into 4-digit ICD-10 codes that allow me to specify which mortality data I am interested in.

For my project, I use data from ICD-10 codes O00-O99 (Pregnancy, childbirth & the puerperium) and P00-P96 (certain conditions originating in the perinatal period) to capture pregnancy-related deaths. Additionally, the maternal death data can be indexed by race and Hispanic ethnicity so that I can construct racial gaps in maternal mortality. Specific demographic information taken from the CDC WONDER data will be discussed in more depth in Table 3 in the *Measures* section. Lastly, since the NIRH LRFI represents only policies passed on or after January 1, 2010, I restrict the CDC WONDER data to include only data from 2010 onward to

create congruence between these sources[9], and the values I use in my analyses are the average of the maternal mortality rates across this eight-year span. I do this because of the rarity of maternal death in the U.S. and because I cannot be sure from which of these years any particular piece of policy data came. It would be ideal to have data on the specific year each policy measure passed in each city to ensure that my maternal mortality data were collected later or contemporaneously with my policy package data. However, this was not possible given that the data only indicates that the various inputs into the policy data for the 50 different cities were collected sometime between 2010 to 2018.

National Institute of Reproductive Health Local Reproductive Freedom Index

Data on specific city-level policies and attributes will be taken from the National Institute for Reproductive Health Local Reproductive Freedom Index (NIRH LRFI), which evaluates how city-level policies work together to impact reproductive rights and health (NIRH 2019). The October 2019 edition includes the 40 most populous U.S. cities and ten additional municipalities across the country (NIRH 2019). As prefigured earlier, the index offers a total of 34 indicators of reproductive freedom coding policies into six broad categories: protection of abortion access, support for young people, funding and coverage for reproductive health care, support for families, initiatives and programs to support healthy and just communities, and opposing state or federal restrictions on reproductive autonomy (NIRH 2019). Table 1, found in the *Measures of Reproductive Policy* section above, identifies all 34 indicators divided by each of the six categories. For a list of all cities represented in the index and their corresponding Star Scores, consult Table 2. Figure 1, directly following Table 2, provides a map displaying the location of all these cities along with their Star Scores.

[9] I asked Jenny Mistry at the NIRH for information on the dates that policies were passed. Ms. Mistry said that their data is organized by whether a city has ever had a policy, versus logging when each city passed each policy. Thus, the information was not available in a meaningful way, and she was not confident she could speak to when a bulk of the policies were passed. So, based on our conversation, I made the decision to match my MMRs/racial gaps to the years the index covered (2010-2018).

Table 2. Cities and Star Scores in the NIRH LRFI

State (N=36)	City (N=50)	Star Score
AL	Birmingham	1.5
AZ	Phoenix	1.5
CA	San Francisco	4.5
CA	San Diego	2.5
CA	San Jose	2.5
CA	Los Angeles	3.5
CO	Denver	3
CT	Hartford	1.5
DC	Washington DC	3.5
FL	Miami	2
FL	Jacksonville	1.5
GA	Atlanta	2
IL	Chicago	4
IN	Indianapolis	2
KY	Louisville	1.5
LA	New Orleans	2
MA	Boston	3.5
MD	Baltimore	3
MI	Detroit	2.5
MN	Minneapolis	3
MN	St. Paul	3
MO	St. Louis	2.5
MS	Jackson	1.5
MT	Billings	0.5
NC	Charlotte	2
ND	Fargo	1.5
NE	Omaha	1
NJ	Newark	2
NV	Las Vegas	1
NY	New York	4
NY	Buffalo	2.5
OH	Columbus	3
OH	Cleveland	2
OK	Oklahoma City	1.5
OR	Portland	3.5
PA	Philadelphia	3
TN	Memphis	2
TN	Nashville	1.5
TX	Austin	2.5
TX	Fort Worth	2
TX	San Antonio	2

Table 2 continued

TX	Dallas	1.5
TX	Houston	1.5
TX	El Paso	1
UT	Salt Lake City	1.5
VA	Richmond	2
WA	Seattle	3.5
WI	Madison	3
WI	Milwaukee	2.5
WV	Charleston	1.5

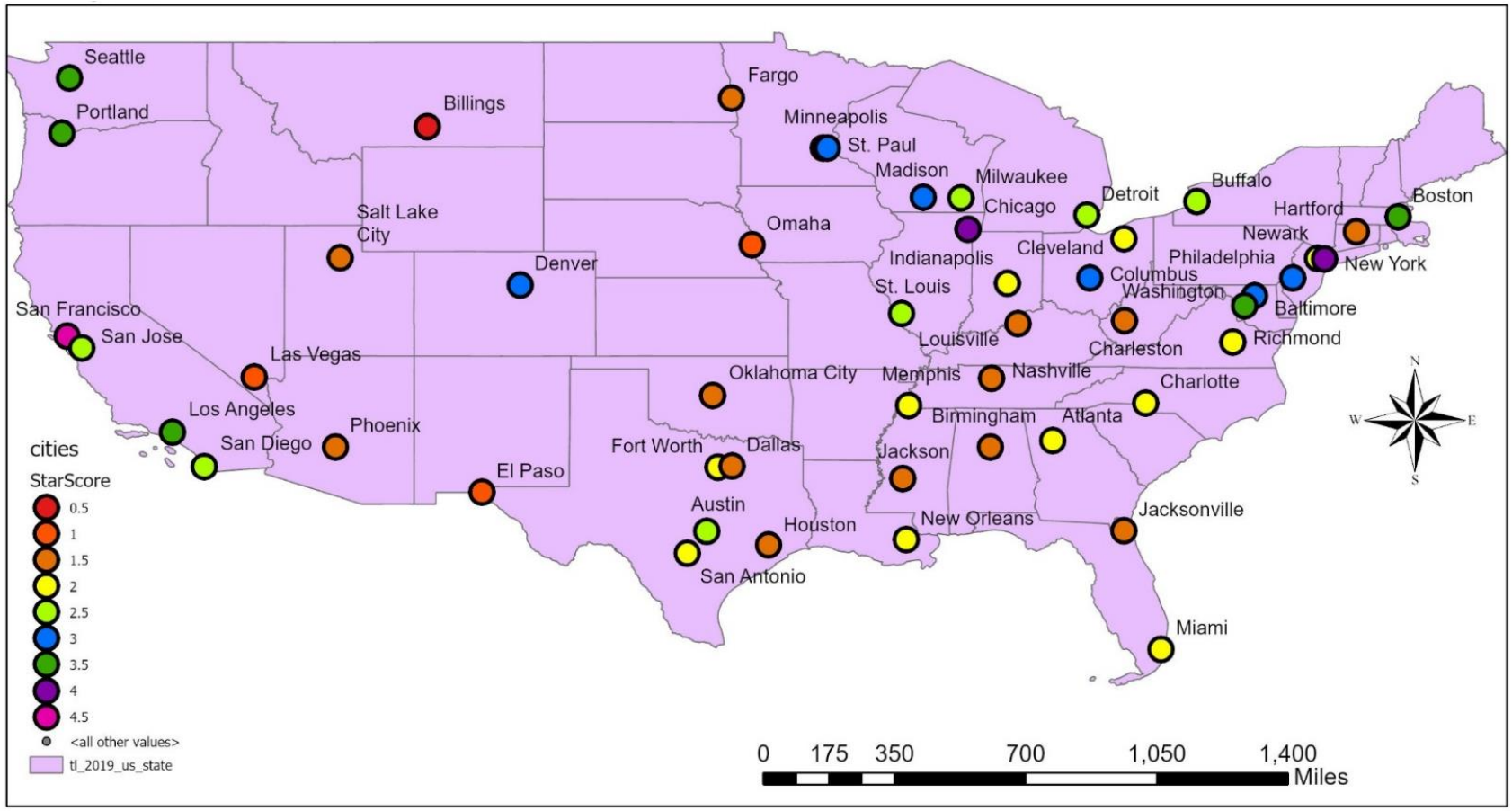

Figure 1. Map of NIRH LRFI City Star Score

American Community Survey

The American Community Survey (ACS) is produced by the Census Bureau. Following the 2000 Census, the long-form survey became the ACS. This survey has detailed questions on population demographics and housing information about property and occupancy organized by census tracts. The ACS is a crucial data source for my project because it allows me to organize demographic data about the population for my cities of interest. More information about specific measures of interest from the ACS can be found in Table 3 below.

Measures

Dependent Variables

Table 3 describes the measurement of key dependent and independent variables of interest and also includes the data source. The dependent variable MMR is coded as a rate per 100,000 and is broken down by the city. Because the raw data on maternal mortality from the CDC Wonder data is provided at the county level, I match county-level CDC Wonder data to the city-level unit of analysis provided for the NIRH Star Scores. The process I follow for doing this is a standard one and will be discussed further in the *Models and Estimation Techniques* section. After completing the full matching process, I do have appropriate variability by city in my three dependent variables: city-level maternal mortality rates (MMRs), white-Black racial disparities in rates of maternal mortality, and white-Latina disparities in rates of maternal mortality.

My second and third dependent variables, racial gaps in MMRs, also come from the CDC WONDER data. In the CDC WONDER database, maternal mortality rates and counts can be indexed by race and whether someone identifies as Latinx. Racial group options are American Indian or Alaskan Native, Asian/Pacific Islander, Black or African American, or White, and the options for Hispanic/Latinx are yes, no, or not stated. For this study, I recode these responses to create a new race variable to construct meaningful groups for comparison. Those identified as Hispanic/Latinx are coded as Latina, regardless of their response to the question about race. Individuals identified as not Hispanic/Latinx are coded by their indicated race if that race is Black or white (i.e., individuals identified as Black are coded as such in the new race variable).

Then, I convert these racial categories into rates per 100,000 population for analysis. Again, because the raw racial data is provided at the county level, I match these data to the cities

represented in the NIRH index. To construct the 'gap' component of my racial gaps in MMRs variables, I then create a variable that is the absolute value of the difference between the white MMRs and that of the given racial category. Thus, the white-Black racial gap for a city is equivalent to the absolute value of the white MMR minus the Black MMR, and this is done for each of the cities in my dataset that have recorded data aggregated by race. Using absolute values allows for ease of interpretation in my analysis, as larger racial gaps represent greater racial disparities in maternal mortality. In the current project, I analyze the effects of the white-Black racial gaps in MMR and the white-Latina gaps in MMR.

Independent Variables

As prefigured earlier in this chapter, the NIRH LRFI indicator I use is measured as a 5-point scale (cities rated from 0.0 to 5.0) in 0.5 increments crafted from an original 10-point scale. Both the 5- and original 10-point scales weigh the importance of specific policies to the index as a whole based on the expert judgment of NIRH staff. Information about how each indicator is weighted in the 10-point scale can be found in Appendix B.

I initially contacted the Local Advocacy team at the NIRH to request access to the 10-point scale. A copy of my inquiry email is available in Appendix C. I was contacted by the Associate Director of Local Advocacy and was informed that the decision had been made not to share the data for the 10-point scale. However, the Associate Director, Jenny Mistry, expressed continued interest in this project. To that end, she stayed in contact with me to answer questions I had about how coding decisions were made for the Index. This guidance and insight helped to ensure that I made the best decisions about coding and modeling.

Although the NIRH was unwilling to share their data from the 10-point scale, the 5-point scale is still a sufficient measure and represents an improvement in my ability to model the relationship between policies and my outcomes. The scoring on each of the 34 indicators that comprise the combined NIRH LRFI is used to assign each city a Star Score ranging from zero to five, with Billings, Montana receiving the lowest score (0.5) and San Francisco, California receiving the highest score (4.5) (NIRH 2019). The mean score for all cities in the index is 2.3 stars (NIRH 2019). Additional visualization of the variation in Star Score can be seen in Figure 1 above. In this figure, the map provided is color-coded so that warm colors (red, orange, and yellow) are for those cities below the mean (2.3), and cool colors (green, blue, and purple) for

those cities with Star Scores above the mean with hot pink being used for San Francisco (4.5 stars).

Recall that I will be conducting analyses with the overall Star Score variable and five specific policy indicators that contribute to the Start Score composite. For these five individual policy inputs, the possible codes are 'yes,' 'no,' 'limited,' or 'preempted.' 'No' indicates that the city does not have those policy provisions. 'Preempted' indicates that the state has implemented a policy that prevents a city from acting on a certain indicator, or a state policy fully addresses the entire area described by an indicator, making it unnecessary for the city to take further action. Preempted measures do not impact the city's overall score.

In detail, cities received a 'yes' in "Funding to Train Providers in Reproductive Health Care" if they provide funding to train providers in an essential element of reproductive health care, such as LARC (long-acting, reversible contraceptive) insertion or removal, contraceptive counseling, or reproductive health care for LGBTQ people, young people, or other specific populations. Here, 'limited' reflects that the training is only available online. Second, cities received a 'yes' in "Support for pregnant and parenting youth" if they have at least one of the following in place: daycare in schools, flexible graduation policies, breastfeeding accommodation policies, high-quality schools for pregnant and parenting youth, pregnant and parenting youth bill of rights, homebound instruction. For this variable, 'limited' represents those cities that offer either after-school support groups, rights-focused policy in their handbook, or classes on parenting. Third, cities received a 'yes' in "Support for immigrants to access reproductive healthcare" if they have sanctuary funding, municipal IDs, or a municipal health insurance program policy in place. Cities received 'limited' on this variable if they only have a policy of non-cooperation with ICE. Fourth, cities received a 'yes' in "Environmental protections for maternal and reproductive health" if the city has at least one of the following in place specifically linked to protections for maternal, fetal, or reproductive health: protections for nail salon workers or other workers exposed to toxic chemicals, banning fracking, radioactive activity regulation, BPA regulation, and regulation of skin lightening creams. Here, 'limited' represents cities with initiatives or programs focused on environmental justice, but that is not linked explicitly to maternal, fetal, or reproductive health protections. Finally, cities received a 'yes' in "Opposition to Deceptive Practices of Anti-Abortion Pregnancy Centers" if they have one or more local protections against the deceptive practices of anti-abortion pregnancy centers in

place, such as signage ordinance, consumer protections, or restrictions on funding. There is no 'limited' category for this indicator.

For each of these policy indicators, I construct categorical variables with 'yes,' 'no,' and, wherever possible, with 'limited' as the three possible categories. None of the cities in my dataset have 'preempted' for any of the five policy indicators I focus on in my analyses. Thus, my analyses reflect the codes provided by the NIRH LRFI.

Table 3. Breakdown of Measurements for Key Variables (Level of Analysis: City; N=50)

Variable	Measurement	Data Source	Use in My Project
Dependent Variables			
Maternal Mortality Rates (MMR)	Maternal deaths per 100,000 Rate = Count / Population * 100,000	CDC WONDER Database ICD-10 Codes O00-O99 (Pregnancy, childbirth & the puerperium) and P00-P96 (certain conditions originating in the perinatal period) Years: 2010-2018	MMR will be broken down by city and used in models
Racial Gap (Race + population by race + Hispanic/Latinx)	MMR Indexed by Race & Latinx: American Indian or Alaskan Native, Asian / Pacific Islander, Black or African American, White; Hispanic/Latino: Y/N or Not Stated	CDC WONDER Database; American Community Survey	Collapse race categories into White, Black, Latinx, and Other for racial gap modeling
Independent Variables			
City-level Variables			
NIRH Star Score	Index 0.0 to 5.0 in 0.5 increments (avg. of scores: 2.3)	NIRH Local Reproductive Freedom Index Report (2019)	Variable of interest for Policy Packages
Funding to Train Providers in Reproductive Health Care	Yes/No/Limited/Preempted	NIRH Local Reproductive Freedom Index Report (2019)	Categorical: the city has, does not have, or has in limited capacity Note: 'preempted' is combined with 'yes'

Table 3 continued

Support for Pregnant and Parenting Youth	Yes/No/Limited/Preempted	NIRH Local Reproductive Freedom Index Report (2019)	Categorical: the city has, does not have, or has in limited capacity Note: 'preempted' is combined with 'yes'
Support for Immigrants to Access Reproductive Health Care	Yes/No/Limited/Preempted	NIRH Local Reproductive Freedom Index Report (2019)	Categorical: the city has, does not have, or has in limited capacity Note: 'preempted' is combined with 'yes'
Environmental protections for maternal and reproductive health	Yes/No/Limited/Preempted	NIRH Local Reproductive Freedom Index Report (2019)	Categorical: the city has, does not have, or has in limited capacity Note: 'preempted' is combined with 'yes'
Regulations on the Deceptive Practices of Anti-Abortion Pregnancy Centers	Yes/No/Limited/Preempted	NIRH Local Reproductive Freedom Index Report (2019)	Categorical: the city has, does not have, or has in limited capacity Note: 'preempted' is combined with 'yes'
Total City Population (2017)	Number of people in 2017	American Community Survey	No Change; used as a control for making ratios with other variables
Percent below poverty level	Percent of total population	American Community Survey	No change
Population Demographics			
Population by Race	Proportion of the total city population self-identifying as each race/ethnicity	American Community Survey	No Change

Models & Estimation Techniques

Analysis & Modeling with a Small N

With the city as the level of analysis, the sample size of this project is reasonably small (N=50), and certain of my outcome variables have missing data that shrink the N to as low as 40. Working with a small N changes the ways I approach data analysis in the context of this project. In addition to more traditional regression analysis, I engage in deep descriptive analysis of the relationships between my variables. In doing so, I take advantage of my small sample size by looking at individual cases and cases in small, thematic groups. This approach also allows me to gain a more nuanced understanding of the patterns emergent in these relationships. Doing this deep dive is all the more necessary because my preliminary analyses with both some initial descriptive work and my bivariate regressions suggested things were more complex than I originally anticipated based on my theoretical framework and review of the literature. In all, this deep descriptive work further bolsters my findings in regression modeling and analysis while also adding to the theoretical understanding of how policy packages impact maternal health outcomes at the city level.

The small N also has consequences for the regression models I do run in my analyses. For instance, I am not able to analyze complex models. Model specification is driven by theoretically appropriate composite measures and concern for parsimony. When it is theoretically necessary, I use single-item measures of crucial independent variables, including the five policy items that may be especially important. However, as needed, I test these one at a time rather than all together in the same model. Another factor influencing my modeling approach is the need to limit the number of covariates to avoid issues with collinearity. My analyses include only the variables that are most central to my argument, as supported by theory, to avoid collinearity issues. Lastly, the small N impacts the level of significance I use in my regression analysis. To account for some of the low statistical power that may be present in my model specification because of my small sample size, I use $p<0.1$ as a level of significance throughout my analysis. I also state where the particular effect is significant at more traditional levels, such as $p<0.05$.

Creating the Dependent Variables for My 50 Cities

The CDC WONDER data provides MMRs organized by county, so some data manipulation needs to be done to represent the MMRs and racial disparities of each of the 50 cities in the NIRH LRFI. I determine the specific CBSA (Core-Based Statistical Areas, formerly known as MSA [Metropolitan Statistical Area]) codes corresponding with the 50 cities I need in the index. The National Bureau of Economic Research has this information publicly available for fiscal years 2005 and 2011-2017. I then combine those codes into a single variable representing an individual city. This method may not yield perfect matches for the cities; however, this matching process is a commonly implemented approach for studies in this field and sufficient for my project.

Modeling Maternal Mortality Rates

In a research meeting with Dr. Shawn Bauldry[10], we reviewed the CDC WONDER data for Texas and California, indexed by county and race, for counties identified as large central metro by the NCHS 2013 Urban-Rural classification. My original thought was to do a rare event analysis since data has indicated that approximately 700 women die per year from pregnancy-related causes in the United States (American College of Obstetricians and Gynecologists 2019; March of Dimes 2019; Petersen et al. 2019), making the individual incidence of maternal mortality very rare. From there, and based on Professor Bauldry's advice, I approached modeling assuming that maternal mortality rates would be recorded as whole numbers, making negative binomial models appropriate because of the nature of the count variable. However, the preliminary examination of the data revealed that the individual incidence per county was high enough to create MMRs with multiple decimal points, meaning MMR can be used as a continuous variable in my models, providing more extensive information than if I were to have only whole number counts. At the same time, rare event analysis is only used for aggregate count variables constructed based on an underlying individual-level variable that has a "yes, no" dichotomous outcome on maternal mortality, where "yes" is extremely rare.

Given that my primary outcome, in this case, is a rate variable, not a raw count, rare event analysis is not the ideal modeling approach for this project (Long and Freese 2006). Also,

[10] Dr. Bauldry is a member of my Dissertation Committee.

given that city is my level of analysis, and I am modeling city-level rates rather than individual-level measures of maternal mortality, I do not require the use of hierarchical linear modeling or other multi-level modeling approaches. Overall, using a continuous dependent variable allows me to model and analyze my data with a Generalized Linear Modeling (GLM) approach. GLM gives me the flexibility to create models with various types of explanatory variables in ways that are appropriate for continuous outcomes and modeling considerations unique to my data (Hutcheson and Moutinho 2008).

Modeling Racial Gap

As indicated previously, the CDC WONDER data allows for disaggregation by race, allowing me to create a variable that is the absolute value of the difference between the white MMRs and that of the given racial category of interest. Thus, the white-Black racial gap for a city is equivalent to the absolute value of the white MMR minus the Black MMR, and this is done for each of the cities in my dataset that have recorded data aggregated by race. Using absolute values allows for ease of interpretation in my analysis, as larger racial gaps represent greater racial disparities in maternal mortality. Because of the size of my N and restrictions resulting from missing data, I am unable to properly analyze the effects of, for example, Black-Latina racial gaps. Instead, I analyze the effects of my independent variables on the white-Black racial gaps in MMR and the white-Latina gaps in MMR. However, the literature does suggest the greatest disparities in maternal outcomes are captured by these two racial gaps.

Conclusion

In this study, I implement deep descriptive and quantitative regression analysis to understand the reproductive policies and policy packages that best increase reproductive freedom while also improving health outcomes such as maternal mortality rates. Especially important is understanding which policies reduce racial gaps in maternal mortality and how these policies may do so. I use the National Bureau of Economic Research's CBSA information to merge the data from the CDC WONDER Underlying Cause of Death Database and American Community Survey to create the maternal mortality rates and racial gaps for the 50 cities measured in the NIRH LRFI. The NIRH LRFI is my critical data source as it has Star Scores and policy data for

the 50 cities measured in the index. In the following chapters—Chapters 5, 6, and 7—I implement my analytic plan to evaluate the relationships between policies and maternal health outcomes. Because my approach to analysis does not include formal hypothesis testing, each analytic chapter will include discussions of expected patterns in relationships between variables based on the literature and theory outlined in Chapters 2 and 3.

CHAPTER 5: ANALYSIS OF NIRH LRFI STAR SCORE POLICY PACKAGE ON MATERNAL MORTALITY RATES AND RACIAL GAPS IN MATERNAL MORTALITY RATES AT THE CITY LEVEL

Introduction

The aim of this chapter is to understand the relationship between the Local Reproductive Freedom Index's (LRFI's) Star Score, overall maternal mortality rates (MMR), and racial gaps in maternal mortality rates. In meeting this aim, I begin by describing the nature of the relationship between MMR and Star Score and racial gaps in MMR and Star Score, respectively. I also position these relationships in conversation with the relevant theories discussed in earlier chapters to suggest the expected relationship between these variables. Additionally, I will identify influencer cities driving the relationship of my key dependent variables and Star Scores and investigate emergent patterns among them. Finally, I conclude this chapter by discussing additional possible reasons for the patterns among my influencer cities and a call for future research on the topic.

MMR & Star Score

Descriptive Exploration of Relationship

I began my descriptive exploration of the relationship between MMR and Star Score by generating visuals to depict the non-parametric pattern in my data and establish a functional form for the relationship between these variables (N=50). The overall mean MMR for the full group of cities is 5.11, with a range of 1.78 to 8.11. Figure 2 is a scatter plot with a fitted, non-parametric line, and cities are assigned an ID number. Table 4 displays the mean MMR by Star Score category, and Figure 3 is a graphed depiction of the information in Table 4.

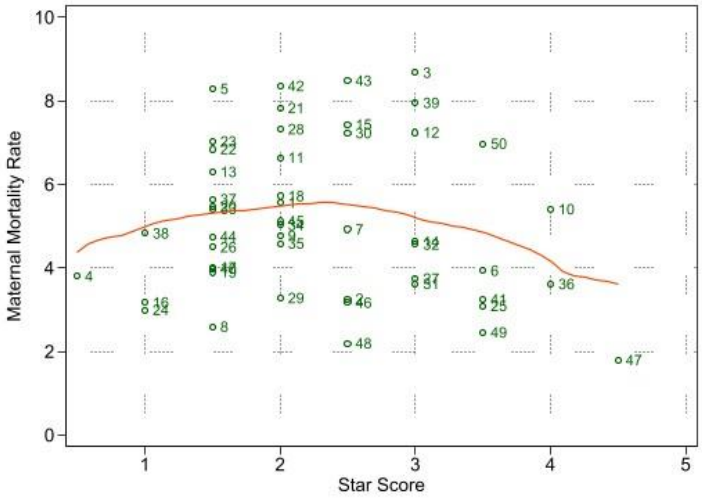

Figure 2. Scatter Plot of Maternal Mortality Rates by Star Score

Table 4. Mean MMR by Star Score

Star Score	Mean MMR	N
0.5	3.80	1
1	3.67	3
1.5	5.29	13
2	5.84	11
2.5	5.24	7
3	5.77	7
3.5	3.94	5
4	4.51	2
4.5	1.79	1
		Total: 50

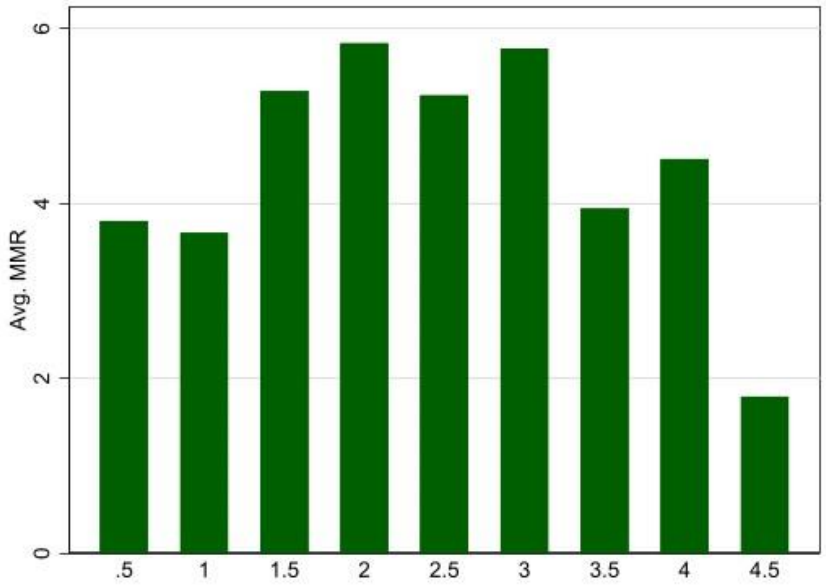

Figure 3. Average MMR by Star Score

Taken together, these confirm that a nonlinear relationship exists between MMR and Star Score. Further, this nonlinear relationship appears to be driven by cities with both a low Star Score and low overall MMR. For example, the mean MMR for cities with a Star Score of 1 is 3.67, compared to cities with a Star Score of 2 with a mean MMR of 5.84. Also, the mean MMRs for Star Scores 1.5, 2, 2.5, and 3 are all over 5, compared to Star Scores 0.5 and 1, with MMRs under 4. Additionally, there appears to be a steep increase in MMR at Star Score equals 4, where mean MMR is 4.51, relative to MMR at Star Score = 3.5, where MMR = 3.94 but MMR at Star Score equals 4.5 returns to a much lower value, indeed the lowest value it takes on at any point along the Star Score range. Before investigating this unexpected relationship in greater detail, the following section will situate this relationship among theories and past research outlined in the previous chapters of this dissertation to highlight how this relationship deviates from expectations.

Expectations of Relationship: Revisiting Theory & Existing Literature

According to research on Social Determinants of Health and Reproductive Justice Theory, creating social environments conducive to exercising reproductive autonomy is critical to reducing health disparities (Centers for Disease Control and Prevention n.d.; Diaz-Tello 2016;

Aline C. Gubrium et al. 2016; Thomson et al. 2016). Reproductive policies have been used to impact women's reproductive autonomy and health outcomes—particularly women of color—for centuries. Historically, policies such as Forced Sterilization Laws, Family Caps on TANF, and segregation in hospitals (among others) have systematically restricted women's access to reproductive health services and increased particular women's likelihood of negative reproductive health outcomes. Conversely, other policies, such as legalizing birth control and abortion and expanded access to these services, have been implemented to attempt to restore women's reproductive freedoms and autonomy. Whether or not they were enacted for this purpose, policies that restore reproductive freedom and autonomy also may improve reproductive health outcomes. I argue that other sets of reproductive policies are worth considering under the Fundamental Cause Theory (FCT) framework as mechanisms driving both racial and SES-based disparities in maternal health. Considering the NIRH LRFI does look at various city-level policies that aim to expand reproductive knowledge, decision-making, and quality of care, these policy packages should improve women's reproductive health outcomes, including maternal health outcomes.

Because of the deeply rooted relationship between policy and health and how the policies in the NIRH LRFI address SDH, I would expect the relationship between MMR and Star Score to be negative and linear, wherein as Star Score increased, MMR would decrease. However, given that I discovered a nonlinear relationship, it is necessary to identify the cities influencing this nonlinear relationship and understand patterns among them. In the following section, I will use insights from my exploration of this relationship to fit and run a regression model.

Regression Model

After confirming a nonlinear relationship between overall MMR and Star Score, I wanted to capture this relationship by fitting a regression model with a quadratic Star Score variable to understand effect size (see Table 5). The quadratic term captures a nonlinear relationship between the Star Scores and maternal mortality rates in which cities with low or high values of the Star Score have relatively low MMRs while cities with middle values have the highest MMRs. This quadratic model not only demonstrates a reasonable fit (R^2= 0.157) but also a statistically significant relationship between Star Score and MMR ($p<0.05$).

Table 5. Effects of Star Score on Overall MMR

	(1)	(2)
Star Score	-0.234	3.551*
	(0.298)	(1.364)
Quadratic Star Score		-0.766**
		(0.270)
Constant	5.640***	1.593
	(0.726)	(1.580)
R-squared	0.0127	0.1569
Observations	50	50

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Influencer Cities

As depicted in Figure 2, Table 4, and Figure 3, the nonlinear relationship between Star Score and MMR appears to be driven by cities with low Star Scores and low overall MMRs. Table 6 breaks down the cities for which Star Score equals 0.5 (Billings, MT), Star Score equals 1 (Las Vegas, NV; El Paso, TX; Omaha, NE), and Star Score equals 4 (New York, NY; Chicago, IL). Star Score of 4 is included because the surge in MMR that appeared on the graph at this Star Score warrants further investigation (mean MMR is 4.51; see Table 4).

Table 6. Cities Shaping Nonlinear Pattern

Star Score	City Name	State	MMR	ID
0.5	Billings	MT	3.80	4
1	Las Vegas	NV	3.00	24
1	El Paso	TX	3.17	16
1	Omaha	NE	4.83	38
4	New York	NY	3.62	36
4	Chicago	IL	5.41	10

Table 6 shows that Billings, MT, Las Vegas, NV, and El Paso, TX all have MMRs under 4. However, Omaha, NE is driving up the average MMR for Star Score equals 1. Additionally, Chicago, IL appears to drive the spike in MMR seen between Star Score 3.5 and 4.5. More information is needed to understand what may be driving these patterns. For instance, Billings, MT, Las Vegas, NV, El Paso, TX, and Omaha, NE are all cities that are at least 60 percent white, whereas Chicago, IL is just under 50 percent white. Perhaps, as I will argue in Chapter 7, city composition variables such as city poverty rate and percent of the city's Black population play a significant role in predicting overall MMR for these cities. As I will argue in Chapter 6, it is also possible that these cities have a particular combination of individual policies that influences the overall MMR more than others, making those policies particularly important for understanding the relationship between MMR and Star Score.

To further understand which cities drive this nonlinear relationship between overall MMR and Star Score, I used the regression model to calculate the residuals. I looked into the two cities with the largest positive residuals, representing the cities with the largest deviation from the sample mean MMR and resulting in high overall MMR. I also explored the two cities with the largest negative residuals, which result in low overall MMR. Birmingham, AL, and Baltimore, MD have the largest positive residuals, while San Jose, CA, and Charleston, SC have the largest negative residuals. Charleston and Birmingham are both parts of the Bible Belt, where one might expect to find low Star Scores because of more conservative views towards policies accounted for in the LRFI and more severe voter suppression. However, they are on opposite ends of the residuals spectrum. In the case of these two cities, it is again important to understand more completely the impact of racial and SES composition on MMR. Baltimore has a large Black population, whereas Charleston has a large white population, which could be contributing to the differences in outcomes for overall MMR. Likewise, San Jose, CA is a crucial part of Silicon Valley and has both a high cost of living and a large white population. Again, these city composition variables will be returned to in Chapter 7 to more fully understand their relationship both to policies and to overall MMR and racial gaps in MMR.

Summary

Through examining the descriptive relationship between MMR and Star Score, I discovered a nonlinear relationship instead of the anticipated negative, linear relationship

wherein as Star Score increased, MMR would decrease. This nonlinear relationship seems to be driven by cities at the lower end of the Star Score scale, such as Billings, MT, El Paso, TX Las Vegas, NV and Omaha, NE that also have low overall MMR. Based on residuals of my regression model, I found Birmingham, Baltimore, San Jose, and Charleston to be the largest influencers of my nonlinear relationship. To more thoroughly understand the factors contributing to these particular cities emerging as influencers, I will need to understand the influence of both individual policy measures in the LRFI and city composition factors. These are the focus of the subsequent chapters, respectively. I will next turn attention to the relationship between Star Score and racial gaps in maternal mortality rates to further understand the impact of variability in the policy package captured by the Star Score variable.

White-Black Racial Gap in MMR & Star Score

Descriptive Exploration of Relationship

While many of the NIRH LRFI policies are written neutrally to affect all women, policies improving conditions for women may especially help women of color who often face disparities in reproductive health. Further, several policies are written with the circumstances of women of color in mind, which should also serve to decrease disparities in maternal mortality rates between White women and women of color. I refer to these disparities as the racial gap and focus on the gap in MMR between white women and women of color.

Again drawing on Fundamental Cause Theory (FCT), Social Determinants of Health (SDH), and Reproductive Justice Theory related to policy packages, I would expect to find a negative, linear relationship between Star Score and white-Black gap wherein as Star Score increased, white-Black gap would decrease. However, given that I discovered a nonlinear relationship between overall MMR and Star Score, I began analyzing white-Black racial gaps in MMR (white-Black gap) with a similar approach. Figure 4 is a scatter plot with a non-parametric line, and each point is labeled with an ID number corresponding to a city in my dataset (N=46). Again, I find a nonlinear relationship where cities with low Star Scores have unexpectedly low white-Black gaps. The overall mean for white-Black racial gaps in maternal mortality is 6.85, ranging from 2.19 to 12.71.

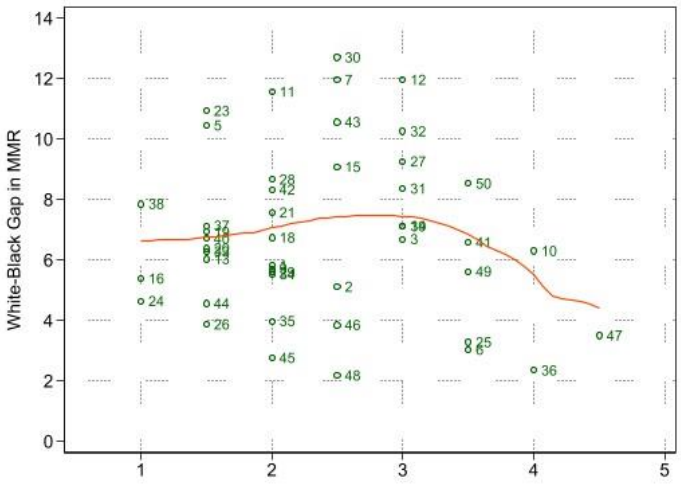

Figure 4. Scatter Plot of White-Black Racial Gap in MMR by Star Score

Table 7 and Figure 5 each display the mean white-Black gap by Star Score, confirming the nonlinear relationship in the white-Black gap. Of note are cities with a Star Score of 1 and 1.5, which are likely driving this nonlinear relationship and which Figure 4 shows have relatively low white-Black gaps with some exceptions. Also of note is the large spike in mean white-Black gap occurring at Star Score equals 3. The mean white-Black gap at Star Score equals 2.5 is 7.07, but jumps to 8.13 at Star Score equals 3, before descending to 5.01 at Star Score equals 3.5. This pattern warrants further description, and in the subsequent sections, I will turn my attention to identifying influencer cities in the relationship between white-Black racial gap and Star Score. Before doing so, I will fit a regression model to understand the statistical relationship between these variables.

Table 7. Mean White-Black Racial Gap in MMR by Star Score

Star Score	Mean White-Black Gap	N
0.5	.	0
1	5.73	3
1.5	7.27	10
2	7.19	11
2.5	7.07	7
3	8.13	7
3.5	5.01	5
4	5.92	2
4.5	2.77	1
		Total N: 46

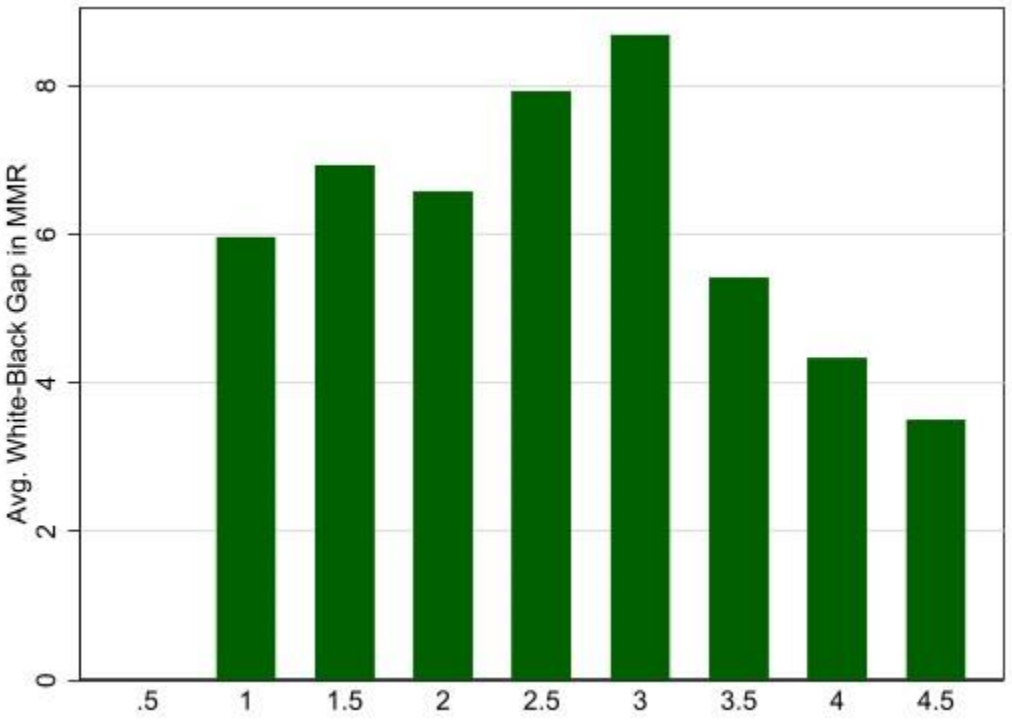

Figure 5. Average White-Black Gap by Star Score

Regression Model

I fit a regression line to the model, which captured the nonlinear relationship by adding a quadratic Star Score term (see Table 8). This quadratic term captures a nonlinear relationship between the Star Scores and white-Black gap in which cities with low and high values of the Star Score, respectively, have relatively low white-Black gaps, while cities with middle values have the highest white-Black gaps. I found an improved model fit compared to a linear model (R^2= 0.12), as well as a significant relationship between Star Score and white-Black gap ($p<0.05$).

Table 8. Effects of Star Score on White-Black Racial Gap in MMR

	(1)	(2)
Star Score	-0.306	5.253*
	(0.472)	(2.462)
Quadratic Star Score		-1.086*
		(0.473)
Constant	7.572***	1.299
	(1.184)	(2.955)
R-squared	0.0095	0.1177
Observations	46	46

Standard errors in parentheses
$^{+}p<0.1$ *$p<0.05$ **$p<0.01$ ***$p<0.001$

Influencer Cities

As I discussed above for overall MMR, this nonlinear pattern for racial gaps in MMR also appears to be driven by cities with Star Scores equal to 1, 1.5. While overall MMR showed a large spike at Star Score equals 4, for white-Black gap, I examine the large spike at Star Score equals 3. In all, Star Scores equal to 1, 1.5, and 3 exhibit patterns that are counter to the patterns I would expect to find from theory and other literature. Table 9 displays these cities arranged by Star Score and lists their respective white-Black gaps.

Table 9. Cities Shaping Nonlinear Pattern

Star Score	City Name	State	WB Gap	ID
1	El Paso	TX	5.39	16
1	Las Vegas	NV	4.64	24
1	Omaha	NE	7.86	38
1.5	Birmingham	AL	10.46	5
1.5	Dallas	TX	6.04	13
1.5	Hartford	CT	6.93	19
1.5	Houston	TX	6.39	20
1.5	Jacksonville	FL	10.94	23
1.5	Louisville	KY	3.88	26
1.5	Nashville	TN	6.29	33
1.5	Oklahoma City	OK	7.14	37
1.5	Phoenix	AZ	6.71	40
1.5	Salt Lake City	UT	4.57	44
3	Baltimore	MD	6.69	3
3	Columbus	OH	11.97	12
3	Denver	CO	7.13	14
3	Madison	WI	9.26	27
3	St. Paul	MN	10.26	32
3	Philadelphia	PN	7.12	39

*Missing Values Excluded N=3

From this table, several cities present as noteworthy. First, among cities with a Star Score of 1, Omaha, NE (white-Black gap of 7.86) once again has a much higher value than either Las Vegas, NV or El Paso, TX, but remains far lower than some other cities with higher Star Scores. Additionally, among cities with a Star Score of 1.5, the white-Black gap ranges from 3.88 (Louisville, KY) to 10.94 (Jacksonville, FL). Excluding those cities with very large white-Black gaps (Jacksonville, FL, and Birmingham, AL) and very small white-Black gaps (Louisville, KY, and Salt Lake City, UT), the remaining six cities in this category are tightly clustered with an average white-Black gap of 6.58, which is still far lower than expected. Cities with particularly small white-Black gaps are especially important at this Star Score, and those cities include Louisville, KY (white-Black gap of 3.88) and Salt Lake City, UT (white-Black gap of 4.57). Finally, Table 9 clarifies that Columbus, OH, with a white-Black gap of 11.97, is driving the spike among cities where Star Score equals 3.

In addition to this set of influencer cities, it is also pertinent to examine the regression model residuals for cities identified as influencers. As with overall MMR, I examined the cities

with the largest negative residuals and the largest positive residuals representing cities with a relatively high or low white-Black gap in MMR compared to the mean. San Jose, CA, and San Antonio, TX have the largest negative residuals, meaning they have the smallest white-Black gaps compared to the mean. San Jose, CA also has the largest negative residual for overall MMR, and as suggested above for overall MMR, its low poverty rate and large white population may insulate the white-Black gap.

Additionally, Milwaukee, WI, and Columbus, OH have the largest positive residuals, corresponding to large white-Black gaps compared to the mean. Columbus, OH, is the city driving the large spike in white-Black gap among cities with a Star Score of 3. Therefore, it is unsurprising that it also emerges in this analysis. While Ohio has introduced and/or passed oppressive reproductive policies in recent years, Columbus has passed city-level policies earning it 3 stars. It is also a predominantly white city but has a higher Black population than the national demographic.

Further, Milwaukee is well-known for racial disparities in housing and hiring (Pager and Shepherd 2008). In this way, it is unsurprising that the disparity between MMR for white and Black mothers is so large. It is necessary to understand the factors driving down, and conversely driving up, the white-Black gap, particularly commonalities in individual policy measures and city composition factors. These are the focus of Chapter 6 and Chapter 7, respectively.

Summary

Like overall MMR, the white-Black gap in MMR also has an unexpectedly nonlinear relationship with Star Score. Through graphing this relationship, it appears the nonlinear functional form is being driven by cities at the lower end of the spectrum, such as those with Star Scores of 1 and 1.5. Fitting a regression model, I find a significant relationship between Star Score and white-Black gap, and residuals draw attention to San Jose, San Antonio, Columbus, and Milwaukee as influencer cities. In the final section of this chapter, I will examine the nuances of the relationship between the Star Score and the white-Latina gap in MMR (white-Latina gap).

White-Latina Racial Gap in MMR & Star Score

Descriptive Exploration of Relationship

As previously discussed with white-Black racial gaps, policies improving conditions for women may especially help women of color who often face disparities in reproductive health. Further, several policies are written with the circumstances of women of color in mind, which should also serve to decrease disparities in maternal mortality rates between White women and women of color. Again, drawing on Fundamental Cause Theory (FCT), Social Determinants of Health (SDH), and Reproductive Justice Theory related to policy packages, I would expect to find a negative, linear relationship between Star Score and white-Latina gap wherein as Star Score increased, white-Latina gap would decrease. However, although literature and existing research document that compared to white women, both Black and Latina women have higher maternal mortality rates, Black women's risk far outpaces that of Latina women. This would suggest that I would expect to see smaller white-Latina gaps compared to white-Black gaps.

In exploring the relationship between Star Score and white-Latina gaps, I built upon my previous discoveries of nonlinear relationships in my other dependent variables and began by fitting a non-parametric line to a scatter plot of my cities with recorded white-Latina gaps (N=40). Figure 6 displays the relationship between white-Latina gap and Star Score. Coupled with insights from Table 10 and Figure 7, I confirmed another nonlinear relationship between these variables. Table 10 is constructed excluding missing values, which affects the N and the average racial gap. However, Figure 7 includes these cases with missing data and thus displays a slightly different range than Table 10. Note that the overall mean for white-Latina racial gaps in maternal mortality is 2.48, with a range of 0.03 to 13.89.

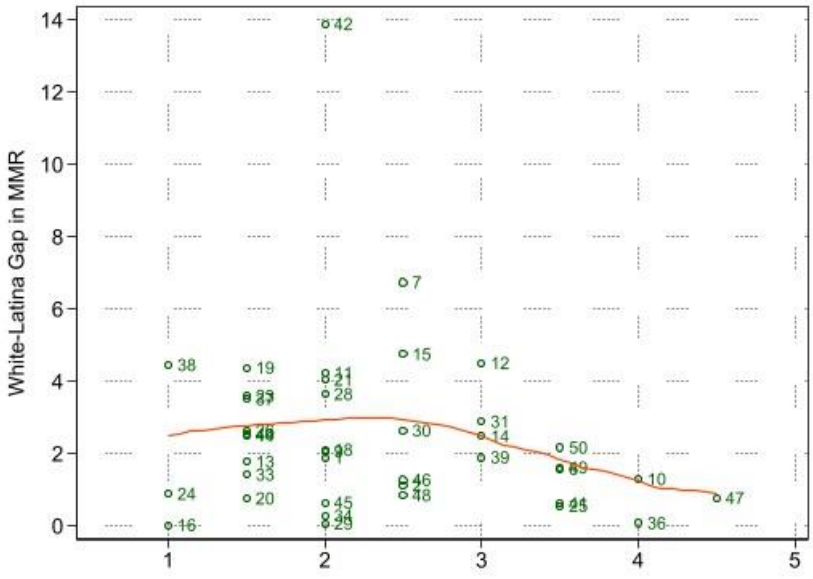

Figure 6. Scatter Plot of White-Latina Racial Gaps in MMR by Star Score

Table 10. Mean White-Latina Gap by Star Score

Star Score	Mean WL Gap	N
0.5	.	0
1	1.48	3
1.5	3.63	8
2	2.24	9
2.5	2.84	7
3	2.84	5
3.5	1.52	5
4	0.79	2
4.5	0.65	1
		Total N = 40

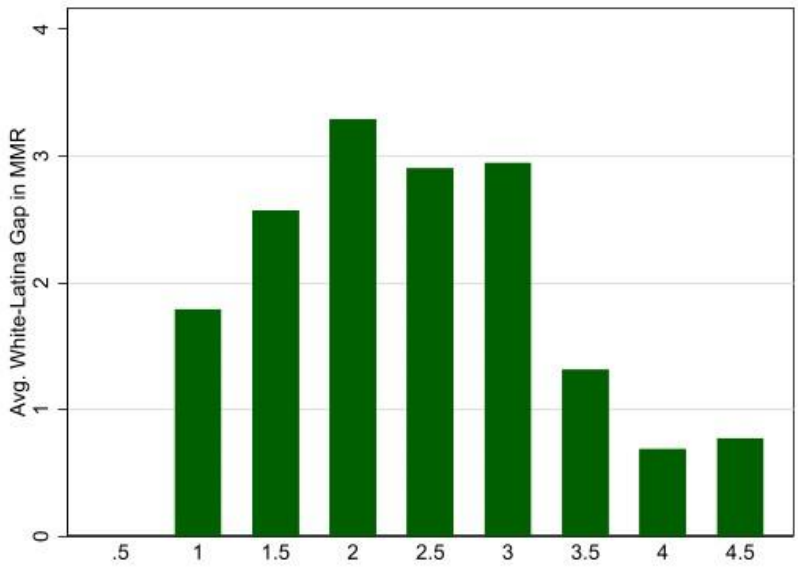

Figure 7. Mean White-Latina Gap in MMR by Star Score

From these visuals, I can also assess that white-Latina gaps are smaller than white-Black gaps. This means that my data reflect patterns in existing research showing that compared to aggregate Black women's risk for adverse maternal outcomes, Latina women's aggregate risk is lower. Compared to the white-Black gap, which averages from 2.77 to 8.13 across Star Scores (see Table 7), the white-Latina gap averages from 0.65 to 3.63 across Star Scores (see Table 10). Subsequent sections will evaluate the nuances of individual cities driving this nonlinear pattern, particularly cities with low Star Scores. The following section will explore the implications and fit of a nonlinear regression model.

Regression Modeling

From here, I attempted to fit a regression model that captured the nonlinear relationship by adding a quadratic term (see Table 11). The quadratic term captures a nonlinear relationship between the Star Scores and white-Latina gap in MMR in which cities with low or high values of the Star Score have relatively low white-Latina gaps while cities with middle values have the highest white-Latina gaps in MMRs. I found that the model fit was only slightly improved compared to a linear model (R^2=0.09), and there was no significant relationship between Star Score and white-Latina gap.

Table 11. Effects of Star Score on White-Latina Racial Gap in MMR

	(1)	(2)
Star Score	-0.487	3.065
	(0.427)	(2.322)
Quadratic Star Score		-0.688
		(0.442)
Constant	3.622**	-0.378
	(1.069)	(2.778)
R-squared	0.0331	0.0924
Observations	40	40

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Influencer Cities

The non-significant nonlinear relationship between white-Latina gap and Star Score is likely driven by cities at the low end of the Star Score spectrum. In addition to looking at these cities, I also investigated the large spike at Star Score equals 2 and revisited Star Score equals 3 to see if influencers from the overall MMR or white-Black gaps reemerge. Table 12 displays the white-Latina gap of cities with Star Scores that may be driving this relationship.

Table 12. Cities Shaping Nonlinear Pattern

Star Score	City Name	State	WL Gap	ID
1	El Paso	TX	0.03	16
1	Las Vegas	NV	0.89	24
1	Omaha	NE	4.46	38
2	Atlanta	GA	1.90	1
2	Charlotte	NC	2.07	9
2	Cleveland	OH	4.24	11
2	Fort Worth	TX	2.11	18
2	Indianapolis	IN	4.05	21
2	Memphis	TN	3.65	28
2	Miami	FL	0.07	29
2	Newark	NJ	0.29	34
2	Richmond	VA	13.89	42
2	San Antonio	TX	0.65	45
3	Columbus	OH	4.51	12
3	Denver	CO	2.48	14
3	Minneapolis	TN	2.89	31
3	Philadelphia	PA	1.90	39

*Missing Excluded, N=4

Insights from Table 12 reveal that El Paso, TX and Las Vegas, NV are driving this nonlinear pattern at Star Score equals 1, which is consistent across my three outcome variables. Additionally, Richmond, VA, emerges as an extremely powerful influencer in the nonlinear relationship between Star Score and the white-Latina racial gap. Richmond, VA's white-Latina gap is not only larger than every other city with a similar Star Score rating, but also larger than any other white-Latina gap by 7.14, and larger than the largest white-Black gap by 1.92. Meanwhile, Miami, FL, has a very small white-Latina gap, meaning that the range of racial gaps among cities with a Star Score of 2 is 13.82. Columbus, OH is still outpacing other cities at Star Score equals 3, as it was with white-Black gap. However, its white-Latina gap is much less severe.

Turning additional attention to the influencer cities identified by the residuals of my regression model, I find Miami, FL, and Newark, NJ to have the largest negative residuals, whereas Buffalo, NY, and Richmond, VA have the largest positive residuals. As revealed in my descriptive exploration into the influencers of the nonlinear pattern, Miami, FL and Richmond, VA are both important cities influencing the relationship between white-Latina gap and Star

Score. However, they were not influencers in my analysis of either overall MMR or white-Black racial gaps. These cities may be influencers because of existing relationships between city composition factors or for reasons having to do with individual policy measures.

For example, Miami, FL, is a predominantly white city with a large Latinx population. Conversely, Newark, NJ, has large Latinx and Black populations. Perhaps these cities have policy measures that are able to target the needs of the Latina community and protect them from adverse maternal outcomes. Meanwhile, Buffalo, NY and Richmond, VA have higher proportions of Black populations but without particularly large Latinx populations. These cities may lack certain policies that would better insulate the Latinx population. Further analysis is needed to understand the patterns in these relationships in greater depth. I turn my attention to this in the subsequent analytic chapters.

Summary

Consistent with previous research, white-Latina gaps in MMRs tend to be much smaller than white-Black gaps in MMRs. However, inconsistent with what theory and literature suggest, I once again found a nonlinear relationship. Key influencers needed to understand these relationships are cities with low Star Scores, Miami, FL, and Newark, NJ for their small white-Latina gaps, as well as Richmond, VA, and Buffalo, NY for their large white-Latina gaps. Regression modeling does not find that Star Score is statistically significant in predicting the white-Latina gap in MMR. However, more analysis is needed to examine how individual policy measures may impact white-Latina gaps.

Conclusion

My deep descriptive work with the data used for this project reveals that there is a nonlinear pattern in the relationship between Star Score and my key dependent variables that is counter to what my theoretical frameworks would suggest. This pattern seems to be driven primarily by cities with low Star Scores that also have relatively low MMR and racial gaps in MMR.

Through describing patterns in racial gaps in MMR related to Star Score, my findings demonstrate that the cities with the smallest and largest racial gaps in MMR, respectively, are not

the same for white-Black racial gaps and white-Latina racial gaps. Further, the white-Latina racial gaps across all cities are much lower than the white-Black racial gaps. Together, these findings parallel current patterns in maternal mortality at the individual level that describe Black women's risk of maternal mortality as approximately four times higher than white women's risk. Additionally, these findings reinforce evidence of anti-Black racism in healthcare and health outcomes that leave Black women's maternal health outcomes more disparate from white women than are outcomes for Latinas.

However, both Black and Latina women do, on average, have higher maternal mortality rates than their white counterparts, creating room for needed conversation regarding which policy factors may be particularly influential in reducing maternal mortality for these respective groups. Cities with small racial gaps, such as those that my regression model residuals identified, have relative equity in outcomes for minority populations compared to these cities' white populations, and this may be because of specific policy decisions that are able to help alleviate adverse maternal outcomes. A deeper exploration into the individual policy measures in the NIRH's index and their impact on both overall MMR and racial gaps in MMR is the subject of Chapter 6.

In addition to these patterns being potentially driven by individual policy measures and city composition factors such as poverty rates and the percent Black population, further research should also be conducted to look specifically at the role of birth rate in shaping these outcomes. For example, specifically for cities such as Billings, MT, El Paso, TX, San Jose, CA, Las Vegas, NV, etc., it may be possible that these cities have such low MMR and/or racial gaps because these cities also have low birth rates and therefore women are not dying from childbirth-related causes at rates as high. Conversely, it may also be true that cities such as Birmingham, AL, Columbus, OH, Richmond, VA, Baltimore, MD have high birth rates, which subsequently increase the population of people who are at risk of dying from childbirth-related causes and also the MMR and/or racial gaps relative to other cities. Considering these analyses from a perspective of birth rates would be an important contribution to future research in this area.

In order to more complexly understand the patterns among these influencer cities, I will need to look more closely at city composition factors such as city poverty rate and percent of the city's population that is Black. This is the goal of Chapter 7. In the next chapter, I will be exploring whether certain policy measures from the NIRH LRFI are especially important to

understanding the unexpected, nonlinear relationships between policy packages as represented by Star Scores and MMR/racial gaps in MMR.

CHAPTER 6: ANALYSIS OF THE IMPACT OF INVIDUAL POLICY MEASURES ON CITY-LEVEL RATES OF MATERNAL MORTALITY AND RACIAL GAPS IN MATERNAL MORTALITY

Introduction

This chapter explores which policy measures in the National Institute of Reproductive Health Local Reproductive Freedom Index (NIRH LRFI) are particularly important for understanding the relationship between Star Score and Maternal Mortality Rates (MMR), white-Black racial gaps in MMR (white-Black gap), and white-Latina racial gaps in MMR (white-Latina gap) respectively. First, I will introduce the individual policy measures I will focus on in this chapter and describe relevant patterns among them. I will then describe the relationship between these focal policy measures and my key dependent variables. From there, I will identify the characteristics of cities that have and do not have these focal policies to further nuance the description of the relationships between policy packages and maternal mortality. I end this chapter with bivariate and multivariate regression analyses that highlight the findings in my deep descriptive dives by demonstrating whether the patterns I find in these descriptive dives are also statistically significant.

Focal Policy Measures

Logic Behind Policy Selection

In addition to looking at the impact of the NIRH LRFI as a package, I am also interested in the impact of five specific policy measures because of their potential implications for MMR and racial disparities. Increasing the quality of training for reproductive health care providers should improve reproductive health outcomes, as should increasing the options available to women throughout their reproductive life course. If women have access to comprehensive options regarding when and how to have children (a central component of Reproductive Justice Theory, which, as I have argued in Chapter 3, also considers the role of Social Determinants of Health [SDH]), then that reproductive autonomy may improve maternal health outcomes such as maternal mortality. Additionally, if that training is specific to women of color or low-income populations that are disproportionately people of color, it could lessen the racial gap between

white women and women of color. Thus, I have included the impact of policies to fund training for providers in reproductive health care in my analysis.

Racial disparities persist among pregnant teens, with Latina and Black teens having higher rates than white teens. Providing supports for pregnant and parenting girls, who studies show are at higher risk for maternal mortality and other post-partum complications (Reid and Creanga 2018), may empower young mothers with the flexibility needed to access proactive pre-natal care. This, in turn, should decrease the likelihood that a mother will experience maternal mortality. Suppose those policies also enable young mothers to go to the doctor regularly during and after pregnancy. In that case, doctors may be more likely to catch cardiovascular conditions, eclampsia, and pre-eclampsia—the leading causes of maternal mortality—before reaching a critical point resulting in death. Together, these policies may have positive impacts on both overall MMR and racial disparities in MMR. In my analysis, I will look specifically at the impact of policy provisions for pregnant and parenting youth.

Additionally, having policies in place that protect marginalized populations, such as immigrant communities, and allow them to access reproductive health care could lower overall MMRs. Given that these policy provisions specifically support Latina women and other immigrants of color, racial maternal health disparities could also be improved. Cities with policies that support immigrants in accessing reproductive health care will be further explored.

Anti-abortion pregnancy centers are designed to discourage women from getting abortions and encourage them to carry their pregnancies to term. Notably, these centers intentionally misinform and mislead pregnant women regarding abortion and abortion services. Pregnancy centers also do not provide abortion services, referrals for abortion services, or comprehensive counseling on abortion as an option for pregnant women. Many of these pregnancy centers may not even promote the use of birth control for family planning or health issues. Centers like these that restrict women's options may persuade some women to opt-out of seeking an abortion and instead carry their pregnancy to term. If those women are also at higher risk for pregnancy-related complications, this could be especially problematic, with ramifications for the overall MMR. Additionally, if those pregnancy centers are disproportionately placed in low-income areas, which women of color disproportionately inhabit, these centers could also be problematic for racial gaps. To explore the relationship further, I include policy provisions to regulate the deceptive practices of anti-abortion pregnancy centers in my analysis.

The Center for Reproductive Rights' (2014) policy recommendations to improve maternal health conditions include calls for policies that improve environmental conditions. The adverse effects of fracking or emissions, for example, are disproportionately felt by low-income and minority women. The Reproductive Justice movement has advocated for environmental justice as an aid to the reproductive health of women of color because of the disproportionate health burdens for minority women and families. Thus, areas with more environmental controls may have healthier mothers and/or improved health outcomes for mothers, particularly mothers of color. I include an analysis of policy provisions for environmental protections for maternal and reproductive health to understand further the relationship between maternal mortality, racial gaps, and this policy measure. In the next section, I will provide descriptive analyses of these policy measures.

Descriptives of Individual Policy Measures by City

In beginning my deep descriptive work with these policy measures, I created a table (Table 13) to break down the number of cities in my dataset that have, do not have, and have to a limited extent, each of the five individual policy measures introduced in the previous section. Table 13 shows that 16 of the 50 cities have policies allocating funding to train providers in reproductive healthcare; only eight have policies providing environmental protections for maternal and reproductive health; 27 cities have policies supporting immigrant access to reproductive healthcare; only five cities regulate the deceptive practices of anti-abortion pregnancy centers; and lastly, 40 out of 50 cities have policies supporting pregnant and parenting youth.

Table 13. Descriptives of NIRH LRFI Policy Measures

Policy Name	No	Limited	Yes
Funding to Train Providers in Reproductive Healthcare	32	2	16
Environmental Protections for Maternal and Reproductive Health	40	2	8
Support for Immigrants to Access Reproductive Health Care	18	5	27
Regulations on the Deceptive Practices of Anti-Abortion Pregnancy Centers	45	0	5
Support for Pregnant and Parenting Youth	2	8	40

City Characteristics by Focal Policy Measures

I then proceeded by identifying specific details about the cities across each of my individual policy measures. In particular, I identified patterns across Star Score, MMR, white-Black gap, and white-Latina gap. I also re-examined influencer cities in this context to see if this might indicate the importance of particular policy measures to my key dependent variables. Recall that cities are "influencer cities" if they are anomalous with respect to my original hypothesis that cities with high Star Scores would have better maternal health outcomes, whereas cities with low Star Scores would have worse maternal health outcomes. Thus, I sought to identify cities that had low MMR/racial gaps but also had one or more specific policy measures that could be driving these mortality outcomes despite the cities' low aggregate Star Scores. I also sought to identify cities that had high MMR/racial gaps and were high in aggregate Star Scores but also did not have one or more specific policy measures whose absence could help

account for these poor mortality outcomes. If I were to find that a number of the cities that achieve low mortality outcomes despite having low Star Scores also do have a particular policy—for example, training providers in reproductive health care—it could suggest that having the training provision is especially important or possibly sufficient to achieving the low mortality outcome. Conversely, if I were to find that a number of the cities with high mortality outcomes despite having high aggregate Star Scores also do not have the particular specific policy—again for example, training providers in reproductive health care—it could suggest that having the training provision is especially important or possibly necessary for achieving a low maternal mortality outcome.

In the following subsections, for each outcome variable, in turn, I provide findings with respect to the five individual policy measures that my analyses suggested might help contribute to the anomalous maternal mortality and racial gap outcomes relative to the Star Scores observed in my influencer cities. In the order in which I discuss them, these policies are: providing funding to train providers in reproductive healthcare (abbreviated as Training Providers); providing environmental protections for maternal and reproductive health (abbreviated as Environmental Protections); providing support for immigrants to access reproductive health care (abbreviated as Support for Immigrants); providing regulations on the deceptive practices of anti-abortion pregnancy centers (abbreviated as Regulations on PCs); and providing support for pregnant and parenting youth (abbreviated as Support for Youth).

It is important to know these outcome variables' overall means and ranges to appreciate which cities are far above or below the overall mean values of MMRs and/or racial gaps. The overall mean MMR for the full group of cities is 5.11, with a range of 1.78 to 8.11. The overall mean for white-Black racial gaps in maternal mortality is 6.85, ranging from 2.19 to 12.71. The overall mean for white-Latina racial gaps in maternal mortality is 2.48, with a range of 0.03 to 13.89. Recall that the overall mean Star Score for the full group of cities is 2.3, with a range of 0.5 to 4.5. For the purposes of my analysis, I define low MMR and small racial gaps as those below their respective means, while high MMR and large racial gaps are those values above their respective means. Additionally, I define low Star Score cities as those with Star Scores less than 2 (Star Scores 0.5 to 1.5) and high Star Score cities as those with a Star Score greater than 3 (Star Scores 3.5 to 4.5).

Policy Measures & Overall MMR

Training Providers & MMR

I first turn attention to identifying overall patterns in "Training Providers" policies and describing influencer cities in this context. Figure 8 shows the average MMRs for cities that do not have, have in a limited capacity, and do have "Training Providers" policies. As depicted in Figure 8, and as expected, cities with these policies do have a lower MMR on average than cities without these policies. However, what is especially important here is whether there are cities that do have "Training Provider" policies but also low Star Scores and low MMRs, and also whether there are cities that do not have "Training Provider" policies but also have high Star Scores and high MMRs.

Of the 16 cities with "Training Providers" policies, two (Las Vegas and Fargo) have Star Scores below 2. Both of these cities also have MMRs under the mean of 5.11. This may mean that in these particular cases, having the "Training Providers" policy is what is driving the anomalously low maternal mortality relative to the low aggregate Star Score. Conversely, of the 32 cities without this particular policy measure, only one has a Star Score greater than 3 (Washington, DC). This city is also the only city with a Star Score above 3 that also has an MMR above the mean. Again—but this time because a city without the "Training Providers" policy has high maternal mortality despite having a high Star Score—this could suggest that having this policy compared to not having it is important for understanding patterns in maternal outcomes.

Figure 8. Average MMR by Policy Status for "Training Providers"

Table 14. MMR Influencer Cities by "Training Providers" Policies

Policy?	Star Score	City	State	MMR
Yes	1	Las Vegas	NV	3.00
Yes	1.5	Fargo	ND	4.02
No	3.5	Washington	DC	6.97

Environmental Protections & MMR

I next identify overall patterns in "Environmental Protections" policies and describe influencer cities in this context. Figure 9 shows the average MMRs for cities that do not have, have in a limited capacity, and do have "Environmental Protections" policies. As depicted in Figure 9, cities with these policies do have a lower MMR on average than cities without these policies, which also aligns with what I would expect to find. Additionally, it is important to understand whether there are cities that *do* have "Environmental Protections" policies but also low Star Scores and low MMRs, and also whether there are cities that *do not* have "Environmental Protections" policies but also have high Star Scores and high MMRs.

Eight cities have "Environmental Protections" policies. Of these eight cities, all have a Star Score of at least 2.5, which is above the mean of 2.3. Indeed, six of the eight have Star Scores of 3.5 and above. Further, most of these eight cities have MMRs below the 5.11 mean, except for Chicago, with an MMR of 5.41. This aspect fits the expected pattern of these policy

measures accompanying higher Star Scores and lower MMRs. Conversely, two of the 40 cities without this particular policy measure have a Star Score greater than 3 (Washington, DC and Los Angeles, CA). However, only Washington, DC has an MMR above the mean. This could suggest that having this policy compared to not having it is important for understanding patterns in maternal outcomes when MMRs are high despite the city having a high Star Score.

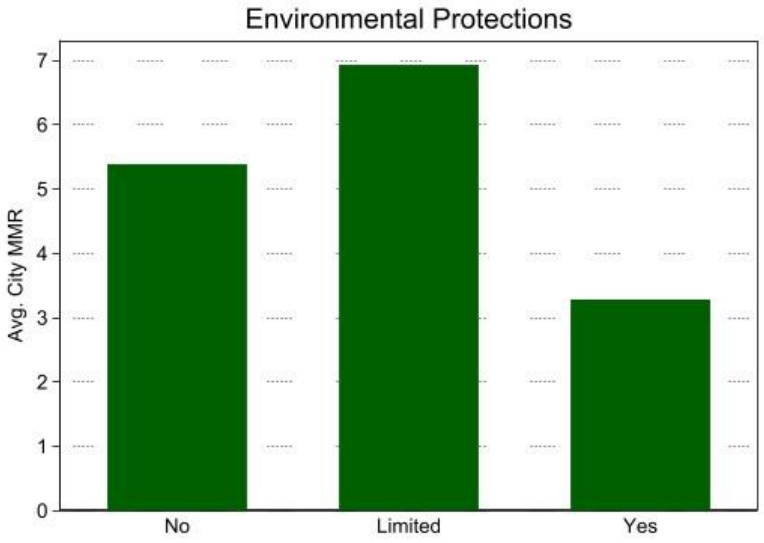

Figure 9. Average MMR by Policy Status for "Environmental Protections"

Table 15. MMR Influencer Cities by "Environmental Protection" Policies

Policy?	Star Score	City	State	MMR
No	3.5	Washington	DC	6.97

Support for Immigrants & MMR

Next, I describe overall patterns in "Support for Immigrants" policies and identify influencer cities and their consequences. Figure 10 shows the average MMRs for cities that do not have, have in a limited capacity, and do have "Support for Immigrants" policies. Figure 10 shows that cities with these policies do have a lower MMR on average than cities without these policies, and this is as I would expect. However, again what is especially important is to identify

any cities that do have “Support for Immigrants” policies but also low Star Scores and low MMRs, and also any cities that do not have “Support for Immigrants” policies but also have high Star Scores and high MMRs.

Of the 27 cities with “Support for Immigrants” policies, three (El Paso, Nashville, and Hartford) have Star Scores below 2. Despite their low Star Score, two of these cities also have MMRs under the mean of 5.11 (Nashville has an MMR slightly above the mean at 5.41). In these particular cases, this may mean that having policy measures providing supports for Immigrant populations is what is driving the anomalously low maternal mortality relative to the low aggregate Star Score. However, all cities with a Star Score greater than 3 also do have policies providing support for immigrants. Yet, five of these cities still have high MMRs despite having the policy and a high Star Score. Thus, as a general matter, having the policy will not be sufficient to attain low aggregate maternal mortality. None of the 18 cities without “Support for Immigrant” policies have a Star Score greater than 3. Thus, this policy measure does not contribute meaningfully to understanding anomalous patterns in cities with high MMRs despite high Star Scores.

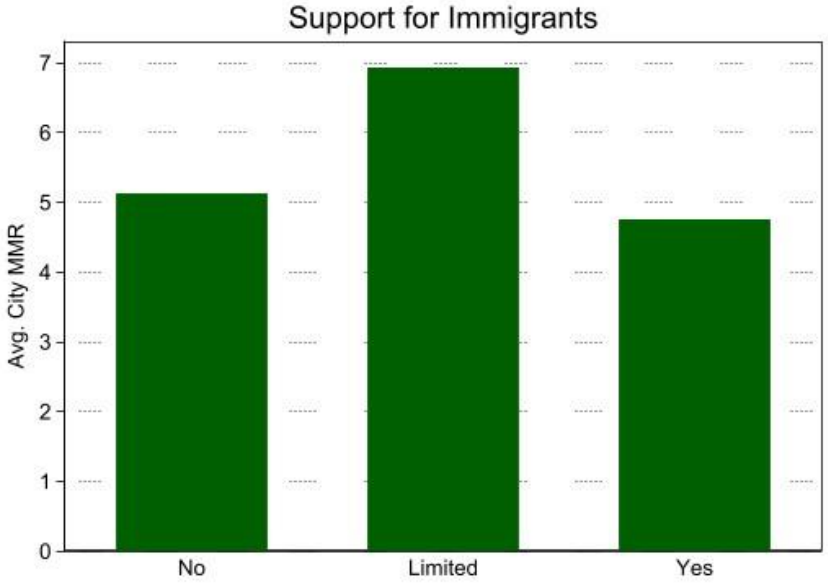

Figure 10. Average MMR by Policy Status for “Support for Immigrants”

Table 16. MMR Influencer Cities by "Support for Immigrants" Policies

Policy?	Star Score	City	State	MMR
Yes	1	El Paso	TX	3.17
Yes	1.5	Hartford	CT	3.90

Regulations on PCs & MMR

Next, I turn attention to identifying overall patterns in "Regulations on PCs" policies and describing influencer cities in this context. Figure 11 shows the average MMRs for cities that do and do not have "Regulations on PCs" policies and reflects that cities with these policies do have a lower MMR on average than cities without these policies. This pattern aligns with what I would expect based on previous theoretical and empirical work. In addition, I identify influencers, those cities that do have "Regulations on PCs" policies but also low Star Scores and low MMRs, and also cities that do not have "Regulations on PCs" policies but also have high Star Scores and high MMRs.

Of the five cities with "Regulations on PCs" policies, only Hartford, CT has a Star Score below 2. This city also has an MMR of 3.9, under the mean of 5.11. This may mean that having "Regulations on PCs" policies even in the absence of a high Star Score is associated with positive outcomes for maternal health. Conversely, of the 45 cities without this particular policy measure, six of them have a Star Score greater than 3 (Washington, DC, Los Angeles, Boston, Portland, and Chicago). Among these six cities, Washington, DC and Chicago have MMRs above the mean. Because these two cities without the "Regulations on PCs" policy also have high maternal mortality despite having a high Star Score, this could suggest that not having the "Regulations on PCs" policy helps drive the poor outcomes in these cases.

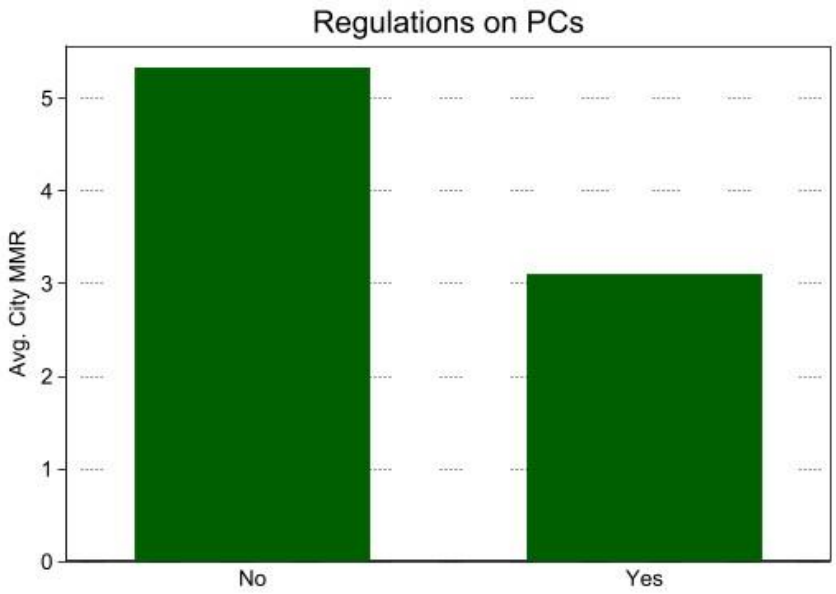

Figure 11. Average MMR by Policy Status for "Regulations on PCs"

Table 17. MMR Influencer Cities by "Regulations on PCs" Policies

Policy?	Star Score	City	State	MMR
Yes	1.5	Hartford	CT	3.90
No	3.5	Washington DC	DC	6.97
No	4	Chicago	IL	5.41

Support for Youth & MMR

Finally, I describe overall patterns in "Support for Youth" policies and identify influencer cities in this context. Figure 12 shows the average MMRs for cities that do not have, have in a limited capacity, and do have "Support for Youth" policies. As depicted in Figure 12, and as expected, cities with these policies do have a lower MMR on average than cities without these policies. Additionally, especially important here is whether there are cities that do have "Support for Youth" policies but also low Star Scores and low MMRs, and also whether there are cities that do not have "Support for Youth" policies but also have high Star Scores and high MMRs.

Eighty percent of cities in my dataset have "Support for Youth" provisions, and of these 40 cities, 12 of them have Star Scores below 2. Among these cities, seven of them also have MMRs under the mean of 5.11. In these particular cases, this may mean that having the "Support for Youth" policy is helping to drive the anomalously low maternal mortality relative to the low aggregate Star Score. However, of the two cities without this particular policy measure (Las Vegas and Birmingham), neither of them has a Star Score greater than 3. Specifically, these cities have Star Scores of 1 and 1.5, respectively, which I would expect to correspond with high MMRs. Birmingham does have a high MMR (approximately 8.2), but the other city, Las Vegas (MMR of approximately 3), does not. Because Las Vegas also lacks "Support for Youth" policies, there is still an unexplained anomaly here based on the pattern in this relationship that I would expect to find. Taken together, this suggests that cities with low Star Scores may particularly benefit from having this policy and that, in this specific way, this policy may be particularly helpful to understanding the anomalous patterns between Star Score and MMR.

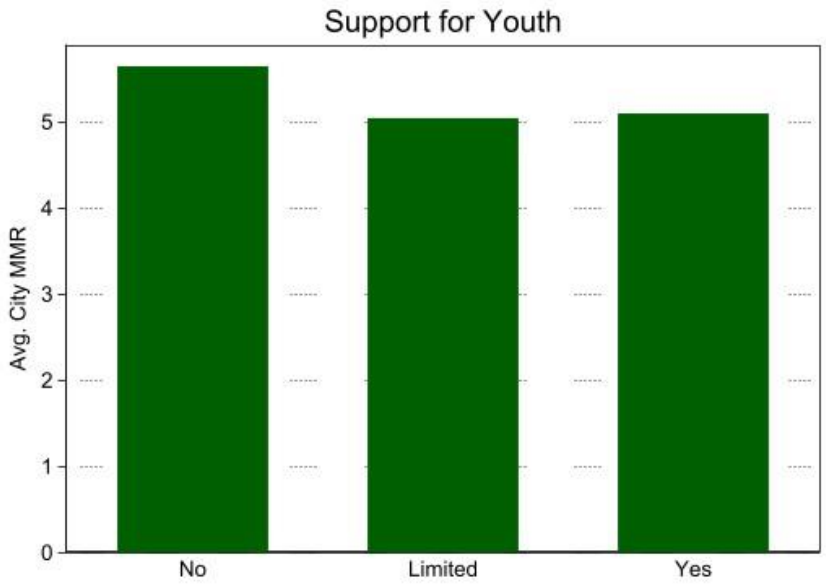

Figure 12. Average MMR by Policy Status for "Support for Youth"

Table 18. MMR Influencer Cities by "Support for Youth" Policies

Policy?	Star Score	City	State	MMR
Yes	1	El Paso	TX	3.17
Yes	1.5	Fargo	ND	4.02
Yes	1.5	Louisville	KY	4.50

Summary

My analysis of overall patterns and influencers in MMR provides context for understanding which of these policies seem especially likely to explain anomalous MMR patterns relative to the Star Score. In particular, I find that there are a high number of influencer cities in my deep descriptive dive of "Support for Youth" policies and that all of these influencers are concentrated at the low end of the Star Score spectrum with corresponding low MMRs. This provides evidence that this policy measure may help account for the nonlinear, anomalous patterns in MMR related to Star Score that I highlighted in Chapter 5. The patterns I find among "Support for Immigrants" policies also highlight that influencers in this context are exclusively those with low Star Scores and low MMRs. However, there are fewer of these cities, which may suggest that this policy measure explains less of the nonlinear pattern in Star Score and MMR I found in Chapter 5.

Further, my analysis shows "Regulations on PCs" and "Environmental Protections" have stark differences in average mortality rates between having and not having the policy (see Figure 11 and Figure 9). For example, cities without policies placing regulations on the deceptive practices of anti-abortion pregnancy centers have an average MMR that is over five. In contrast, cities with these policies have an average MMR of approximately three. This starts to build a case for exploring the statistical significance of these two policies with modeling. Additionally, cities with "Support for Youth" policies, "Training Providers" policies, and "Support for Immigrants" policies do appear to have lower rates compared to cities without these policies. However, because those differences in rates are not as stark, it may not result in a statistically significant difference. In subsequent sections, I will use regression modeling to determine the statistical significance of these policy measures. In the following sections, I focus on determining patterns in my policy measures for racial gaps, as the policies that have a significant effect on average MMR may not be the same policies that impact average racial gaps.

Policy Measures & Racial Gaps

Training Providers & Racial Gaps

Shifting the focus to racial gaps, I identify overarching patterns in "Training Providers" policies for both white-Black and white-Latina racial gaps and describe influencer cities in this context. Figure 13 shows both the average white-Black and white-Latina gaps for cities that do not have, have in a limited capacity, and do have "Training Providers" policies. In these graphs and subsequent racial gap graphs, shorter bars represent smaller racial gaps, whereas taller bars represent larger gaps and more disparities in maternal outcomes. Counter to expectations, Figure 13 depicts that cities with these policies do not have smaller average racial gaps than cities without these policies. This may suggest that "Training Providers" policies alone cannot distinguish between cities with smaller racial gaps and cities with larger racial gaps. However, it is also is important to investigate whether there are cities that do have "Training Provider" policies but also low Star Scores and small racial gaps, and also whether there are cities that do not have "Training Provider" policies but also have high Star Scores and large racial gaps.

As above, 16 cities have "Training Providers" policies, and two of them (Las Vegas and Fargo) have Star Scores below 2. Las Vegas also has racial gaps under the white-Black mean of 6.85 and the white-Latina mean of 2.48. However, Fargo has missing data for both racial gaps. This may mean that in the case of Las Vegas, having the "Training Providers" policy is at least helping to drive the anomalously small racial gaps relative to the low aggregate Star Score. Conversely, of the 32 cities without this particular policy measure, only one of them has a Star Score greater than 3 (Washington, DC). This particular city has a white-Black gap that is above the mean; however, its white-Latina gap is below the mean. Again—but this time because a city without the "Training Providers" policy has a large white-Black gap despite having a high Star Score—this could suggest that having this policy compared to not having it could, in some instances, help us understand patterns in maternal outcomes.

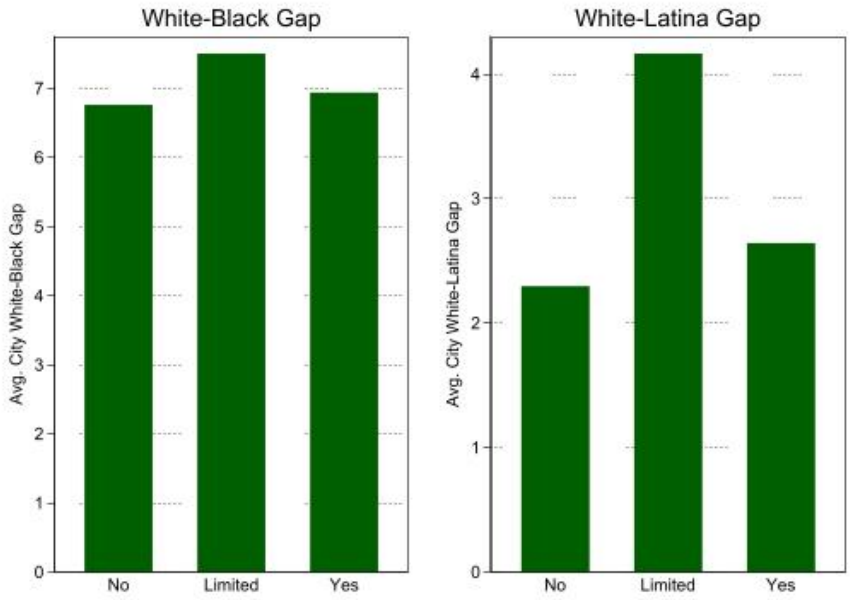

Figure 13. Average Racial Gaps by Policy Status for "Training Providers"

Table 19. Racial Gap Influencer Cities by "Training Providers" Policies

Policy?	Star Score	City	State	White-Black	White-Latina
Yes	1	Las Vegas	NV	4.64	0.89
Yes	1.5	Fargo	ND	.	.
No	3.5	Washington	DC	8.53	2.17

Environmental Protections & Racial Gaps

I next identify overall patterns in "Environmental Protections" policies and describe influencer cities in this context for white-Black and white-Latina gaps, respectively. Figure 14 shows the average racial gaps for cities that do not have, have in a limited capacity, and do have "Environmental Protections" policies. As depicted in Figure 14, cities with these policies do have smaller racial gaps on average than cities without these policies, which aligns with what I would expect to find. Additionally, it is important to understand whether there are cities that do have "Environmental Protections" policies but also low Star Scores and small racial gaps and

whether there are cities that do not have “Environmental Protections” policies but also have high Star Scores and large racial gaps.

Recall that eight cities have “Environmental Protections” policies. Of these eight cities, all have a Star Score of at least 2.5, which is above the mean of 2.3. Indeed, six of the eight have Star Scores of 3.5 and above. However, none of these six cities is an influencer city because all also have racial gaps below the 6.85 mean for white-Black gaps and below the 2.48 mean for white-Latina gaps. As with overall MMR, this aspect fits the expected pattern of these policy measures accompanying higher Star Scores and smaller racial gaps. Conversely, two of the 40 cities without this particular policy measure have a Star Score greater than 3 (Washington, DC and Los Angeles, CA). However, only Washington, DC has a white-Black gap above the mean. In only one case, then, does not having this specific policy help explain the anomalous finding of a high racial gap in mortality despite a high Star Score.

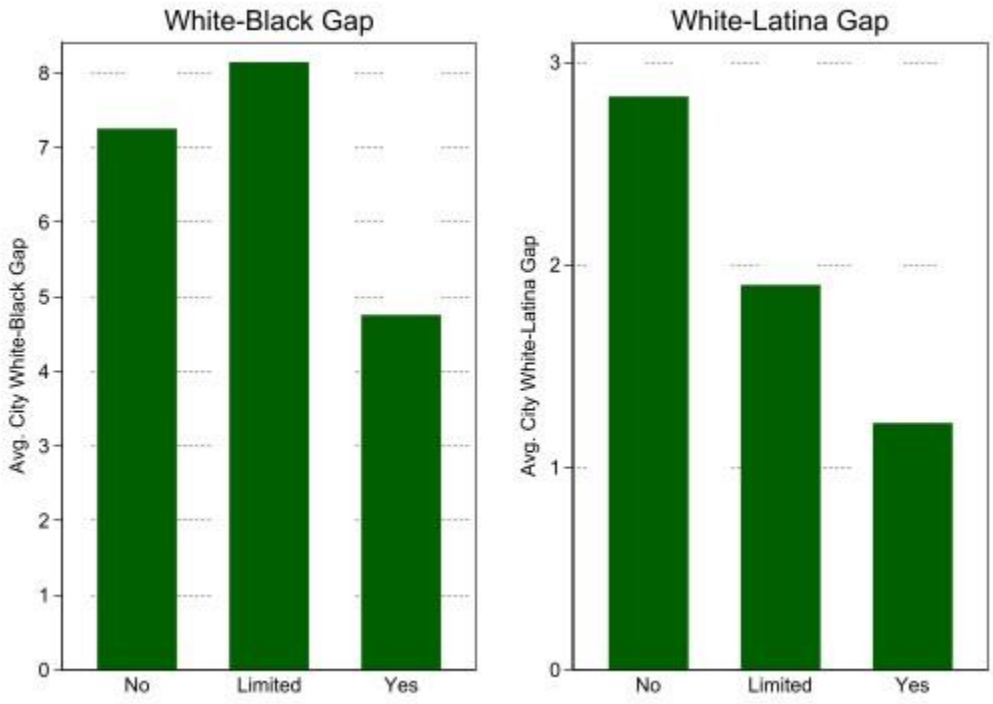

Figure 14. Average Racial Gaps by Policy Status for “Environmental Protections”

Table 20. Racial Gap Influencer Cities by "Environmental Protections" Policies

Policy?	Star Score	City	State	White-Black	White-Latina
No	3.5	Washington	DC	8.53	2.17

Support for Immigrants & Racial Gaps

Next, I describe overall patterns in "Support for Immigrants" policies, and I identify influencer cities within the context of racial gaps. Figure 15 shows the average racial gaps for cities that do not have, have in a limited capacity, and do have "Support for Immigrants" policies. Figure 15 shows that, as expected, cities with these policies do have smaller racial gaps on average than cities without these policies. In identifying influencers, it is important to identify any cities that do have "Support for Immigrants" policies but also low Star Scores and small racial gaps, and also whether there are cities that do not have "Support for Immigrants" policies but also have high Star Scores and large racial gaps.

As previously stated with MMR, three of the 27 cities with "Support for Immigrants" policies (El Paso, Nashville, and Hartford) have Star Scores below 2. Two of these cities also have racial gaps that are smaller than both the white-Black gap mean of 6.85 and the white-Latina gap mean of 2.48. Whereas with MMR, where Hartford and El Paso were the influencers, I now find that Nashville and El Paso are influencers regarding racial gaps. In these particular cases, this may mean that having policy measures providing supports for Immigrant populations is what is driving the anomalously low maternal mortality relative to the low aggregate Star Score. However, all cities with a Star Score of 3 and above also have this policy measure, and despite this, seven of these high Star Score cities still have white-Black gaps above the mean. Thus, for none of these cities can the individual policy variable explain the anomaly. This may suggest that this policy measure is not as important for understanding patterns in racial gaps compared to other policy measures I analyze. As well, because none of the cities lacking this particular policy measure have Star Scores greater than 3, any anomalous patterns in the relationship between Star Score and racial gaps cannot be explained by lacking "Support for Immigrants" policies.

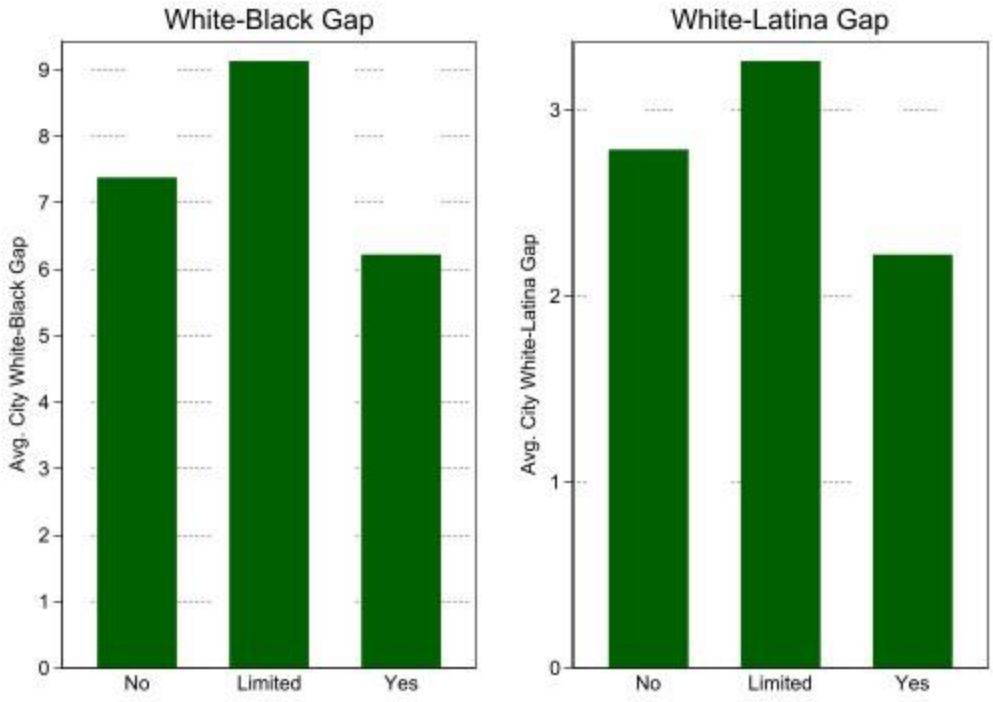

Figure 15. Average Racial Gaps by Policy Status for "Support for Immigrants"

Table 21. Racial Gap Influencer Cities by "Support for Immigrants" Policies

Policy?	Star Score	City	State	White-Black	White-Latina
Yes	1	El Paso	TX	5.39	0.03
Yes	1.5	Nashville	TN	6.29	1.42

Regulations on PCs & Racial Gaps

Next, I turn attention to identifying overall patterns in "Regulations on PCs" policies and describing influencer cities in this context. Figure 16 shows the average racial gaps for cities that do and do not have "Regulations on PCs" policies and reflects that cities with these policies do have smaller racial gaps on average than cities without these policies. This pattern aligns with what I would expect based on previous theoretical and empirical work. In addition, I identify influencers, those cities that do have "Regulations on PCs" policies but also low Star Scores and

low racial gaps, and also cities that do not have "Regulations on PCs" policies but also have high Star Scores and large racial gaps.

Of the five cities with "Regulations on PCs" policies, only Hartford, CT has a Star Score below 2. However, this city has larger racial gaps than the means (6.85 for white-Black gaps and 2.48 for white-Latina gaps). This may suggest that at low Star Scores, this policy measure alone cannot differentiate between cities with large racial gaps compared to small racial gaps. However, it should be noted that Hartford's white-Black gap is only slightly larger than the mean at 6.93. Conversely, of the 45 cities without this particular policy measure, six of them have a Star Score greater than 3 (Washington, DC, Los Angeles, Boston, Portland, and Chicago). Among these six cities, five cases present no anomaly to explain because small racial gaps accompany their high Star Scores. Indeed, only Washington, DC has a white-Black gap larger than the mean. In this one anomalous case, then, the absence of this specific policy seems to help explain the high racial gap despite its high Star Score. This may suggest that having "Regulations on PCs" policies compared to not having them could be useful for more fully understanding the patterns in maternal outcomes.

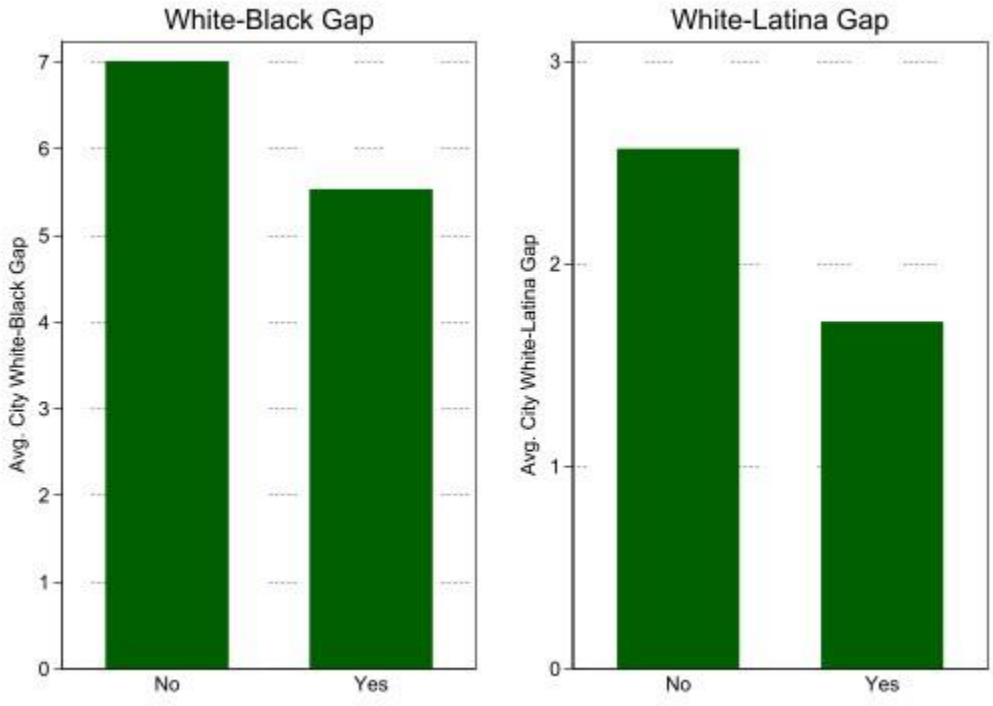

Figure 16. Average Racial Gaps by Policy Status for "Regulations on PCs"

Table 22. Racial Gap Influencer Cities by "Regulations on PCs" Policies

Policy?	Star Score	City	State	White-Black	White-Latina
Yes	1.5	Hartford	CT	6.93	4.38
No	3.5	Washington	DC	8.53	2.17

Support for Youth & Racial Gap

Finally, I describe overall patterns in "Support for Youth" policies and identify influencer cities in this context. Figure 17 shows the average racial gaps for cities that do not have, have in a limited capacity, and do have "Support for Youth" policies. As shown in Figure 17, the average pattern for the white-Black gap and the white-Latina gap do not match. Indeed, as expected, cities with these policies do have smaller white-Black gaps on average than cities without these policies. However, counter to what I would expect, cities with "Support for Youth" policies have much larger average white-Latina gaps than cities without these policies. Additionally, especially important here is whether there are cities that do have " Support for Youth" policies but also low Star Scores and small racial gaps, and also whether there are cities that do not have "Support for Youth" policies but also have high Star Scores and large racial gaps.

As a reminder, 80 percent of cities in my dataset have "Support for Youth" provisions, and of these 40 cities, 12 have Star Scores below 2. Among these cities, seven (Fargo and Charleston missing) of them also have at least one racial gap smaller than the mean (white-Black gap has a mean of 6.85 and white-Latina gap has a mean of 2.48). This may mean that in these particular cases, having the "Support for Youth" policy is what is driving the anomalously small racial gaps relative to the low aggregate Star Score. Conversely, of the two cities (Birmingham and Las Vegas) without this particular policy measure, neither has a Star Score greater than 3. While Birmingham has high racial gaps in addition to its low Star Score, which meets the general expectations, Las Vegas' racial gaps are both below the mean. Because Las Vegas has a low Star Score and low racial gaps and does not have the "Support for Youth" policies, it remains an unexplained, anomalous case.

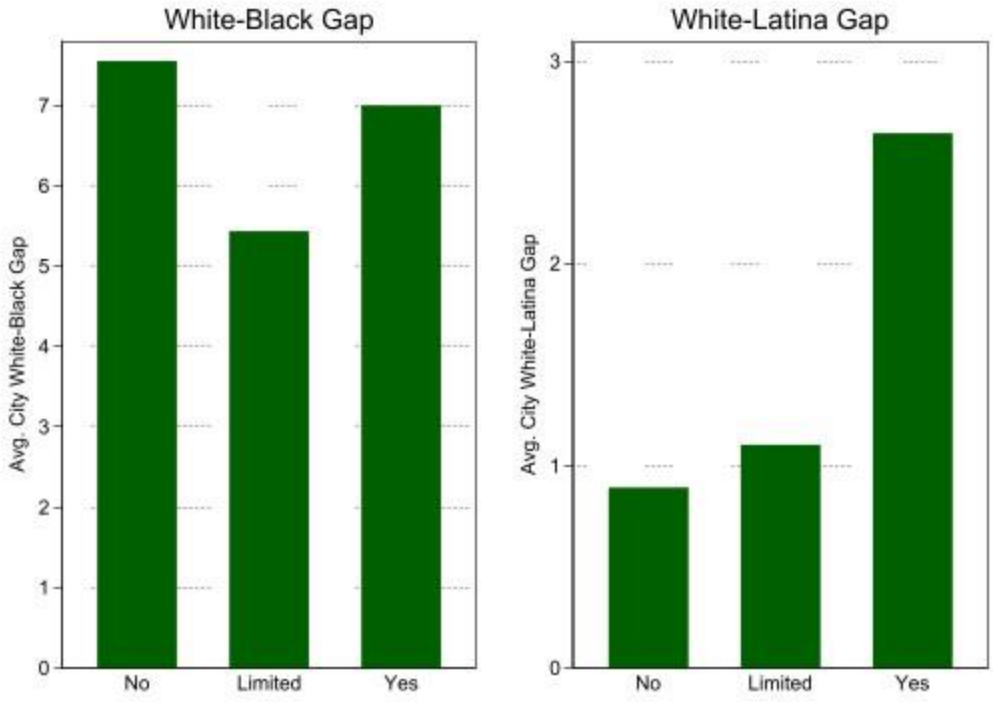

Figure 17. Average Racial Gaps by Policy Status for "Support for Youth"

Table 23. Racial Gap Influencer Cities by "Support for Youth" Policies

Policy?	Star Score	City	State	White-Black	White-Latina
Yes	1	El Paso	TX	5.39	0.03
Yes	1.5	Dallas	TX	6.04	1.78
Yes	1.5	Louisville	KY	3.88	2.64

Summary

My analysis of overall patterns and influencers in racial gaps provides context for understanding which of these policies seem especially likely to explain anomalous patterns in racial gaps relative to the Star Score. In particular, I again find that there are a high number of influencer cities in my deep descriptive dive of "Support for Youth" policies, and that all of these influencers are concentrated at the low end of the Star Score spectrum with corresponding

anomalous low racial gaps. This provides evidence that this policy measure may help account for the nonlinear, anomalous patterns in racial gaps related to Star Score that I highlighted in Chapter 5. The patterns I find among "Support for Immigrants" policies also highlight that influencers in this context are exclusively those with low Star Scores and low MMRs. However, there are fewer of these cities, which may suggest that this policy measure explains less of the nonlinear pattern in Star Score and racial gaps that I found in Chapter 5.

As with average MMR, "Regulations on PCs" and "Environmental Protections" have stark differences in average racial gaps between having and not having the policy (See Figure 16 and Figure 14). For instance, cities without environmental protection policies have a white-Black gap of approximately seven compared to just under five for cities with these policies. This provides some reinforcement to my argument that having these policies may be especially important for good maternal outcomes. Again, "Training Providers," "Supports for Immigrants," and "Support for Youth" policies have less distinct differences. "Support for Youth" policies also show a stark difference in white-Latina gaps between cities that do versus do not have these policies. However, in this case, having this policy is associated with a higher white-Latina gap. Therefore, this policy measure may not be useful in significantly lowering the white-Latina gap. Taken together, these patterns in racial gaps again reinforce the argument for delving especially into the statistical effects of "Environmental Protections" and "Regulations on PCs" policies, respectively, on maternal outcomes. In the next section, I use regression modeling to understand further which policy measures affect maternal mortality and racial gaps and to what extent.

Regression Modeling

Returning to the nonlinear regression model I fit in Chapter 5, I now aim to use regression modeling to understand the effects that my focal policy measures have on MMR and racial gaps. I first translate my bar charts capturing average MMR and racial gaps by my policy measures into bivariate regressions. Doing so demonstrates whether the bivariate patterns I found in my deep descriptive dive represent significant effects of the various policies on maternal health outcomes and provides further justification for my focus on two particular policy measures. In this section, I focus on all five of the policy measures I analyzed in the deep descriptive dive and use the results to further focus my analysis on the variables I find to be statistically significant.

I then perform multivariate regression analysis focusing exclusively on the effects of policies providing environmental protections for maternal and reproductive health ("Environmental Protection") and policies placing regulations on the deceptive practices of anti-abortion pregnancy centers ("Regulations on PCs"). As defined in Appendix B, "Regulations on PCs" is weighted at 2 out of 2 on the LRFI and "Environmental Protections" is weighted at 1 out of 2. Particularly for "Regulations on PCs," this may add context to this particular variable's relationship to the Star Score. Based on my previous analysis, these two policy measures appeared to have the greatest impact on average MMR and average racial gaps. In addition to adding these policy measures to my model individually to understand their relationships to MMR and racial gaps, I also return to the impact of aggregate Star Score on maternal mortality outcomes found in Chapter 5 and look at the changing effect of Star Score on my outcome variables once these policy measures are in the equation.

Recall that the nonlinear model I fit with a quadratic Star Score term has a negative coefficient, meaning that my maternal health outcomes first increase as Star Score increases, and then the respective maternal health outcomes decrease as Star Score continues to increase. Thus, it is difficult to evaluate the change in a nonlinear relationship when additional variables are added to the model. However, if Star Score becomes insignificant when one of these policy measures is added to the model, it suggests that the given policy is particularly important for driving the effect of Star Score I found previously when the given policy was not in the model. Because of my small N, I use $p<0.1$ as a significance level across models.

Bivariate Regression Modeling

I begin my regression analysis by displaying the effects of my five focal policy measures on MMR, white-Black gap, and white-Latina gap as bivariate regressions (see Table 24, Table 25, and Table 26). As depicted in Table 24, I find that cities with "Environmental Protections" policies and "Regulations on PCs" policies, respectively, have significantly lower overall MMRs compared to cities without the given policy measure ($p<0.01$ for both policies). However, unexpectedly, cities that have "Support for Immigrants" policies in a limited capacity have a positive and significant relationship with MMR ($p<0.1$). This may suggest that this particular policy measure reflects and contributes to the nonlinear effect of aggregate Star Score. In other words, overall MMR worsens from 'no' to 'limited,' then improve from 'limited' to 'yes.' To

confirm this is likely the case, I analyzed this model with 'limited' as the base category and found that compared to 'limited,' cities with this policy measure in place do have significantly lower overall MMR.

Table 24. Bivariate Effects of Policy Measures on Overall MMR (Compared to "No")

	(1)	(2)	(3)	(4)	(5)
Train Providers Limited	-0.825				
	(1.371)				
Train Providers Yes	-0.354				
	(0.576)				
Environmental Protections Limited		1.544			
		(1.216)			
Environmental Protections Yes		-2.098**			
		(0.65)			
Support For Immigrants Limited			1.808^{+}		
			(0.899)		
Supports for Immigrants Yes			-0.366		
			(0.541)		
Regulations on PCs Yes				-2.229**	
				(0.823)	
Support for Youth Limited					-0.599
					(1.495)
Support for Youth Yes					-0.549
					(1.37)
Constant	5.254***	5.381***	5.124***	5.330***	5.642***
	(0.333)	(0.265)	(0.419)	(0.26)	(1.337)
R-squared	0.0136	0.2148	0.1182	0.1326	0.0036
Observations	50	50	50	50	50

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

In terms of racial gaps, Table 25 displays the bivariate effects of my five policy measures on white-Black racial gaps in MMR. As depicted, only cities with "Environmental Protections" policies have significantly lower white-Black gaps compared to cities without these policies ($p<0.05$). Similarly, as depicted in Table 26, only cities with "Environmental Protections" policies have significantly lower white-Latina gaps compared to cities without these policies ($p<0.1$). Thus, I find that my bivariate regressions echo several of my findings in my descriptive deep dive and further justify my decision to focus specifically on "Environmental Protections" policies and "Regulations on PCs" in my multivariate regression analysis. While "Regulations on PCs" policies are not significant to racial gaps, their significance to overall MMR warrants further investigation.

Table 25. Bivariate Effects of Policy Measures on White-Black Racial Gaps (Compared to "No")

	(1)	(2)	(3)	(4)	(5)
Train Providers Limited	0.743				
	(2.035)				
Train Providers Yes	0.18				
	(0.885)				
Environmental Protections Limited		0.898			
		(1.887)			
Environmental Protections Yes		-2.500*			
		(1.015)			
Support For Immigrants Limited			1.761		
			(1.484)		
Supports for Immigrants Yes			-1.149		
			(0.849)		
Regulations on PCs Yes				-1.475	
				(1.287)	
Support for Youth Limited					-2.12
					(2.292)
Support for Youth Yes					-0.556
					(1.986)
Constant	6.759***	7.245***	7.371***	7.010***	7.552***
	(0.517)	(0.433)	(0.681)	(0.424)	(1.937)
R-squared	0.0036	0.1327	0.1063	0.0290	0.0355
Observations	46	46	46	46	46

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Table 26. Bivariate Effects of Policy Measures on White-Latina Racial Gaps (Compared to "No")

	(1)	(2)	(3)	(4)	(5)
Train Providers Limited	1.871				
	(1.789)				
Train Providers Yes	0.349				
	(0.873)				
Environmental Protections Limited		-0.932			
		(2.424)			
Environmental Protections Yes		-1.613^{+}			
		(0.946)			
Support for Immigrants Limited			0.479		
			(1.572)		
Supports for Immigrants Yes			-0.561		
			(0.845)		
Regulations on PCs Yes				-0.855	
				(1.282)	
Support for Youth Limited					0.215
					(2.805)
Support for Youth Yes					1.754
					(2.462)
Constant	2.293***	2.829***	2.783***	2.568***	0.889
	(0.47)	(0.428)	(0.681)	(0.405)	(2.429)
R-squared	0.0303	0.0743	0.0203	0.0116	0.0403
Observations	40	40	40	40	40

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Environmental Protections Policy

Policies providing environmental protections for maternal and reproductive health may help alleviate the adverse effects of harmful environmental practices disproportionately felt by low-income and racial minority women. Additionally, areas with more environmental controls may have healthier mothers and/or improved health outcomes, particularly mothers of color. In understanding these relationships statistically, I build on my findings from my bivariate regression analysis (See Table 27). Recall that I find that compared to cities without "Environmental Protections" policies, those with these policies have significantly lower overall MMRs ($p<0.01$), white-Black gaps ($p<0.05$), and white-Latina gaps ($p<0.1$). These findings align with my previous section's findings that this policy may play an important role in positively impacting maternal health outcomes.

I then analyze the effects of this policy measure on overall MMR by adding it to my nonlinear model with the quadratic Star Score term. Recall that in my regression analysis of Star Score in Chapter 5, I found a statistically significant nonlinear relationship between Star Score and MMR ($p<0.05$). When I add this variable to my regression model, I find that compared to cities lacking "Environmental Protection" policies, cities with these policy provisions still do have significantly lower overall MMR ($p<0.1$). Having these policies in place lowers a city's MMR by 2.45 percent. Further, adding this variable to my model does not change the significance of the Star Score terms. In this case, Star Score is still significant ($p<0.1$). These findings suggest that both that having Star Score values at the highest aggregate levels and having specific "Environmental Protection" policies contribute independently to lowering a given city's aggregate MMR.

Moving to racial gaps, I find that cities with "Environmental Protection" policies have significantly smaller white-Black gaps compared to cities without these policies by 2.81 percent ($p<0.1$). Having found a significant relationship between Star Score and white-Black gap ($p<0.05$) in Chapter 5, I now also find that adding this policy variable to my model makes the significance of the Star Score variable disappear. This suggests that "Environmental Protection" policies are extremely important to decreasing aggregate white-Black racial gaps in MMR. Controlling for this particular policy variable, the aggregate Star Score provides no additional help in explaining variability in the white-Black racial gap in maternal mortality. Additionally, consistent with my findings for the bivariate regression of white-Latina gaps on aggregate Star

Scores from Chapter 5, when I add the "Environmental Protection" policy measure to the equation to predict white-Latina racial gaps, Star Score remains insignificant. I also find no significant relationship between having an "Environmental Protection" policy and white-Latina gap. However, the policy measure coefficient shows that having these policies is associated with smaller white-Latina gaps.

The findings for white-Latina gaps may suggest that other factors, such as city composition, may be more important than this particular policy alone to lowering white-Latina gap. It is also possible that this non-significant effect may be capturing low statistical power due to the small sample size. Overall, it is clear that "Environmental Protection" policies are a crucial component in lowering MMR and the white-Black gap. I return to this finding and elaborate on it with respect to theory in Chapter 7. In the next subsection of this chapter, I evaluate the effect of policies regulating pregnancy centers' practices to understand the statistical impact on MMR and racial gaps.

Table 27. Effects of Environmental Protections Policies and Star Score on Maternal Health Outcomes

	Overall MMR	White-Black Gap	White-Latina Gap
Star Score	2.493^{+}	3.939	2.820
	(1.324)	(2.496)	(2.419)
Star Score Squared	-0.412	-0.665	-0.583
	(0.281)	(0.508)	(0.485)
Environmental Protections Limited	1.629	1.142	-1.180
	(1.179)	(1.869)	(2.451)
Environmental Protections Yes	-2.447**	-2.806^{+}	-1.002
	(0.904)	(1.430)	(1.408)
Constant	2.221	2.187	-0.232
	(1.494)	(2.935)	(2.845)
R-squared	0.2997	0.1998	0.1109
Observations	50	46	40

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Policy Regulations for Pregnancy Centers

Policies regulating the deceptive practices of anti-abortion pregnancy centers may contribute to the alleviation of the harm caused by these centers' deceptive practices, such as restricting women's options regarding their pregnancy and reproductive decision-making. As a result, cities with these policies may have better maternal outcomes for mothers, particularly low-income mothers and mothers of color. In understanding these patterns statistically, I again build on my analysis of this policy measure's bivariate relationship with overall MMR and racial gaps (See Table 28). Recall again that cities with "Regulations on PCs" have significantly lower overall MMRs than cities without these policies. This finding is consistent with previous findings in my deep descriptive dive, suggesting that this policy is important for understanding patterns in maternal health outcomes. However, these policies do not have a statistically significant effect on racial gaps.

I then add this policy measure to my nonlinear model with the quadratic Star Score term to analyze the effects on overall MMR. Recall again that in my regression analysis of Star Score in Chapter 5, I found a statistically significant relationship between Star Score and MMR ($p<0.05$). When I add this variable to my model, I find that compared to cities lacking "Regulations on PCs" policies, cities with these policy provisions have significantly lower overall MMR ($p<0.1$), and Star Score remains significant ($p<0.05$). Thus, having these policies is associated with a 1.6 percent lower MMR than cities without these policies in place.

Regarding racial gaps, I find Star Score to have a significant relationship to white-Black gap in Chapter 5 ($p<0.05$). I again find that Star Score maintains a significant relationship with the white-Black gap when adding the "Regulations on PCs" policy measure. Additionally, "Regulations on PCs" does not significantly impact white-Black gap, although the effect is negative as expected. This suggests that having this variable in the model does not provide additional explanatory power after controlling for the relationship between Star Score and white-Black gap. Further, in Chapter 5 I found that Star Score did not have a significant relationship to white-Latina gap, which is consistent with my findings in this chapter. However, counter to what I would expect to find, my "Regulations on PCs" policy measure has a relationship to white-Latina gap that is both insignificant and positive. As above, non-significant effects may be capturing the low statistical power of the model measures because of the small sample size. Overall, I find that this policy measure's effects are still worth considering, despite the

insignificant p-value, as having this policy measure is associated with smaller white-Black racial gaps in MMR. Chapter 7 elaborates on the impact of Star Scores and individual policy measures by expanding the regression equation to consider city composition factors, including poverty rates and racial demographics.

Table 28. Effects of Regulations on PCs Policies on Maternal Health Outcomes

	Overall MMR	White-Black Gap	White-Latina Gap
Star Score	2.880*	5.148^{+}	3.574
	(1.394)	(2.621)	(2.547)
Star Score Squared	-0.588*	-1.060*	-0.807
	(0.285)	(0.518)	(0.503)
Regulations on PCs Yes	-1.597^{+}	-0.190	0.788
	(0.938)	(1.473)	(1.537)
Constant	2.217	1.406	-0.905
	(1.592)	(3.103)	(2.988)
R-squared	0.2070	0.1181	0.0990
Observations	50	46	40

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Conclusion

Building on insights from my analysis of the Star Score variable, my descriptive analysis of five individual policy measures suggests that certain policy measures are particularly important to consider when discussing strategies to lower city-level MMR and shrink racial gaps. From my descriptive work, two policies emerged as distinctly important to helping explain more general patterns of maternal mortality outcomes: “Environmental Protections” policies and “Regulations on PCs” policies. These policies again emerged as statistically significant in my bivariate analysis of the effects of all five policy measures on maternal health outcomes, indicating that the bivariate patterns I found in my descriptive deep dive represent significant

effects of these two policies on maternal health outcomes. Cities with "Environmental Protections" policies have lower average MMRs and smaller average racial gaps compared to cities without these policies. These findings are also echoed in my multivariate regression analyses, in which I find that having these policies is associated with significantly lower MMR and smaller racial gaps. Together, these findings suggest that having "Environmental Protections" policies is associated with positive maternal health outcomes independent of the aggregate Star Score measure of policy packages. Indeed, in the equation predicting white-Black racial gaps, once the environmental protections policy variable is in the equation, the effect of aggregate Star Score becomes insignificant.

Similarly, cities with "Regulations on PCs" policies have lower overall MMRs and smaller white-Black racial gaps on average compared to cities without these policy provisions. Also, my regression modeling shows that having these policies is associated with lower MMR and smaller white-Black gaps. While not all of my findings are statistically significant, the findings are still worth discussing, as the insignificant results may be due to the small sample size causing low statistical power in my model.

Additionally, helping to explain anomalies is another way that a specific policy variable could be important for specific cities' maternal health outcomes. Most importantly, in my analysis, I find that "Support for Youth" policies seem to contribute to explaining anomalies in MMR and racial gaps. Indeed, a high number of cities emerge as influencers, and all of the influencers for this policy have low MMRs and small racial gaps despite having a Star Score below 2. While "Support for Immigrants" policies also have influencers exclusively with low MMR/small racial gaps and low Star Scores, there are far fewer of these cities compared to the number of influencer cities for "Support for Youth." In the aggregate, it is likely that not enough anomalies are explained this way to support any general statement that it is the specific policy rather than the Star Score itself that is important. However, resolving a few anomalies could be part of a combination of reasons that I find significant effects of both Star Score and a specific policy with the two policies I do examine with multivariate regression in this chapter.

Based on my findings, beyond attending to their aggregate Star Score values constructed by the NIRH LRFI, cities aiming to reduce aggregate rates of maternal mortality and racial gaps need to consider implementing specific policies. Consistent with my findings pertaining to environmental protection policies and policies regulating pregnancy centers, cities that have not

had these policies but now implement them may well see lower MMR and smaller white-Black racial gaps in MMR.

Additionally, "Support for Youth" policies allowed cities with low Star Scores to nonetheless achieve good mortality outcomes for many of my cases. Thus, for cities with low Star Scores, a top priority may be to implement "Support for Youth" policies as a means of diminishing some adverse maternal health outcomes. Future studies should attempt to ascertain the effects of yet other specific policies in the NIRH LRFI and policies, such as access to doulas, that are not included in the NIRH LRFI, but may well help reduce maternal mortality. This would continue to provide guidance to cities looking to use policies to improve maternal outcomes for their residents. In the final analysis chapter, I further nuance the relationships between maternal health outcomes and policy by introducing city-level composition factors related to SES and racial demographics to understand how theoretical ideas proposed by fundamental cause theory (FCT) and the social determinants of health perspective (SDH) manifest in my data.

CHAPTER 7: ANALYSIS OF CITY POVERTY RATE AND PERCENT BLACK POPULATION AS SOCIAL DETERMINANTS OF MATERNAL HEALTH

Introduction

The aim of this chapter is to evaluate the extent to which city composition factors, as outlined by Fundamental Cause Theory (FCT) and Social Determinants of Health (SDH), impact my city-level maternal health outcomes. Of particular importance to this analysis are poverty rates and racial demographics of the city, because FCT and SDH suggest that both racism and socio-economic inequality are crucial components driving health disparities on the individual level. In this chapter, I work to position racial composition and poverty rates within SDH/FCT perspectives, and I then engage in deep descriptive work to analyze the relationship between these city composition factors and my maternal mortality outcome variables. I do this by analyzing average patterns in the relationships among the cities' composition characteristics with both policy measures and maternal health outcomes. I end my analysis by returning to my regression models to statistically examine how these city composition variables shape outcomes in maternal health. Recall that in Chapter 6, I found that "Environmental Protections" policies and "Regulations on PCs" policies showed the most promise in terms of general explanations for women's mortality outcomes, and I also found that "Support for Youth" policies showed the most promise for explaining anomalies in my key relationships. Thus, I will focus exclusively on these three specific policies in this chapter.

City Composition Variables

Research on FCT conducted by Link and Phelan (2015) centers on the driving mechanisms of SES and racism as fundamental causes of health disparities such as maternal mortality at the individual level. As explained in Chapter 2, the city composition measures I analyze in this chapter act as aggregate level analogs for fundamental causes at the individual level. Indeed, the composition indicators are social determinants of health that also function as fundamental causes at the aggregate level.

Because SES is related to maternal mortality, such that lower SES mothers experience a higher incidence of maternal mortality than higher SES mothers, cities with more of their population below the poverty line should have greater overall maternal mortality. While I cannot control for individual-level SES in my model, cities with a larger population below the poverty line also will increase the probability that any woman of color that appears in my sample also is below the poverty line. If this is so, the size of the racial gap in maternal mortality might be associated with the size of the population below the poverty line. In any case, more impoverished cities may have fewer resources and are thus less equipped to provide adequate care for higher-risk women, no matter whether they are of color or white.

Further, previous research has acknowledged that Black women are still three to four times as likely to die from complications related to childbirth compared to white women when controlling for SES (American College of Obstetricians and Gynecologists 2019; Petersen et al. 2019). Additionally, insights from FCT identify racism as a fundamental cause of racial inequalities in health and mortality independent of SES (Phelan and Link 2015). Thus, independently of the percentage of persons living below the poverty line, I can expect to find racial gaps in maternal mortality. This may suggest that cities with higher proportions of Black residents will have higher maternal mortality rates than will cities with lower proportions of Black residents, and larger Black populations also would contribute to larger racial gaps in MMR.

Complications may arise when considering the effects of the composition variables in tandem with the effects of the Star Scores and individual policy measures examined in Chapters 5 and 6. On the one hand, both city composition factors and policy measures may be viewed as social determinants of health. On the other hand, in considering racial and poverty composition as fundamental causes, I must consider whether these variables, in turn, shape other policy measures—which also may be considered social determinants of maternal health—such that the policy measures become one mechanism through which city composition variables may shape maternal health outcomes. Perhaps there is something about cities with a high proportion of Black residents or a high percentage of residents in poverty—such as, for example, political or cultural climate and ideology—that makes these cities less likely to establish reproductive policies favorable to reducing maternal mortality and racial gaps in maternal mortality.

With all this in mind, this chapter will examine multivariate and bivariate relationships among focal variables. It also will look at the bivariate relationships between city composition and policy measures and between city composition and maternal health outcomes.

Overarching Patterns in City Composition Variables

In understanding the extent to which the patterns in my data align with insights from FCT and SDH, I begin my analysis by presenting and discussing Table 29, a correlation matrix highlighting the relationships between my city composition variables and my maternal outcome variables. Poverty rate and percent Black are highly correlated with one another (0.75). This is unsurprising considering the ways in which poverty tends to be disproportionately concentrated among communities of color. Also, the city's proportion of Black population is strongly correlated with overall MMR (0.71), the white-Black gap (0.53), and the white-Latina gap (0.43). This suggests that percent Black is a crucial component to understanding MMR and racial gaps, which aligns with FCT arguments. Additionally, the city's poverty rate is also correlated with overall MMR (0.50), white-Black gap (0.53), and white-Latina gap (0.37). While the correlations are not as strong as those for percent Black, city poverty rate still appears to be a significant factor shaping city MMR and racial gaps.

Finally, note that Table 29 shows that neither the bivariate relationships between Star Scores and any of the maternal health outcomes nor the bivariate relationships between Star Score and the city composition variables are statistically significant. However, Star Scores are negatively correlated with maternal health outcomes and city composition variables, which would be expected under FCT.

Understanding the nuances of these relationships is the goal of this chapter. Preceding chapters have shown various relationships lining up as theoretically expected for some cities but deviating from what was theoretically expected for other cities. Thus, although it may be possible that analyses of the impact of city composition and policy measures on MMR and racial gaps will suggest that city composition influences maternal mortality outcomes in part through policies, it also may be that policy measures help counteract negative effects of percent Black and percent in poverty on maternal mortality.

Table 29. Correlation Matrix of Key Continuous Variables

	Star Score	Overall MMR	White-Black Gap	White-Latina Gap	Percent Black	Poverty Rate
Star Score	1					
Overall MMR	-0.200	1				
White-Black Gap	-0.135	0.660***	1			
White-Latina Gap	-0.182	0.560***	0.552***	1		
Percent Black	-0.0255	0.712***	0.526***	0.434**	1	
Poverty Rate	-0.131	0.501***	0.525***	0.374*	0.752***	1

*p<0.05 **p<0.01 *** p<0.001

First, I represent these key relationships with scatter plots to understand these relationships' strength and direction visually. Specifically, Figure 18 includes two graphs for MMR, white-Black gap, and white-Latina gap, respectively, depicting the bivariate relationships to these outcome variables of both percent Black and poverty rate. Each plot features points labeled with ID numbers that correspond to city names to identify any cities that may have particularly high or low percent Black or poverty rates. Across all plots, there is a positive correlation, and it again appears that percent Black has a slightly stronger relationship to all maternal mortality outcomes than does poverty rate.

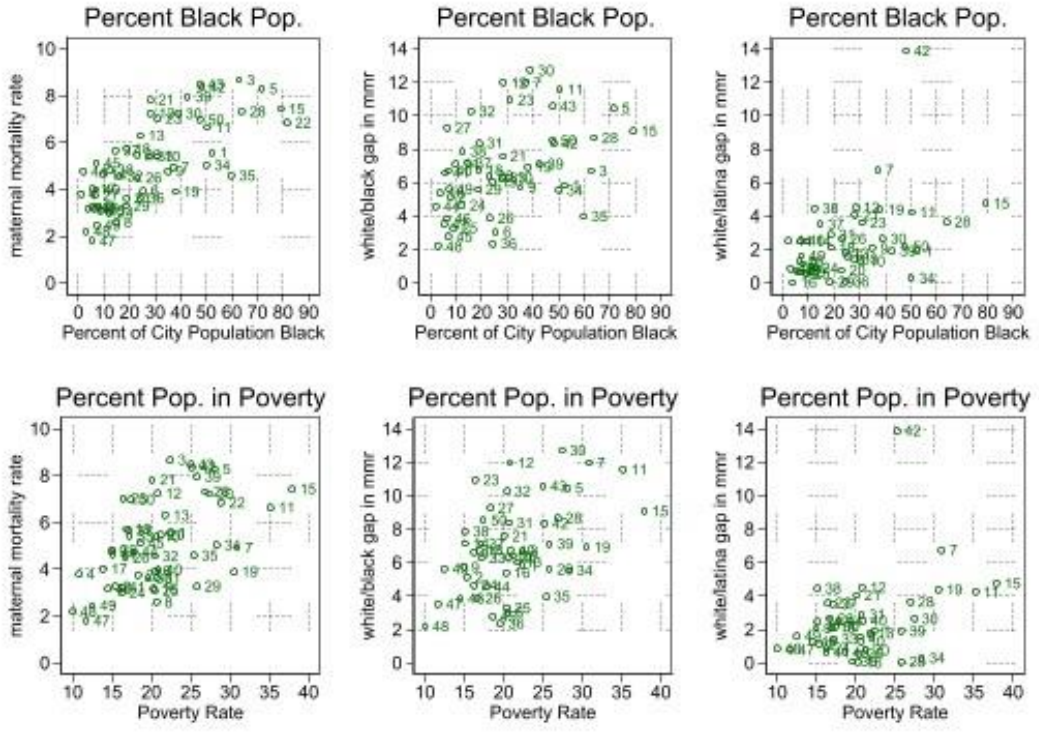

Figure 18. Scatter Plots of Maternal Health Outcomes by Percent Black and Poverty Rate

Finally, incorporating insights from Chapter 6, I seek to understand how average poverty rates and the average proportion of Black populations vary by Star Score. Figure 19 shows these patterns in city composition variables across Star Scores. I also fit a line to each plot to see if there is any evidence of a linear relationship. As depicted in Figure 19, there is no evidence of a linear or nonlinear relationship between either of my city composition variables and Star Score. This finding echoes the results of my correlation matrix, which also does not indicate a significant relationship between these sets of variables (see Table 29).

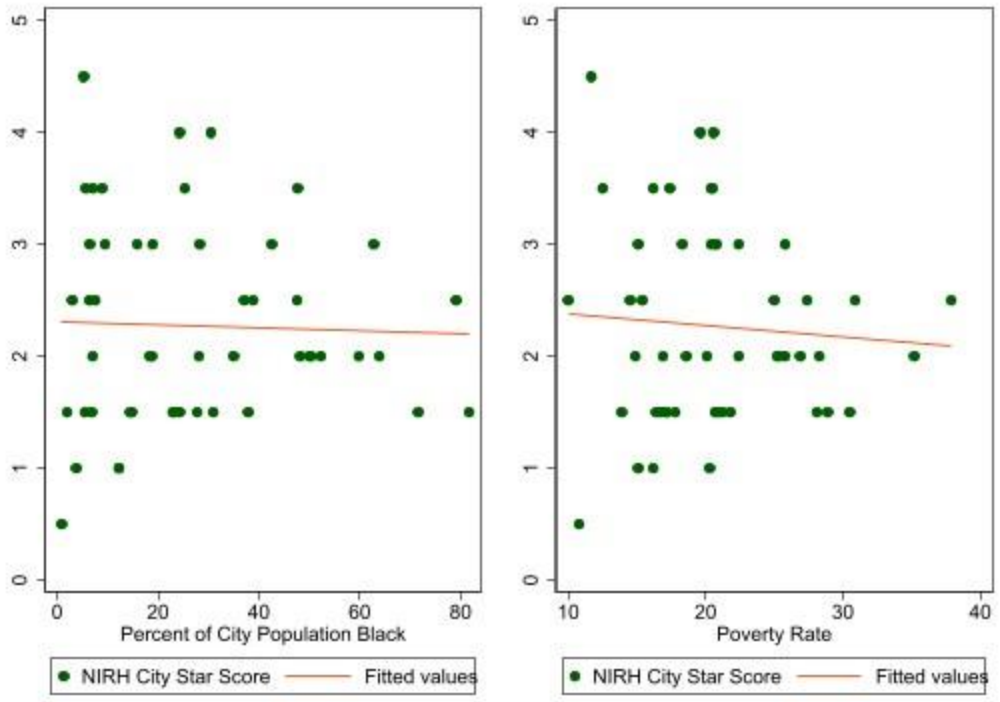

Figure 19. Patterns in City Composition Variables by Star Score

Also incorporating insights from Chapter 6, I graph the relationship between my respective city composition variables—average poverty rates and average proportion Black residents—and my respective policy measures—"Environmental Protections," "Regulations on PCs," and "Support for Youth" policies (See Figure 20 and Figure 21). Turning first to average percent Black, all graphs in Figure 20 depict that cities with each of the given policy measures have lower percentages of Black residents compared to cities without these policies. This is aligned with what I would expect to find based on theory. For example, cities without "Regulations on PCs" policies have a proportion of Black residents of approximately 30 percent on average, compared to cities with this policy that have an average percent Black of slightly above 15 percent approximately. Further, Figure 21 captures the pattern that cities with each of the three policy measures have lower poverty rates than cities without these policies. This pattern is also consistent with the pattern I would expect to find. For instance, cities without "Environmental Protections" policies have poverty rates of approximately 29 percent on average, versus cities with this policy with poverty rates of around 15 percent on average. Together, these patterns bolster my theoretical argument that particular individual policy measures are important

components to consider in understanding the relationship between city composition factors and maternal outcomes. These patterns also warrant further investigation

Later sections of this chapter will address whether the differences in rates between cities with and without these three policy measures represent statistically significant differences and the extent to which these differences impact other key relationships in my data. However, insights from Chapter 6 reveal that these patterns are often imperfect, and there are a substantial number of cities that are anomalous in their relationships between maternal health outcomes and policy measures. Thus, before undertaking further statistical analyses, I continue my deep descriptive dive to nuance my anomalous cases by incorporating city composition variables.

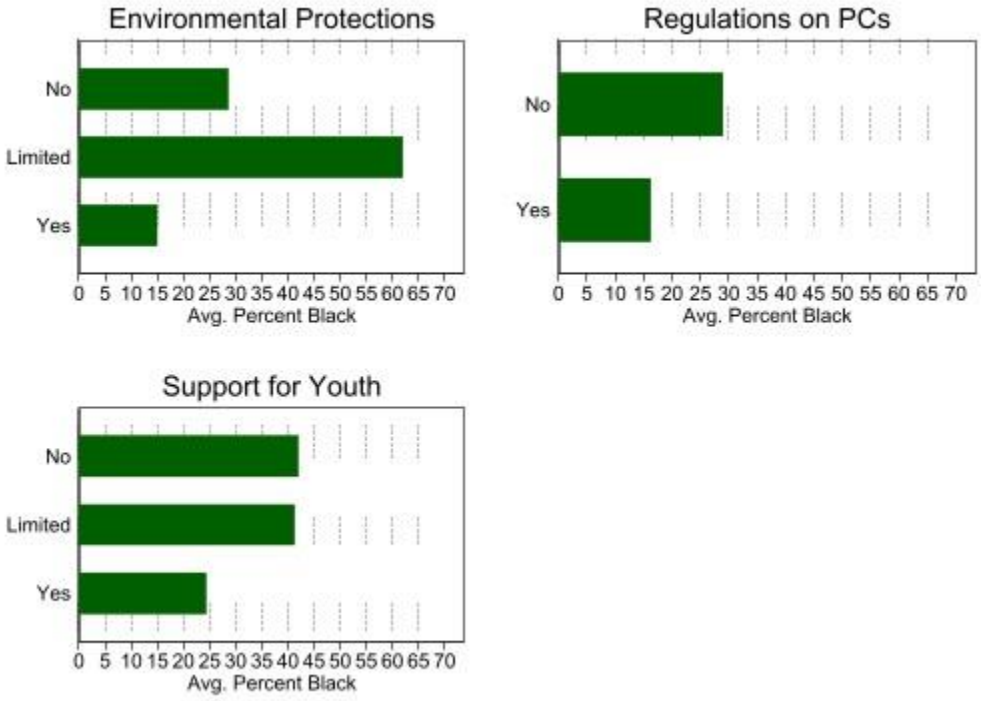

Figure 20. Average Percent Black by Policy Measures

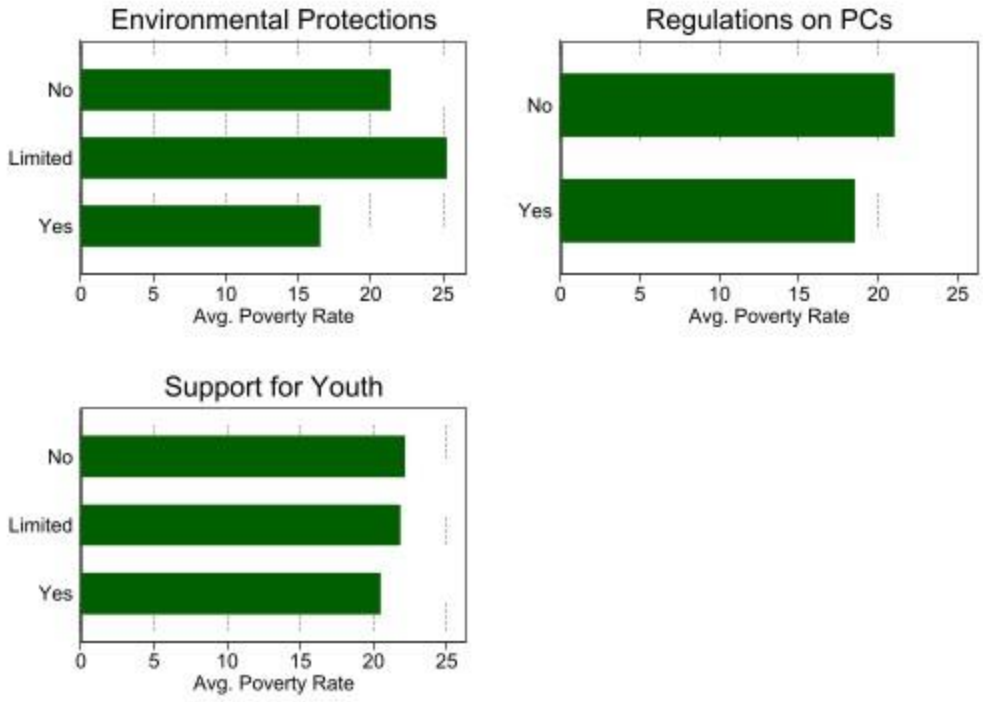

Figure 21. Average Poverty Rates by Policy Measures

Cities on the Extremes

In this section, I perform a descriptive analysis of cities on the extremes of my city composition variables to continue looking for cities that fit the pattern I would expect to find based on theory and looking for cities that represent anomalies. In Chapter 6, I looked at anomalies with respect to patterns between Star Score and maternal health outcomes and explored the extent to which these anomalies could be explained by having or not having specific individual policy measures. Here in Chapter 7, I look for anomalies with regard to patterns between city composition and maternal mortality outcomes and again explore the extent to which having or not having specific individual policy measures offers an explanation for these anomalies.

In this context, the pattern I would expect to find in my data is that cities with low poverty rates would also have low percentages of Black residents, my individual policies in place and/or high Star Scores, and good maternal health outcomes. Conversely, I would also expect to

find that cities with especially high rates of poverty and especially high percentages of Black residents also have absences of individual policies, low Star Scores, and poor maternal health outcomes. These patterns would both be in accordance with FCT and suggest that Star Scores and/or individual policies act as mechanisms through which some of the influence of my city composition factors flows.

Based on these expected patterns, I identify anomalies in this context in two ways. First, anomalies arise if I find cities with high percent poverty and high percent Black that also have good maternal health outcomes. In these cases, I may find that these cities have certain individual policy measures or high Star Scores that may help explain the anomalies. Second, anomalies are also cities with low percent poverty and low percent Black yet poor maternal health outcomes. For these cases, I may find that not having my particular individual policy measures or having a low Star Score may help explain these anomalies.

To fully appreciate which cities are far above or below the overall mean values of my city composition variables, it is important to know the overall means and ranges of these two variables. Overall, percent Black population ranges from 0.9 percent (Billings, MT) to 81.7 percent (Jackson, MS), with a mean of 27.69 percent. Poverty rates range from 10 percent (San Jose, CA) to 37.9 percent (Detroit, MI), with a mean of 20.74 percent. Recall also that the overall mean MMR for the full group of cities is 5.11 with a range of 1.78 to 8.11. The overall mean for white-Black racial gaps in maternal mortality is 6.85, with a range of 2.19 to 12.71. The overall mean for white-Latina racial gaps in maternal mortality is 2.48, with a range of 0.03 to 13.89.

In exploring patterns among my city composition variables for cities on the high and low ends of the spectrum, I take the cities with the highest and lowest measures on city composition variables, respectively, and analyze patterns across my other variables of interest. These are MMR, racial gaps, Star Score, and whether they have the "Environmental Protections," "Regulations on PCs," or "Support for Youth" policies.

Percent Black

Table 30 shows the maternal mortality outcomes, Star Scores, and policy information for the five cities with the largest Black populations by proportion. In addition to having the largest proportion of Black residents, these cities all have poverty rates above the mean of 20.74 percent. This pattern echoes findings from previous research demonstrating the ways in which racial and

SES disparities are intertwined. Additionally, all cities in this category have MMRs that are well above the mean of 5.11 percent. In terms of racial gaps, for the four cities that have a recorded white-Black gap, three of them have a white-Black gap above the mean of 6.85 percent. However, Baltimore, MD, has a white-Black gap that is 0.15 lower than the mean. Likewise, for those two cities with recorded white-Latina gaps, both have white-Latina gaps above the mean of 2.48 percent.

Regarding policy packages, I find that none of the cities in this category has a Star Score above 3. Similarly, none of the cities has either "Environmental Protections" policies or "Regulations on PCs" policies. Two cities in this category, Detroit and Memphis, do have "Support for Youth" policies. However, because neither of these cities has corresponding good maternal health outcomes along with unfavorable Star Scores, or city composition measures, this particular policy measure does not offer any additional explanatory power for the patterns I find among the cities in this category. Overall, Table 30 reveals patterns suggestive of FCT and reinforces my theoretical argument that cities with higher proportions of Black populations have higher MMR and larger racial gaps while lacking the individual policies or higher Star Scores that may lessen adverse effects.

Table 31 lists the five cities with the smallest proportions of Black population and their respective racial gaps, policy measures, and maternal outcomes. In addition to having the lowest proportion of Black residents, each of the cities in this category also has poverty rates below the mean of 20.74. Again, this finding matches patterns from other empirical work and FCT showing that race and SES are deeply entwined. Regarding maternal outcomes, all cities have MMRs below the mean of 5.11; San Francisco has the lowest MMR in the range at 1.79. Additionally, of the four cities that have recorded white-Black gaps, all are below the 6.85 mean. Similarly, of the four cities with reported white-Latina gaps, all but Salt Lake City, UT have gaps below the mean. Salt Lake City is only 0.03 percent above the mean, still making it a relatively small white-Latina gap. Further, El Paso, TX, has the smallest white-Latina gap in the range. Using an FCT frame, the patterns between city composition factors and good maternal health outcomes match what I would expect to find in these cases.

However, I would also expect these cities to have high Star Scores and have the policy measures for which I account. Yet this category includes both the city with the lowest Star Score, Billings, MT, and the city with the highest Star Score, San Francisco, CA. Indeed, three of the

five cities in this category have low Star Scores (below 2), which is not expected. Further, while San Francisco has all three policies in place, the same cannot be said of any other city in this category. In fact, none of the other cities has "Regulations on PCs" policies, and only San Jose, CA has "Environmental Protections" policies in place. These cities all have the "Support for Youth" policies, except for Billings, which only has this policy in a limited capacity. This finding, coupled with finding other policies absent for all these cities except San Francisco, echoes my finding in Chapter 6 that perhaps "Support for Youth" policies are particularly helpful for achieving good outcomes among cities with low Star Scores.

Together, these two tables suggest that percent Black seems to be particularly important to MMR and racial gaps. Additionally, for the cities with the highest proportion Black population (see Table 30), none of them have the "Environmental Protections" or "Regulations on PCs" policies of interest from Chapter 6, compared to a few of the cities with the lowest proportion Black population that do have these policies. Given this, I especially need to see whether, for my entire sample, I find a significant effect of percent Black on MMRs and racial gaps in MMRs when including policy provisions in my models.

Table 30. Five Cities with Highest Proportion of Black Residents

City	State	Percent Black	Percent in Poverty	Stars	Environmental Protection	Regulations for PCs	Support for Youth	MMR	White-Black Gap	White-Latina Gap
Jackson	MS	81.7	28.9	1.5	No	No	Limited	6.84	.	.
Detroit	MI	79.1	37.9	2.5	No	No	Yes	7.43	9.09	4.76
Birmingham	AL	71.6	28.1	1.5	Limited	No	No	8.29	10.46	.
Memphis	TN	63.9	26.9	2	No	No	Yes	7.32	8.67	3.65
Baltimore	MD	62.8	22.4	3	No	No	Limited	8.67	6.69	.

Table 31. Cities with the Lowest Proportion of Black Residents

City	State	Percent Black	Percent in Poverty	Stars	Environmental Protection	Regulations for PCs	Support for Youth	MMR	White-Black Gap	White-Latina Gap
Billings	MT	0.9	10.8	0.5	No	No	Limited	3.80	.	.
Salt Lake City	UT	2	17.8	1.5	No	No	Yes	4.75	4.57	2.51
San Jose	CA	3	10	2.5	Yes	No	Yes	2.20	2.19	0.85
El Paso	TX	3.8	20.3	1	No	No	Yes	3.17	5.39	0.03
San Francisco	CA	5.3	11.7	4.5	Yes	Yes	Yes	1.79	3.50	0.77

Poverty Rates

Turning to percent in poverty, Table 32 shows the five cities with the highest poverty rates alongside their respective policy measures, Star Scores, and maternal mortality outcomes. Again, Table 32 shows that all cities in this category also have proportions of Black residents above the mean of 27.69 percent. Of note, Detroit, MI, and Jackson, MS appear on this list as well as on the list of cities with the highest percent Black population. This speaks to the ways in which poverty rates and proportion Black are highly, but not perfectly correlated.

In terms of maternal outcomes, three cities out of five—Detroit, Cleveland, and Jackson—have MMRs above the mean, which I would expect to see based on FCT. However, the remaining two cities have MMRs far below the mean. This may speak to the slightly smaller correlation I found between poverty and MMR compared to percent Black and MMR. Further, all cities in the high poverty category for which there is racial gap data do have both white-Black gaps and white-Latina gaps above the mean. Jackson, MS, is the only city with missing racial gap data.

All of the Star Scores for cities in this category are between 1.5 and 2.5, with three cities out of the five being categorized as low Star Scores (below 2). This component is consistent with what I would expect to find using the logic of FCT for cities with high poverty and percent Black and poor maternal health outcomes.

In terms of policy measures, none of the five cities here has "Environmental Protections" policies, and only one city—Cleveland, OH—has "Regulations on PCs" policies in place. In contrast, I find that all of my cities have "Support for Youth" policies, except for Detroit, which only has this policy measure in a limited capacity. However, because this policy measure is in place in cities with both high and low MMRs, it offers little explanation for the anomalously low maternal mortality rates in Buffalo and Hartford. Overall, this table reinforces my theoretical argument that cities with higher poverty rates have higher MMR and larger racial gaps while lacking the individual policies or higher Star Scores that may lessen adverse effects in maternal health outcomes.

Finally, Table 33 lists the five cities with the lowest poverty rates in my dataset. Three out of these five cities—San Jose, CA, Billings, MT, and San Francisco, CA—also appear on the list of cities with the lowest percent Black population. The remaining two cities also have very low proportions of Black residents. Regarding maternal mortality outcomes, all cities in this

category have MMRs, white-Black gaps, and white-Latina gaps that are well below their respective means (Billings and Fargo have missing racial gap data). Patterns of low poverty and low percent Black along with good maternal health outcomes, are consistent with patterns expected based on the logic put forth by FCT.

The Star Score variable spans its full range for cities in this category, from Billings, MT at 0.5 to San Francisco, CA at 4.5. The two cities with high Star Scores (above 3; Seattle and San Francisco) also have all three of my focal policy measures in place. Again, this is the expected pattern for these two cases. Fargo and Billings both have low Star Scores (below 2) and do not have "Environmental Protections" policies or "Regulations on PCs" policies, but Fargo does have "Support for Youth" policies in place. It is possible that for this case, "Support for Youth" policies do help further explain the low MMR. Lastly, San Jose has both "Environmental Protections" and "Support for Youth" policies. While it does not have all three policies in place, and its Star Score is neither particularly high nor low, I find the case of San Jose to be largely in keeping with FCT logic. Taken together, these two tables on cities with especially high and low poverty rates suggest that considering poverty rates is important for understanding maternal mortality and racial gaps.

Overall, cities with low poverty rates and low percent Black population have lower rates of overall maternal mortality and racial gaps, which is aligned with what SDH and FCT would suggest at the individual level. Thus, these findings give support to my theoretical argument that these city composition variables are social determinants of health that also may function as fundamental causes on the aggregate level. Most of the cities in these categories fit the expected pattern as outlined by FCT, but the extent to which policies contribute to understanding the patterns between these sets of variables remains unclear. As suggested by my correlation matrix (see Table 29), Star Score may be less important to these relationships insofar as I initially expected its effects to be linear, and it is instead the individual policy measures that must be taken into account alongside city composition factors in relation to their impacts on maternal health outcomes[11]. Also, as posited in Chapter 6, it may be that "Support for Youth" policies are important in helping to further explain the pattern between low percent Black, low poverty rates, and low maternal mortality outcomes, particularly for cities with low Star Scores and none of my

[11] However, as shown in chapter 5, Star Score does have a statistically significant nonlinear relationship to key maternal health outcomes.

other policy measures in effect. Given these findings, I use regression modeling in my next section to explore what the analysis suggests with respect to FCT.

Table 32. Five Cities with Highest Poverty Rates

City	State	Percent in Poverty	Percent Black	Stars	Environmental Protection	Regulations for PCs	Support for Youth	MMR	White-Black Gap	White-Latina Gap
Detroit	MI	37.9	79.1	2.5	No	No	Limited	7.43	9.09	4.76
Cleveland	OH	35.2	50.4	2	No	Yes	Yes	6.64	11.57	4.24
Buffalo	NY	30.9	37.1	2.5	No	No	Yes	4.92	11.97	6.75
Hartford	CT	30.5	37.9	1.5	No	No	Yes	3.90	6.93	4.38
Jackson	MS	28.9	81.7	1.5	No	No	Yes	6.84	.	.

Table 33. Five Cities with Lowest Poverty Rates

City	State	Percent in Poverty	Percent Black	Stars	Environmental Protection	Regulations for PCs	Support for Youth	MMR	White-Black Gap	White-Latina Gap
San Jose	CA	10	3	2.5	Yes	No	Yes	2.20	2.19	0.85
Billings	MT	10.8	0.9	0.5	No	No	Limited	3.80	.	.
San Francisco	CA	11.7	5.3	4.5	Yes	Yes	Yes	1.79	3.50	0.77
Seattle	WA	12.5	7.1	3.5	Yes	Yes	Yes	2.46	5.62	1.62
Fargo	ND	13.9	5.5	1.5	No	No	Yes	4.02	.	.

Regression Modeling

I now return to my regression model from the previous chapters to understand how the addition of my city composition variables impacts overall MMR and racial gaps in MMR. The logic of FCT posits that both city composition factors and policy measures are social determinants of health. Additionally, in considering racial and poverty composition as fundamental causes, policy measures may act as one mechanism through which city composition variables may shape maternal health outcomes. Thus far, I have built evidence suggesting that high proportion Black and high poverty rates are associated with higher MMRs and larger racial gaps. Because of the patterns in the city composition variables that I have found thus far, it will be important to assess whether and to what extent these patterns in city composition have their effects *through* policy measures or, alternatively, having particular policy measures is able to compensate for some of the negative impacts of percent Black and poverty rate.

I begin my regression analysis by translating my graphs and scatter plots from the beginning of this chapter into bivariate regressions that show the impact of the background composition variables on Star Scores and my three individual policy measures. I then will analyze the bivariate effects of the composition factors on maternal health outcomes. Lastly, I analyze multivariate models considering the impact of both city composition variables and policy variables on maternal health outcomes. I am not performing a formal mediation analysis in these analyses, as this would not be appropriate given my data's low statistical power and its cross-sectional nature. However, I will attempt to use my cross-sectional data to see if, for future research with appropriate data, it would make sense to continue to think in terms of the FCT perspective for this type of aggregate analysis and formally test for mediation.

In my previous regression analysis conducted in Chapter 6, I found that having "Environmental Protections" and "Regulations on PCs" policies lowered overall MMRs and white-Black gaps. I also found that having "Environmental Protections" policies lowered white-Latina gaps. These findings resulted from bivariate models and multivariate models with a quadratic Star Score term. In this chapter, to explore the general idea of policies as mechanisms through which city composition factors—as fundamental causes—may have part of their influence, I will be using Star Scores and individual policy measures as alternative operationalizations of policies.

Bivariate City Composition Variables

I begin my regression analysis by modeling the bivariate effects of poverty rate and percent of Black residents, respectively, on Star Score and each of my policy variables in turn (see Table 34). As depicted, the models capturing city composition effects on Star Score are reported as standard regression coefficients. The findings in my correlation matrix (see Table 29) and graphs (see Figure 19) presented earlier in this chapter support my results here. There is no evidence of a significant statistical relationship between Star Score and my city composition variables. Thus, at least in my cross-sectional data, the Star Score aggregate policy variable in its original form *cannot* be acting as an important mechanism through which city poverty levels and percent Black shape maternal mortality outcomes.

The models examining the effects of my city composition variables on my three policy variables are ordinal logistic regressions, and the presented results are odds ratios. My results indicate that increases in percent Black are associated with decreased odds of having any of my three specific policy measures. However, this association is only significant for "Support for Youth" policies ($p<0.05$). Additionally, although increases in a city's poverty rate are associated with decreased odds of having any of the three policy measures, none of these bivariate relationships is statistically significant. Together, these results suggest that the plot and graphs of the relationship between these variables represented in Figure 20 and Figure 21 do not represent statistically significant differences in the relationship between city composition variables and policy variables. Regardless, my previous findings suggest that important relationships exist between city composition variables and my maternal health outcomes. The following section uses multivariate regression to understand how policy measures and Star Scores nuance those relationships.

Table 34. Bivariate Effects of City Composition Variables on Star Score and Policy Measures

	Star Score		Environmental Protections Policies, OR		Regulations on PCs Policies, OR		Support for Youth Policies, OR	
Percent Black	-0.001		0.987		0.963		0.966*	
	(0.006)		(0.017)		(0.0305)		(0.0157)	
Poverty Rate		-0.011		0.891		0.925		0.963
		(0.021)		(0.0643)		(0.0842)		(0.0550)
Constant	2.301***	2.490***						
	(0.208)	(0.457)						
Cut 1			2.806	0.407	3.942	1.923	0.0117***	0.0186**
			(1.582)	(0.572)	(2.843)	(3.406)	(0.0119)	(0.0267)
Cut 2			3.695*	0.543			0.0814***	0.112
			(2.148)	(0.762)			(0.0574)	(0.144)
Observations	50	50	50	50	50	50	50	50

Standard errors in parentheses

$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Percent Black

Overall MMR

I begin by analyzing the effects of percent Black and my policy measures on overall MMR. Table 35 shows the results of my four different MMR models. In Model 1, I include only the city composition variable, in this case, proportion Black. Percent Black is statistically significant ($p<0.001$), with a one percent increase in proportion Black being associated with a 0.063 percent increase in overall MMR. This finding aligns with my previous findings that there is a positive association between these two variables and that percent Black seems to be an important factor in shaping maternal health outcomes. In Model 2, I add my measure for "Environmental Protections" policies, where "no" is the contrast category. When this policy measure is added, percent Black maintains a significant, positive relationship with MMR, and the policy measure itself has a significant negative relationship with MMR. Holding percent Black constant, cities with these policies have significantly lower MMRs by 1.31 percent ($p<0.01$), compared to cities without "Environmental Protections" policies.

In Model 3, I add my policy measure for "Regulations on PCs." Percent Black maintains a significant positive relationship with overall MMR, while the "Regulations on PCs" policy variable has a significant negative effect on MMRs. Compared to cities without this policy, cities with this policy have significantly lower overall MMRs by 1.48 percent ($p<0.05$), holding percent Black constant.

Further, as depicted in Model 4, when the "Support for Youth" policy measure is added to my model, percent Black maintains a significant positive relationship with MMRs. However, holding percent Black constant, "Support for Youth" policies are not significantly associated with overall MMR. Further, the coefficient for cities with this policy is positive, which is the opposite effect that I would expect.

Lastly, Model 5 adds Star Score and a quadratic Star Score term to the analysis. Here, I find no significant association between the Star Score and MMR with percent Black held constant. This finding echoes earlier findings from my correlation matrix (see Table 29), graphs (see Figure 19), and my bivariate models (see Table 34). Taken together, percent Black is a city composition factor that significantly increases city-level MMRs, and holding percent Black constant, both "Environmental Protections" and "Regulations on PCs" policies significantly

lower city MMRs. Because there is no significant effect of the city composition factors on these two individual policy measures, it appears that the independent effects of having these two policies on lowering maternal mortality can, to some extent, compensate for high percent Black. Also, I find no evidence from the multivariate regression equation to suggest that Star Score may mediate the relationship between percent Black and overall MMR.

Table 35. Effects of Percent Black & Policy Measures on Overall MMR

	(1)	(2)	(3)	(4)	(5)
Percent Black	0.063***	0.058***	0.059***	0.069***	0.058***
	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)
Environmental Protections Limited vs. No		-0.399			
		(0.920)			
Environmental Protections Yes vs. No		-1.314**			
		(0.481)			
Regulations on PCs Yes vs. No			-1.477*		
			(0.578)		
Support for Youth Limited vs. No				-0.554	
				(0.964)	
Support for Youth Yes vs. No				0.673	
				(0.896)	
Star Score					1.283
					(1.047)
Star Score Squared					-0.299
					(0.208)
Constant	3.372***	3.725***	3.621***	2.740**	2.361*
	(0.294)	(0.312)	(0.295)	(0.933)	(1.152)
R-Squared	0.5379	0.6037	0.5943	0.5940	0.5660
Observations	50	50	50	50	50

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

White-Black Gap

I next analyze the effects of a city's proportion Black population, Star Score, and having each of my focal policy measures on a city's white-Black racial gap in MMR. Table 36 displays the results of my model with only percent Black, with percent Black and "Environmental Protections" policies, with percent Black and "Regulations on PCs" policies, with percent Black and "Support for Youth" policies, and with percent Black and Star Score respectively. In Model 1, I find that percent Black significantly increases a city's white-Black gap by approximately 0.06 percent with each percent increase in proportion Black ($p<0.01$). This finding aligns with my previous findings that there is a positive association between these two variables and that percent Black seems to be an important factor in shaping racial gaps.

In Model 2, I find that percent Black remains positively associated with the white-Black gap and remains statistically significant when my "Environmental Protections" variable is added to the model. Additionally, holding percent Black constant, having "Environmental Protections" is significant ($p<0.1$) and is associated with a decrease in the white-Black racial gap in maternal mortality rates. Specifically, cities with "Environmental Protections" policies have a white-Black gap that is 1.8 percent smaller than cities without these policy measures.

Turning to Model 3, percent Black again remains positive and significantly related to white-Black gap. While this model does not indicate statistical significance for the "Regulations on PCs" policy factor, "Regulations on PCs" policies do have a negative effect on a city's white-Black gap.

Model 4 shows that percent Black maintains a significant positive relationship with white-Black gap, while my "Support for Youth" policy variable has a negative effect on the white-Black gap in maternal mortality that is not statistically significant. Finally, Model 5 shows that the effect of Star Score on the white-Black gap is not statistically significant, controlling for percent Black, while percent Black maintains a significant positive relationship to the outcome variable controlling for Star Score.

Overall, increased percent Black does significantly increase the size of the white-Black gap across models, but only the "Environmental Protections" policy variable has an independent, statistically significant effect on the white-Black gap in maternal mortality. Recall that percent Black did not significantly influence having the "Environmental Protections" policy variable. Thus, it appears that having "Environmental Protections" policies can help mitigate the negative

influence of high percent Black for cities that have this composition factor unfavorable to women's maternal health. This speaks to the importance of "Environmental Protections" policies as a social determinant of maternal health but in a way that is inconsistent with fundamental cause theory.

As well, having a higher Star Score does not significantly impact the size of a city's white-Black gap in MMR when holding percent Black constant. Recall that city composition factors also did not significantly impact aggregate Star Score as a measure of city policies. These findings are inconsistent with my theoretical framing of FCT. In addition to providing no evidence suggesting that Star Scores may mediate the relationship between percent Black and the white-Black gap in maternal mortality, they also do not suggest that having a high aggregate Star Score will generally counteract the impact of city composition factors unfavorable to women's maternal health. These results may stem from several factors that I will discuss in the conclusion of this chapter.

Table 36. Effects of Percent Black & Policy Measures on White-Black Gap

	(1)	(2)	(3)	(4)	(5)
Percent Black	0.058**	0.051*	0.055**	0.075***	0.048*
	(0.018)	(0.020)	(0.019)	(0.018)	(0.019)
Environmental Protections Limited vs. No		-0.784			
		(1.895)			
Environmental Protections Yes vs. No		-1.799			
		(0.994)			
Regulations on PCs Yes vs. No			-0.751		
			(1.210)		
Support for Youth Limited vs. No				-2.465	
				(1.967)	
Support for Youth Yes vs. No				0.725	
				(1.732)	
Star Score					3.405
					(2.436)
Star Score Squared					-0.708
					(0.471)
Constant	5.241***	5.782***	5.387***	4.423*	1.945
	(0.624)	(0.703)	(0.671)	(1.832)	(2.800)
R-Squared	0.1875	0.2493	0.1947	0.3069	0.2331
Observations	46	46	46	46	46

Standard errors in parentheses

$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

White-Latina Gap

Finally, I analyze the effects of percent Black and my policy measures on city-level white-Latina gaps in maternal mortality. Table 37 shows the results of my model with only percent Black, with percent Black and "Environmental Protections" policies, with percent Black and "Regulations on PCs" policies, with percent Black and "Support for Youth" policies, and with percent Black and Star Score respectively. Across models, percent Black has a significant positive relationship with white-Latina gaps ($p<0.01$; model 5 $p<0.05$). In Model 1, I find that as percent Black increases, white-Latina gap also increases by 0.06 percent per one percent increase in percent Black. In Models 2, 3, and 4, respectively, none of my policy measures are statistically significant, even at the $p<0.1$ level. However, "Environmental Protections" and "Regulations on PCs" policy measures are both associated with decreasing the size of a city's white-Latina gap when compared to cities without these measures in place.

Recall that there was no significant influence of the city composition factors on the aggregate Star Score measure of policies adopted by cities. As well, as depicted in Model 5, there is no significant relationship of the Star Score measure with maternal mortality outcomes controlling for city composition. Thus, there is no evidence suggestive of mediation, and likewise, there is no evidence that the independent effect of the Star Score measure can compensate for city composition factors unfavorable to women's maternal health at the aggregate level.

Taken together, my models make clear that the proportion of a city's Black residents is important to explaining racial gaps in maternal mortality at the city level. However, my models do not align with the expected logic produced by FCT, which suggests that policy measures and policy packages may work as mechanisms furthering the city composition variable's impact on maternal health outcomes. I discuss this finding further in the conclusion to this chapter. I next turn attention to the second city composition variable, poverty rates.

Table 37. Effects of Percent Black & Policy Measures on White-Latina Gap

	(1)	(2)	(3)	(4)	(5)
Percent Black	0.057**	0.055**	0.056**	0.061**	0.051*
	(0.019)	(0.020)	(0.019)	(0.019)	(0.020)
Environmental Protections Limited vs. No		-2.319			
		(2.295)			
Environmental Protections Yes vs. No		-0.935			
		(0.908)			
Regulations on PCs Yes vs. No			-0.436		
			(1.184)		
Support for Youth Limited vs. No				-1.284	
				(2.553)	
Support for Youth Yes vs. No				0.978	
				(2.217)	
Star Score					1.065
					(2.314)
Star Score Squared					-0.295
					(0.442)
Constant	1.045	1.320	1.111	0.141	0.541
	(0.596)	(0.681)	(0.629)	(2.186)	(2.624)
R-Squared	0.1887	0.2324	0.1916	0.2524	0.2275
Observations	40	40	40	40	40

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Poverty Rates

Overall MMR

Having explored the statistical impacts of percent Black, I now turn attention to examining the effects of poverty rates and policy measures on my maternal outcome variables.

Table 38 shows the results of my five different models analyzing the impacts of my poverty and policy variables on overall MMR. In Model 1, I include only the city composition variable, in this case, percent in poverty. Poverty rate has a significant positive relationship with MMR ($p<0.001$), with a one percent increase in poverty rate being associated with a 0.161 percent increase in overall MMR. This finding aligns with my previous findings that there is a positive association between these two variables and that percent in poverty seems to be an important factor in shaping city-level maternal mortality.

In Model 2, I add my measure for "Environmental Protections" policies, where "no" is the contrast category. I find that poverty rate maintains a significant positive relationship with MMR when this variable is added to the model. Also, compared to cities without "Environmental Protection" policies, cities with these policies have significantly lower MMRs by 1.47 percent ($p<0.05$), holding poverty rate constant.

In Model 3, I add my policy measure for "Regulations on PCs" policies, and I again find that poverty rate maintains a significant positive relationship with MMR. Additionally, cities with this policy have significantly lower overall MMRs by 1.86 percent ($p<0.05$), holding poverty rate constant, compared to cities without this policy.

Model 4 introduces the effects of the "Support for Youth" policy measure on overall MMR. As with my other two policy measures, poverty rate maintains a significant positive effect with overall MMR. While it is not significant, I do find that this policy does have a negative relationship with MMR.

Finally, Model 5 adds the nonlinear Star Score term to the model. Here, I find that holding poverty rate constant, Star Score does not have a significant relationship with overall MMR. Poverty rate still has a significant negative influence on MMR, controlling for the Star Score measure.

Overall, percent in poverty is a city composition factor that significantly increases city-level MMRs, and both "Environmental Protection" and "Regulations on PCs" policies significantly lower city MMRs. Because city composition factors do not significantly influence having versus not having these policies, it appears that the independent influence of "Environmental Protection" and "Regulations on PCs" policies can help compensate for city composition factors unfavorable to maternal health in cities with high poverty. Across models, I find *no* evidence, at least in my cross-sectional data, to suggest that the influence of city poverty

rate works in part through policies as mechanisms. This is counter to my theoretical argument based in FCT.

Table 38. Effects of Poverty Rate & Policy Measures on Overall MMR

	(1)	(2)	(3)	(4)	(5)
Poverty Rate	0.161***	0.128**	0.150***	0.162***	0.135**
	(0.037)	(0.038)	(0.036)	(0.038)	(0.041)
Environmental Protections Limited vs. No		1.045			
		(1.110)			
Environmental Protections Yes vs. No		-1.470*			
		(0.616)			
Regulations on PCs Yes vs. No			-1.860*		
			(0.714)		
Support for Youth Limited vs. No				-0.540	
				(1.282)	
Support for Youth Yes vs. No				-0.274	
				(1.177)	
Star Score					1.829
					(1.345)
Star Score Squared					-0.404
					(0.269)
Constant	1.760*	2.637**	2.182**	2.048	0.561
	(0.809)	(0.844)	(0.781)	(1.427)	(1.470)
R-Squared	0.2790	0.3717	0.3698	0.2829	0.3181
Observations	50	50	50	50	50

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

White-Black Gap

Secondly, I analyze the effects of a city's poverty rate and having each of my focal policy measures on a city's white-Black racial gap in MMR. Table 39 displays the results of my model with only poverty rate, with poverty rate and "Environmental Protections" policies, with poverty rate and "Regulations on PCs" policies, with poverty rate and "Support for Youth" policies, and with poverty rate and Star Score respectively.

Across all models, I find that poverty rate maintains a significant, positive relationship with white-Black gap independent of adding policy measures to my models ($p<0.01$). In Model 1, I find that poverty rate significantly increases a city's white-Black gap by approximately 0.23 percent with each percent increase in poverty ($p<0.001$). This finding aligns with my previous findings that there is a positive association between these two variables and that percent in poverty seems to be an important factor in shaping racial gaps.

In Model 2, I find that having "Environmental Protections" policies has a negative association with white-Black racial gap in maternal mortality rates, despite these effects not being statistically significant. Specifically, cities with "Environmental Protections" policies lower the white-Black gap by 1.5 percent compared to cities without these policy measures, holding poverty rate constant.

Turning to Model 3, while this model does not indicate statistical significance for my policy measure, having "Regulations on PCs" policies does decrease the size of a city's white-Black gap. Next, I find that "Support for Youth" policies have a negative association with white-Black gap independent of the significant positive effect of poverty rate, although this policy measure is not significant (see Model 4).

Finally, in Model 5, I add my nonlinear Star Score term to my model. Here, I find that Star Score does not significantly influence the white-Black gap. In all, percent in poverty does maintain a significant positive relationship with the size of white-Black gap across models. Also, I find that neither my policy measures nor my Star Score variables have a significant relationship with white-Black gap. Regardless of significance, I do find my policy measures have a negative relationship with white-Black gap, suggesting that perhaps they can help cities with high percent in poverty improve their maternal health outcomes. Because there is no significant influence of the city composition factors on the policy variables themselves, the patterns I find here do not

suggest mediation. In short, findings from my regression modeling are largely counter to the relationships I anticipated using FCT as a guiding framework.

Table 39. Effects of Poverty Rates & Policy Measures on White-Black Gap

	(1)	(2)	(3)	(4)	(5)
Poverty Rate	0.228***	0.193**	0.221***	0.239***	0.197**
	(0.060)	(0.064)	(0.061)	(0.059)	(0.065)
Environmental Protections Limited vs. No		0.208			
		(1.747)			
Environmental Protections Yes vs. No		-1.496			
		(0.990)			
Regulations on PCs Yes vs. No			-0.879		
			(1.151)		
Support for Youth Limited vs. No				-2.271	
				(1.970)	
Support for Youth Yes vs. No				-0.191	
				(1.709)	
Star Score					3.037
					(2.369)
Star Score Squared					-0.611
					(0.460)
Constant	2.086	3.061*	2.320^{+}	2.247	-0.586
	(1.304)	(1.449)	(1.346)	(2.122)	(2.776)
R-Squared	0.2466	0.2860	0.2567	0.3043	0.2774
Observations	46	46	46	46	46

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

White-Latina Gap

Lastly, I analyze the effects of percent in poverty and my policy measures on city-level white-Latina gaps in maternal mortality. Table 40 shows the results of my model with only poverty rate, with poverty rate and "Environmental Protections" policies, with poverty rate and "Regulations on PCs" policies, with poverty rate and "Support for Youth" policies, and with poverty rate and Star Score respectively.

Across models, percent Black is significantly associated with increasing white-Latina gaps ($p<0.1$). In Model 1, I find that the white-Latina gap increases by 0.15 percent per one percent increase in poverty rate. In Models 2 and 3 respectively, neither of my policy measures are statistically significant, even at the $p<0.1$ level. However, both policy measures are negatively associated with the size of a city's white-Latina gap when compared to cities without these measures in place (holding poverty rate constant).

In Model 4, I find that not only is having "Support for Youth" policies not significantly associated with white-Latina gap but also that the coefficient demonstrates a positive relationship with white-Latina gaps. This particular relationship is counter to the relationships I have found across my other policy models and does not fit with any part of my theoretical argument or anticipated relationships.

Lastly, Model 5 depicts the pattern between my nonlinear Star Score term, poverty rate, and white-Latina gap. I find that Star Score does not significantly influence the white-Latina gap. Taken together, my models make clear that a city's poverty rate is important to racial gaps, with poverty rate maintaining a significant, positive relationship with white-Latina gaps across models. Additionally, while none of my policy measures achieve statistical significance, the coefficients for "Environmental Protections" policies and "Regulations on PC"s policies have negative effects on white-Latina gap independent of poverty rate, and "Support for Youth" policies" has an inexplicably positive effect but it is insignificant. Because the relationships I find here provide no evidence to suggest mediation of city composition by policy factors, again, my regression findings run counter to the mediation logic suggested by FCT. I address this further in concluding this chapter.

Table 40. Effects of Poverty Rate & Policy Measures on White-Latina Gap

	(1)	(2)	(3)	(4)	(5)
Poverty Rate	0.146*	0.126^{+}	0.143*	0.148*	0.120^{+}
	(0.059)	(0.063)	(0.060)	(0.059)	(0.064)
Environmental Protections Limited vs. No		-1.037			
		(2.332)			
Environmental Protections Yes vs. No		-0.970			
		(0.965)			
Regulations on PCs Yes vs. No			-0.537		
			(1.216)		
Support for Youth Limited vs. No				-0.649	
				(2.649)	
Support for Youth Yes vs. No				1.106	
				(2.320)	
Star Score					1.648
					(2.366)
Star Score Squared					-0.392
					(0.455)
Constant	-0.524	0.110	-0.411	-1.510	-1.391
	(1.262)	(1.423)	(1.301)	(2.470)	(2.738)
R-Squared	0.1398	0.1665	0.1443	0.1814	0.1748
Observations	40	40	40	40	40

Standard errors in parentheses
$^{+}$p<0.1 *p<0.05 **p<0.01 ***p<0.001

Conclusion

This chapter describes and evaluates patterns related to my theoretical argument that city composition factors are important to consider for driving up or decreasing maternal reproductive mortality, including overall MMRs and racial gaps at the city level. Although I do find that the city composition measures I analyze in this chapter may act as aggregate level analogs for

fundamental causes at the individual level, surprisingly, policies do not seem to act as important mechanisms through which city-level poverty levels and racial composition have their effects. While formal testing for mediation would require longitudinal data, I find no evidence suggesting such mediation in my regression analyses using cross-sectional data. My aggregate Star Score measure does not have significant effects on any maternal mortality outcome controlling for city racial composition or city poverty level. Although some of my individual policy measures as independent variables do have significant effects on one or another maternal mortality outcome controlling for city composition factors, city composition factors did not significantly influence those policy measures as dependent variables.

Instead, especially the single policy measures of "Environmental Protections" and Regulations on PCs" policies independently may help to counteract city composition factors unfavorable to aggregate maternal mortality and white-Black gaps in maternal mortality for cities with high percent Black or high percent in poverty. That is, while having "Environmental Protection" and "Regulations on PCs" policies generally are important for all cities that seek to lower their aggregate maternal mortality rates and racial gaps in maternal mortality, as a practical matter, they are especially important for those cities that have high percentages of Black or impoverished populations.

In addition, through a descriptive deep dive into the relationships between my city composition factors, policy measures, Star Scores, and maternal health outcomes, I identified patterns in these relationships that complement the results of my regression analyses and provide further information pertaining to reducing overall MMR and racial gaps in maternal mortality at the aggregate level. Overall, my analysis of cities with especially high proportions of Black residents, cities with especially high poverty rates, cities with especially low proportions of Black residents, and cities with especially low poverty rates, respectively, reveals that poverty rates and percent Black are highly associated with one another. Indeed, I find that cities with high percent Black populations also have high poverty rates, and cities with low percent Black residents have corresponding low poverty rates and vice versa. This finding parallels other empirical work and the theoretical argument crafted in Fundamental Cause Theory, speaking to the strong linkages between race and SES.

Additionally, although I found no statistically significant relationship between either of the city composition factors and any of the policy measures used in my regression models, my

descriptive analyses did find that cities with lower percent Black and lower poverty rates not only tended to have lower MMRs and smaller racial gaps, they also had a greater number of key individual policy measures compared to cities with higher percent Black and/or higher poverty rates. This suggests that scholars should not entirely discount the possibility that policies may function in part as mechanisms through which city composition factors have part of their effects. Even though my regression analyses provided no suggestive evidence of mediation, these analyses have very low statistical power. Perhaps a further analysis with longitudinal data and/or more statistical power would uncover findings suggestive of the type of mediation that my FCT-informed theoretical perspective would predict.

My findings in Chapter 7 do bolster pieces of my original theoretical argument while providing additional context for my findings in Chapters 5 and 6. In particular, as I demonstrate in this chapter, many cities that I found to be influencers because they stood out as anomalous in my regression models in previous chapters turned out to have high or low percent Black populations and/or poverty rates. These city composition factors, in turn, could help explain what seemed anomalous in analyses that failed to consider the role of city composition factors in shaping maternal mortality outcomes. Together, this suggests that in understanding why cities may emerge as influencers when looking at policy packages and maternal outcomes, it is also necessary to consider city composition factors that have strong effects on overall MMR and racial gaps.

My regression findings also support in part my original theoretical argument about the role of city composition factors. I find that a city's proportion of Black population is significant across all models for all maternal outcomes. The larger the Black population in a city, the higher the overall MMR and larger the racial gaps. Additionally, I find that my individual policy measures are most important for impacting a city's overall MMRs. Indeed, I find that having "Environmental Protections" policies and "Regulations on PCs" policies in place both have significant negative effects on a city's MMR, holding percent Black constant.

However, I do not find that my policy measures have significant effects on racial gaps. This lack of significance could be the case due to low statistical power in my models since my respective sample sizes for racial gaps are smaller than that for overall MMR. Additionally, and to reiterate, I find no evidence in my regression analyses to suggest the possibility that mediation of the impact of percent Black on maternal mortality outcomes is occurring through either

individual policy measures or Star Score measures of policy packages. This is inconsistent with FCT as a framework for these relationships at the aggregate level, but again my deep descriptive dive suggests at least the possibility that this too could result from low statistical power.

Similarly, a city's poverty rate is significantly related to overall MMR and racial gaps across models, and higher poverty rates are associated with significantly higher overall MMRs and larger racial gaps. I also find that my single policy measures are especially important to reducing overall MMR independent of poverty rates. Indeed, having "Environmental Protection" policies is associated with a significant decrease in the overall MMR compared to cities without these policies, holding poverty rate constant. Likewise, independent of poverty rate, having "Regulations on PCs" policies is also associated with significantly lower overall MMRs.

However, I do not find that my policy measures have significant effects on racial gaps. This lack of significance could be the case due to low statistical power in my models, since my full sample size is relatively small and my respective sample sizes for racial gaps are smaller than the sample size for overall MMR. Additionally, I find no evidence in my analyses of poverty rates to suggest the possibility that mediation of the influence of poverty rates is occurring through the individual policy measures I examined or through aggregate Star Scores. This is inconsistent with the framework FCT provides for these relationships at the aggregate level.

Overall, my findings do indicate that policymakers in cities with high proportions of Black residents and/or high poverty rates can partially offset the independent negative effects of these city composition factors through implementing key policies. Specifically, policymakers should focus their efforts on enacting "Environmental Protections" policies and "Regulations on PCs" policies. Currently, relatively few cities do have these policies. My analyses indicate that these two policies have significant negative effects on overall MMR and do have negative relationships with racial gaps despite these relationships not achieving statistical significance for the racial gap outcomes.

Future studies should continue to look at the breadth of policies contained in the NIRH LRFI, as well as policies not included in this index, such as policies providing access to doula services. This research should seek to determine whether there are additional policies whose independent effects further offset the negative impacts of high percent in poverty and/or high percent Black residents on maternal health. My analyses do suggest that some policy measures

can help combat the adverse city-level health effects of economic inequality and systemic racism.

There may be several reasons why results in this chapter do not reflect the logic put forth by FCT more closely. As previously noted, my low sample size may be resulting in low statistical power in my models. It may also be that my cross-sectional data gives an insufficient test of these relationships because a longitudinal dataset in which maternal health outcomes for all cities are clearly measured later in time relative to the measurement of the policies is better suited to theoretical arguments pertaining to mediation. Further, it is also possible that the original FCT perspective needs more development for a successful application at the aggregate level. Future theoretical work should be devoted specifically to creating solid linkages between the micro and aggregate mechanisms through which the fundamental causes of economic inequality and systemic racism operate.

CHAPTER 8: CONCLUSION AND DISCUSSION

Summary of Findings

Summary of Project

Social scientific research has been dedicated to understanding and disrupting negative trends in obstetric outcomes for women, particularly as obstetric outcomes continue to worsen in the U.S., disproportionately impacting women of color. Appropriate policies are essential for improving reproductive and maternal health outcomes, but few previous studies considered the role of policies in shaping maternal mortality outcomes in their analyses (Center for Reproductive Rights 2014; March of Dimes 2018, 2019). Moreover, fewer still considered those policies as interconnected packages.

Indeed, many of the prior quantitative studies are exclusively epidemiological (Aoyama et al. 2018; Creanga et al. 2014, 2015a; Reid and Creanga 2018). Others take a more social approach to the investigation of maternal mortality but do not consider the role of policies at any level of the state (Goffman et al. 2007; Liu et al. 2015; Nicoloro-SantaBarbara et al. 2017). Additionally, prior scholarship in this area suggested a clear need for more research that combines consideration of social determinants of health (SDH) with policies aimed at improving health outcomes for reproducing individuals, particularly for communities of color (Creanga et al. 2015b; Kozhimannil et al. 2015; Osypuk et al. 2015).

This dissertation connects previous work on maternal mortality to policies by examining the ways in which policy packages focused on improving reproductive conditions impact adverse maternal outcomes at the local level. Policy can be an effective—though under-studied—avenue for reducing the risk of maternal mortality. This is because policies can be used to target specific social factors that research has demonstrated place individuals at higher risk of a negative outcome. This project is innovative in three ways. First, it highlights some of the reproductive policies and policy packages that best increase reproductive freedom while also improving maternal health outcomes, including racial gaps in maternal mortality. Second, it examines how policies in the NIRH LRFI work as social determinants that may improve maternal health while controlling for city composition factors that tend to worsen maternal health outcomes. Third, the dissertation theoretically extends the bounds of Fundamental Cause Theory (FCT) from the

individual level to the aggregate level and places it in conversation with Reproductive Justice Theory. Combining FTC with SDH and the Reproductive Justice Framework provides a more complete theoretical lens through which to evaluate policies that may impact city-level maternal health outcomes. This information is beneficial not only to scholars of maternal health/reproduction and SDH but also to local policymakers working to shift reproductive ideology and policy to reduce maternal mortality and center the needs and experiences of marginalized groups.

I use the National Institute of Reproductive Health's Local Reproductive Freedom Index (NIRH LRFI) of 50 U.S. cities to advance scholarship and policy advocacy on how policies included in that index may lessen the overall maternal mortality rate while also perhaps diminishing the disparity in maternal mortality between women of color and white women. As described fully in Chapter 4, the NIRH LFRI is an aggregate measure of a policy package that should be pertinent to maternal reproductive health. The index is comprised of 34 indicators divided by each of the six categories (See Table 1). The scoring on these indicators is used to assign each city a score on a 10-point scale condensed into a Star Score ranging from zero to five. Working with this small N of 50 cities allowed me to implement deep descriptive analysis of the relationships among my variables, looking at individual cases and cases in small, thematic groups. This approach also allows me to gain a more nuanced understanding of the patterns emergent in these relationships.

Overall, the analysis chapters of this dissertation have three primary aims. First, I examined the relationship between Star Score and my maternal health outcomes (Chapter 5). Second, I analyzed which individual policy measures within the NIRH LRFI are particularly useful in reducing city-level MMR and racial gaps (Chapter 6). Third, I investigated the effects of city composition factors, including percent Black and percent in poverty, to see whether they act as analogs to the fundamental causes of race and socioeconomic status (SES) at the individual level (Chapter 7).

Analytic Findings

The findings in Chapter 5 illustrate that there is far more complexity in understanding the relationship between policy packages and maternal health outcomes than I had expected based on my theoretical framework alone. Chapter 5 investigates the relationship between city-level

MMR, racial gaps in MMR, and Star Score—the NIRH LRFI's composite policy package measure. My results indicate that there is a nonlinear pattern in the relationship between Star Score and maternal health outcomes. I find that cities with low or high values of the Star Score have relatively low MMRs and racial gaps, while cities with middle values have the highest MMRs. This nonlinear pattern is counter to what my framework combining FCT, SDH, and Reproductive Justice would suggest. Indeed, insights from FCT suggest that there should be a linear relationship between these variables, in which higher Star Scores are associated with lower MMRs, and smaller racial gaps at the city level. Instead, the specific nonlinear pattern that I find seems to be driven primarily by cities with low Star Scores that also have relatively low MMR and racial gaps in MMR.

Further, my findings in Chapter 5 demonstrate that Black and Latina populations have higher MMRs than their white counterparts. Additionally, cities with the largest white-Black racial gaps in MMR are not the same set of cities with the largest white-Latina racial gaps; the same is true of cities with the smallest white-Black and white-Latina racial gaps, respectively. Also, the white-Latina racial gaps across all cities are much lower than the white-Black gaps.

These findings parallel current patterns in individual-level maternal mortality that describe Black women's risk of maternal mortality as approximately four times higher than white women's risk (March of Dimes 2018; Petersen et al. 2019). Additionally, these findings echo evidence and logic from FCT, which also finds that systemic anti-Black racism is associated with disparities in maternal health outcomes that leave Black women's maternal health outcomes worse than those for both Latinas and white women. These findings also highlight the continued need for intersectionality in studies of maternal mortality at both the individual and aggregate levels. While intersectionality theory is not a primary theoretical frame of this project, elements from it are reflected in my analyses into the ways in which Black, white, and Latina women experience adverse maternal health outcomes at differing rates (Crenshaw 1991; Price 2011). Thus, building from insights of Reproductive Justice Theory, Black and Latina mothers may need different combinations of policies in place to lower their aggregate risk of maternal mortality, which would also shrink racial gaps in MMR relative to white women.

Chapter 6 and Chapter 7 provide insights into the relationships between individual policy measures and maternal health outcomes and suggest the importance of individual policies as well as policy packages for understanding nuances in maternal health outcomes. Specifically, in

Chapter 6, I analyze five of the NIRH LRFI's 34 policy measures. These are: providing funding to train providers in reproductive healthcare (abbreviated as Training Providers); providing environmental protections for maternal and reproductive health (abbreviated as Environmental Protections); providing support for immigrants to access reproductive health care (abbreviated as Support for Immigrants); providing regulations on the deceptive practices of anti-abortion pregnancy centers (abbreviated as Regulations on PCs); and providing support for pregnant and parenting youth (abbreviated as Support for Youth).

Recall that cities received a 'yes' in "Training Providers" if they provide funding to train providers in an essential element of reproductive health care, such as LARC (long-acting, reversible contraceptive) insertion or removal, contraceptive counseling, or reproductive health care for LGBTQ people, young people, or other specific populations. Here, 'limited' reflects that the training is only available online. Second, cities received a 'yes' in "Support for Youth" if they have at least one of the following in place: daycare in schools, flexible graduation policies, breastfeeding accommodation policies, high-quality schools for pregnant and parenting youth, pregnant and parenting youth bill of rights, or homebound instruction. For this variable, 'limited' represents those cities that offer either after-school support groups, rights-focused policy in their handbook, or classes on parenting.

Third, cities received a 'yes' in "Support for Immigrants" if they have sanctuary funding, municipal IDs, or a municipal health insurance program policy in place. Cities received 'limited' on this variable if they only have a policy of non-cooperation with ICE. Fourth, cities received a 'yes' in "Environmental Protections" if the city has at least one of the following in place specifically linked to protections for maternal, fetal, or reproductive health: protections for nail salon workers or other workers exposed to toxic chemicals, banning fracking, radioactive activity regulation, BPA regulation, and regulation of skin lightening creams. Here, 'limited' represents cities with initiatives or programs focused on environmental justice, but that are not linked explicitly to maternal, fetal, or reproductive health protections. Finally, cities received a 'yes' in "Regulations on PCs" if they have one or more local protection against the deceptive practices of anti-abortion pregnancy centers in place, such as signage ordinance, consumer protections, or restrictions on funding. There is no 'limited' category for this indicator.

In Chapter 7, I consider how three of these policy measures—specifically, "Environmental Protections," "Regulations on PCs," and "Support for Youth" policies—operate

to influence maternal health in conjunction with the racial composition and poverty rates of the 50 cities in the NIRH LRFI. My results indicate that "Environmental Protections" policies and "Regulations on PCs" policies are distinctly important in helping explain more general patterns of maternal mortality outcomes. Indeed, cities with "Environmental Protections" policies have significantly lower MMRs and smaller racial gaps than cities without these policies, independent of the aggregate Star Score measure of policy packages. These patterns that surfaced in my descriptive analyses are also echoed in my Chapter 7 regression analyses. Regression analyses show that the "Environmental Protections" policy measure has a significant negative association with city-level MMR independent of city composition.

Similarly, cities with "Regulations on PCs" policies have lower overall MMRs and smaller white-Black racial gaps on average compared to cities without these policy provisions. Here, while only my findings pertaining to "Regulations on PCs" policies' impact on overall MMR are statistically significant, the findings are still worth discussing, as the insignificant results may be due to the small sample size providing low statistical power.

Moreover, while having "Environmental Protection" and "Regulations on PCs" policies generally are important for all cities that seek to lower their aggregate maternal mortality rates and racial gaps in maternal mortality, as a practical matter, they are especially important for those cities that have high percentages of Black or impoverished populations. My findings do indicate that policymakers in cities with high proportions of Black residents and/or high poverty rates can at least partially offset the independent negative effects of these city composition factors through implementing key policies. My analyses indicate that these two policies have significant negative effects on overall MMR and do have negative relationships with racial gaps despite these relationships not achieving statistical significance for the racial gap outcomes.

In Chapter 7, I also conducted regression analyses that could be suggestive of the extent to which policy package and individual policy measures may mediate any influence my city composition factors have on overall MMRs and racial gaps. While formal testing for mediation would require longitudinal data and would benefit from a larger N, I did not find suggestive evidence for such mediation. This is inconsistent with my theoretical argument that policies and policy packages may be one mechanism by which the fundamental causes of city racial and poverty composition do their work. However, I do find evidence that independent of the effects of these city composition factors, "Environmental Protections" and "Regulations on PCs"

policies do have a significant negative association with overall MMR and a negative association with the white-Black racial gap.

Additionally, I find that "Support for Youth" policies best help explain some anomalies in the pattern between policy packages and maternal health outcomes (Chapter 6). Particularly, I find that many cities with this policy also have a low Star Score yet surprisingly low MMRs and racial gaps. In the aggregate, it is likely that not enough anomalies are explained this way or by other single policy measures to support any general statement that it is the specific policy rather than the Star Score itself that is important. However, resolving a few anomalies could be part of a package of reasons that I find significant effects of both Star Score and a specific policy.

My findings in Chapters 6 and 7 regarding individual policy measures have important implications for cities aiming to reduce aggregate maternal mortality rates and racial gaps. Previous research recognizes that laws and policies embody a diversity of values and ideologies, and that this is a leading mechanism through which culture shapes state policies and outcomes (Danielson and Stryker 2014; Pedriana and Stryker 1997; Steensland 2006). Consistent with my findings pertaining to "Environmental Protection" policies and "Regulations on PCs" policies, cities that have not had these policies but now implement them may well see lower MMR and smaller white-Black racial gaps in MMR. In addition, these cities would be enacting policies that embody a pro-reproductive freedom ideology, which may continue to perpetuate changes in state policies in line with pro-reproductive freedom perspectives. This is particularly important, as this dissertation argues, because of the ways policy is able to respond to specific community conditions. In particular, these two policies each work to lessen city-level MMRs. This set of findings raises additional questions about how policy packages emerge over time to achieve particular outcomes and whether other policies in the NIRH LRFI should be considered as part of this process.

These findings also have important implications for scholars. My descriptive analyses did find that cities with lower percent Black and lower poverty rates not only tended to have lower MMRs and smaller racial gaps, they also had a greater number of key individual policy measures indicating more reproductive freedom compared to cities with higher percent Black and/or poverty rates. This suggests that scholars should not entirely discount the possibility that policies may function in part as mechanisms through which city composition factors have part of their effects. Even though my regression analyses provided no suggestive evidence of mediation, these

analyses had very low statistical power, and they were not conducted on a longitudinal dataset. Perhaps a further analysis with more statistical power and longitudinal data would uncover some findings suggestive of the type of mediation that my FCT-informed theoretical perspective would predict.

These findings also reiterate the importance of efficacy in policy-based interventions. Recall that in Chapter 2, I summarize Freese and Lutfey's critiques of FCT. They argue that it is imperative to introduce interventions that do not rely on individual agency or leave room for institutions to deliver disparate resources, services, or treatment (Freese and Lutfey 2011; Lutfey and Freese 2005). Both "Environmental Protections" and "Regulations on PCs" policies do not require any agency on the part of pregnant mothers. Implementing non-agentic versus agentic policies means that pregnant women can experience more equal access and benefits, even with varying amounts of time, money, and other resources. Scholars expanding on work related to FCT and policy packages need to center Freese and Lutfey's contributions by considering the role of efficacy in the relationship between policy packages and maternal health outcomes.

In addition to considering the impacts of individual policy measures, I analyze the impact of poverty rates and racial demographics of the city. FCT and SDH suggest that variability in poverty and race are crucial components driving health disparities among individuals, and I argue that aggregate poverty rates and racial composition act as analogs of individual-level fundamental causes on the city level. My bivariate findings in Chapter 7 reflect that the city composition measures of percent Black residents and poverty rate operate consistent with the idea that they are aggregate-level analogs for fundamental causes at the individual level.

In short, and even though in the regression analyses I conducted with my dataset, there was little evidence that the influence of racial and poverty composition of cities on maternal mortality was mediated by policies, my city demographic composition indicators are social determinants of health that may well also function as fundamental causes at the aggregate level. I find that cities with high percent Black populations also have high poverty rates, and cities with low percent Black residents have corresponding low poverty rates and vice versa. This finding parallels other empirical work and the theoretical arguments crafted in Fundamental Cause Theory and speaks to the strong linkages between race and SES. Additionally, my deep descriptive dive indicates that cities with lower percent Black and lower poverty rates also had lower MMRs, smaller racial gaps, and more policy measures compared to cities with higher

percent Black and/or poverty rates. Indeed, I find that a city's proportion of Black population is significant across all models for all maternal outcomes in my multivariate analysis. The larger the Black population in a city, the higher the overall MMR and larger the racial gaps. Similarly, a city's poverty rate is significant for overall MMR and racial gaps across multivariate regression models, where higher poverty rates are associated with significantly higher overall MMRs and larger racial gaps. Thus, analyses conducted with a larger N might well find some statistically significant mediation of city demographic composition through policies. Even if they do not, it could be that mediation of some of the influence of city poverty rates and percent Black residents could operate through other mechanisms I was unable to measure with my data, including the availability of doulas, especially doulas of color.

As well, the findings in Chapter 7 do suggest that it is essential to consider city composition factors that have very strong effects on overall MMR and racial gaps to understand why some cities demonstrate relationships between policy packages and maternal outcomes that are anomalous in light of prior theory. This itself is consistent with the operation of these city composition factors as fundamental cause analogs, so it provides some preliminary evidence to suggest that FCT may be able to operate on the aggregate level. Again, however, given that I found no evidence in my regression models to suggest a possible mediation relationship between city demographic composition and maternal mortality through my policy measures, more research is needed to fully develop the ways in which FCT may operate at the city level. This includes evaluating factors I could not measure that potentially could operate as mediating mechanisms between the demographic composition of cities and aggregate maternal mortality.

In sum, my dissertation shows how individual policy measures and the policy packages measuring levels of reproductive freedom as constructed by the NIRH can work to decrease adverse maternal health outcomes for cities across the U.S. These findings also reiterate the importance of empirical research investigating racism as a fundamental cause of health disparities. This project echoes findings in previous studies that demonstrate that considering the relationship between racism and health disparities is required for policymakers to craft the most effective interventions to lessen racial disparities in maternal mortality (Hill Collins 2009; Phelan and Link 2015; Roberts 1997; Ross 2017a; Washington 2006). However, more data is needed to further build out patterns in these relationships. I return to this discussion in the *Future Research* section below.

The underlying reason for researching the impacts of reproductive freedom policies and policy packages in lowering adverse maternal health outcomes is to aid in developing and implementing policy interventions that decrease aggregate maternal mortality rates and racial gaps in maternal mortality. If interventions are able to build upon the positive impacts of particular sets of policies, in addition to interventions existing on the micro-level, to decrease MMRs and racial gaps, then ultimately, communities have hope for mitigating racial disparities in maternal healthcare.

Limitations

There are four notable limitations to this research, which speak to why my results do not more closely reflect the relationships I would expect to find based on theory and past empirical work and why I have not been able to fully investigate the complex mechanisms through which city poverty rates and racial composition may influence maternal health. First, while my small sample size does allow me to do deep descriptive analysis in this project, it may also be resulting in low statistical power in my models. Second, it may be that my cross-sectional dataset is insufficient to properly test these relationships, where a longitudinal dataset would be better suited. This is particularly the case for the analyses conducted in Chapter 7, as longitudinal data would allow for formal tests of mediation. Third, according to Reproductive Justice Theory, the NIRH LRFI leaves out some measures that seem particularly important in shaping and informing racial disparities in maternal health and mortality. Notably, these include policies providing coverage and services of doulas. This limits the scope of policies I am able to evaluate as part of a package of policy interventions aimed at reducing maternal mortality. It also makes it impossible for me to examine the influence of factors pertaining to the availability and use of doulas in and of themselves. Fourth, it is also possible that the original theory of FCT needs more development in order to sufficiently operate on the aggregate level. For example, the theory may need more work to incorporate insights from Freese and Lutfey (2005; 2011) about agentic versus non-agentic mechanisms on the aggregate level. Because it is a different scale than the theory currently operates on, these different mechanisms may impact people through pathways the theory does not yet consider. Future theoretical work should be devoted specifically to creating solid linkages between the micro and aggregate mechanisms through which FCT operates.

Future Directions

My research has contributed to enhancing our understanding of how policies may influence maternal health outcomes. However, more research is needed to ascertain the effects of the breadth of policies contained in the NIRH LRFI and policies not included in this index, such as policies providing access to doula services. This work would be especially useful in investigating whether there are additional policies whose independent effects further offset the negative impacts of city composition factors indicative of the influence that systemic racism and economic inequality have had on maternal mortality outcomes.

Policy Packages

Future research should be dedicated to improving the data that is used to look at the key relationships in this project between policy packages and maternal health outcomes. Particularly, longitudinal data would improve research in this area by allowing formal tests of mediation and an understanding of the ways in which policy packages develop over time. Understanding whether policy measures mediate key relationships between city composition factors and maternal health outcomes is important substantively for reducing adverse maternal outcomes, but also theoretically by advancing scholarship on the ways in which the logic of FCT functions at the aggregate level. Additionally, future research would be strengthened by having data on more cities. A larger sample size would allow for more complex regression analyses and stronger statistical power, which could provide needed insights into the relationship between policy packages and maternal mortality outcomes that my dissertation was unable to engage with. Future research with a larger sample size of cities and longitudinal data should also examine the degree to which the independent impact of aggregate policy packages such as that represented in the NIRH LFRI Star Score measure and also specific policy factors—both those included in and those excluded from the NIRH LRFI—can counteract what otherwise is the general negative influence of racism and economic inequality on maternal health outcomes.

In addition to studies committed to exploring the remaining policy indicators comprising the NIRH LRFI, future research on policy packages should extend beyond the LRFI to include policy recommendations posited by other organizations focused on reproductive and maternal wellbeing. For example, the Center for Reproductive Rights offers several policy

recommendations that may be crucial to mitigating the maternal mortality crisis. These include that states create and fund maternal mortality review committees, require mandatory case reporting of pregnancy-related deaths to the state health department, and ensure the use of the U.S. standard death certificate, which includes indicators of pregnancy-related death (Center for Reproductive Rights 2014). Enacting these policy recommendations would increase the quality and quantity of data available on maternal death and may improve outcomes.

Additionally, organizations such as the March of Dimes recommend policies to increase access to doulas, insurance coverage for doula services and training more women of color as doulas to improve maternal healthcare for Black women (March of Dimes 2018, 2019). Grounded in the Reproductive Justice perspective, these policy recommendations are critical to use as a lens for assessing existing gaps in reproductive and maternal policies and disparities in maternal and reproductive health.

My dissertation focuses on policy packages operating on the city level. However, to continue to improve maternal health outcomes, policy packages are needed on the local, state, and federal levels to address both the national need and the needs of specific communities. Future studies should be dedicated to understanding the complex ways policy packages work in tandem across levels to achieve improvements in maternal health outcomes.

Chapter 3 has outlined the benefits and limitations of federal policy interventions for mitigating adverse maternal health outcomes. Some examples of federal and state policy interventions that may be particularly important include Medicaid reimbursement of maternal health services, including doula services (Hung et al. 2017; Kozhimannil et al. 2019; Kozhimannil, Hardeman, et al. 2013; Kozhimannil, Law, et al. 2013), training programs for non-clinical practitioners like doulas, and requiring implicit bias training (U.S. Senate 2019a). All of these policy interventions may help ensure that providers are equipped to provide equitable care to their patients and clients and can impact a larger number of pregnant individuals in the U.S. compared to a city-level policy.

Increasing the body of work in this area is distinctly important because, as FCT argues, power dynamics exacerbating racial and class-based disparities perpetuate through several ever-adapting mechanisms. Additionally, state and federal legislation and funding can help create uniform access to data that can then be used in studies and interventions aimed at improving

maternal health outcomes (Center for Reproductive Rights 2014; Kozhimannil et al. 2019). These implications make this a critical area for future research.

City Composition Factors

In addition to the policy indicators available in the NIRH LRFI, several covariates available in the NIRH LRFI city profiles refer to the number of centers, clinics, and hospitals, which are all distinct in their focus and provision of reproductive health services. Pregnancy centers—often referred to as crisis pregnancy centers (CPCs) or pregnancy resource centers—are non-profit organizations that provide counseling on abortion, pregnancy, and childbirth. These organizations may also offer adoption referrals or financial assistance. Some CPCs do qualify as medical clinics and will provide services like sonograms and pregnancy testing. Typically, these pregnancy center organizations are pro-life/anti-abortion and often Christian-affiliated. These centers are distinct from abortion clinics that provide abortions to patients and Title X clinics[12] that prioritize the healthcare needs of low-income or uninsured individuals by providing comprehensive family planning services at low or no cost. Lastly, school-based health centers (SBHCs) provide primary care clinician services on elementary or secondary school campuses, and many give developmentally appropriate reproductive health services, education, or referrals to students.

Because these organizations are doing the work to provide reproductive health services and information, understanding the impact of these types of organizations on maternal mortality rates and/or racial gaps is a needed area of future research. In future studies that explore the impacts of city-level policy packages—both those that use the NIRH LRFI as their core policy package and those that incorporate other policy measures—it may be pertinent to account for the impact that having more versus fewer of these types of organizations per capita may have on maternal mortality rates and/or racial gaps.

In this dissertation, I investigate patterns in influencer cities that exhibit anomalous relationships with my maternal health outcome variables. As I established in Chapters 6 and 7, these patterns potentially may be driven by individual policy measures and by city composition factors such as poverty rates and the percent Black population. In addition to these factors,

[12] Title X clinics provide access to basic, preventative reproductive healthcare, such as wellness exams, cervical and breast cancer screenings, birth control, contraceptive education, HIV testing, and testing and treatment for STIs.

further research should also be conducted to look specifically at the role of city birth rates in shaping these outcomes. For example, cities such as Billings, MT, El Paso, TX, San Jose, CA, Las Vegas, NV, etc., may have such low MMR and/or racial gaps because these cities also have low birth rates, and therefore women are not dying from childbirth-related causes at rates as high. Conversely, it may also be true that cities such as Birmingham, AL, Columbus, OH, Richmond, VA, and Baltimore, MD have high birth rates, which subsequently increase the population of people who are at risk of dying from childbirth-related causes and also the MMR and/or racial gaps relative to other cities. Considering the analyses I conduct in this dissertation, a potential influence of birth rates would be an important contribution to future research in this area.

Additionally, the NIRH LRFI city profiles also provide data on the teen birth rate and incarceration rates. Studies have documented that risk for maternal mortality is higher for those giving birth under the age of 20 (Reid and Creanga 2018). Further, teen birth rates are higher among communities of color, putting mothers of color under 20 at a disproportionately higher risk for unfavorable maternal outcomes (Centers for Disease Control and Prevention n.d.). Lastly, there are healthcare disparities for incarcerated women, and the U.S. prison system is the second-largest provider of reproductive healthcare in the country (Bronson and Sufrin 2019). Therefore, incarcerated women and formerly incarcerated women are at higher risk of maternal mortality (Bronson and Sufrin 2019). Given that women of color are disproportionately incarcerated, the health disparities associated with incarceration may disproportionately impact women of color (Bronson and Sufrin 2019). Yet whether incarceration rates are high or low, because women of color are disproportionately incarcerated, lowering incarceration rates may not lower the racial gap in maternal mortality. Studies with larger samples and longitudinal datasets would be strengthened by including consideration of the ways in which city-level incarceration rates and teen birth rates impact maternal health outcomes. This would, in turn, continue to inform scholars and practitioners about which policy measures are best suited for improving city-level maternal health.

Doula Services Policies

Regarding policies providing access to doula services, a 2019 March of Dimes position statement on doulas and birth outcomes reports that in 2012 six percent of births were attended

by doulas and that in 2018 there were over 8,000 registered doulas in the U.S. (March of Dimes 2019). Additionally, the Center for Reproductive Rights advocates for using doulas to assist in births, and research suggests this is an integral piece of improving maternal health outcomes (American College of Nurse-Midwives 2012; Gruber et al. 2013; March of Dimes 2019).

Birth Doulas

Several studies have documented the positive impact of doulas on births (Ancient Song Doula Services et al. 2019; March of Dimes 2018; Southern Birth Justice Network and Forward Together 2019). As indicated in Chapter 3, using a doula is accompanied by significant health benefits (Gruber et al. 2013; March of Dimes 2019). Mothers whose care is led by a doula experience lower rates of cesarean sections (the leading cause of maternal morbidity), episiotomies (surgical cutting of the vagina to assist with labor), vaginal tearing, and use of oxytocin to induce labor (American College of Nurse-Midwives 2012; Gruber et al. 2013; Kozhimannil, Hardeman, et al. 2013; March of Dimes 2019; Southern Birth Justice Network and Forward Together 2019). Moreover, women attended to by doulas also experience shorter labor, have fewer requests for epidurals, and have lower rates of pre-term births, and fewer miscarriages before 24 weeks. This provides evidence that doulas are beneficial not only for mothers' health outcomes but also beneficial for infant outcomes (American College of Nurse-Midwives 2012; March of Dimes 2019; Sandall et al. 2016). There are additional benefits to patient-doctor interactions, as doulas can advocate for their clients and aid them in navigating the healthcare system (Ancient Song Doula Services et al. 2019; March of Dimes 2019; Southern Birth Justice Network and Forward Together 2019). Further, research also has documented how the use of doulas lowers healthcare costs (March of Dimes 2018, 2019).

Despite these benefits, access to doula services during pregnancy is often left out of conversations and policy considerations about women's increased reproductive autonomy and rights. Additionally, most doulas are middle-class, white women providing care to other middle-class, white women, despite research that indicates that women of color and low-income women could benefit the most from expanded access to doula care (Kozhimannil, Hardeman, et al. 2013; Oparah and Black Women Birthing Justice 2016; Ross 2016). Despite the prominence of white doulas and the history of women of color birth workers being systematically undermined and removed from the childbirth arena, several organizations, such as the National Black Doulas

Association and the Black Mammas Matter Alliance, have formed to increase doula services among the Black community. Among other services, these organizations provide doula training, doula directories, and doula advocacy, all based on addressing the U.S. disparities in maternal mortality (Black Mamas Matter Alliance n.d.; National Black Doulas Association n.d.).

One methodological approach is to conduct qualitative research focusing on determining variation in the presence of Black doulas and doula organizations in contrasting U.S. cities (some with anomalously high MMRs and large racial gaps relative to their high Star Scores on the NIRH LRFI, and some with anomalously low MMRs and small racial gaps relative to their low Star Scores). This research could work to provide some evidence that doula policies may be especially helpful in resolving some of the anomalous patterns I found in this project. If this turns out to be the case, data on doulas could then be combined with the NIRH LRFI or another policy package to allow systematic quantitative investigation of the impact of factors pertaining to doulas at the city level.

Full-Spectrum Doula Services

Discussions of full-spectrum doula services, those which extend beyond prenatal, labor/delivery, and postpartum care, have become popularized in several prominent media outlets, such as Bustle, SELF, The Nation, Rewire News, and more (Campoamor 2019; Lane 2019; MacQueen 2017; Markham-Cantor 2019). These articles recount experiences of doulas trained to provide emotional, informational, and physical support to people receiving various healthcare procedures, particularly abortion.

While abortion support is the most prominent expansion of doula services, doulas may also offer emotional support, coping strategies, and relaxation techniques during and after miscarriage or stillbirth (Ancient Song Doula Services n.d.; Southern Birth Justice Network and Forward Together 2019; Wilson et al. 2017), for women who are incarcerated (Alabama Prison Birth Project n.d.; Ancient Song Doula Services n.d.), and for women who are not fluent in English (Maher, Crawford-Carr, and Neidigh 2012). Several organizations, such as the D.C. Doulas for Choice Collective in Washington, D.C., and the Doula Project in New York City, NY, offer full-spectrum doula services to pregnant individuals in their communities (DC Doulas for Choice Collective n.d.; The Doula Project n.d.). Additionally, the organization Ancient Song Doula Services in New York City, NY, offers services provided by Bereavement Doulas to assist

with the grief process after a "miscarriage, stillbirth, abortion, unplanned outcome, adoption process, and other complex factors" (Ancient Song Doula Services n.d.). Other organizations such as the Alabama Prison Birth Project offer doula services and advocacy to incarcerated women, advocating for their right to have a dignified, humane birth experience, and particularly advocate for the removal of handcuffs or shackles during birth (Alabama Prison Birth Project n.d.; Ancient Song Doula Services n.d.).

Research on full-spectrum doula services is rather limited, but studies have documented the benefits of full-spectrum doula services for patients and providers. Several studies found that women appreciated procedure-related supports offered by doulas during abortions, especially in clinical settings prohibiting the presence of family or friends (Chor et al. 2016; Wilson et al. 2017). Not only that, but several studies build on those findings documenting the increase of patient satisfaction and self-reported quality of care (Chor et al. 2018; Maher et al. 2012). The benefits of these doulas also extend beyond patients to providers and clinics (Chor, Palmer, and Ethier 2012). Chor et al. (2018) conducted focus groups with physicians, staff members, and abortion doulas and found that using abortion doulas as emotional supports for patients allowed providers and staff to provide more efficient, effective care. In addition, Maher et al. (2012) tested the implementation of an interpreter/doula program where trained medical interpreters received additional training as labor and postpartum doulas. The authors found that these interpreter/doulas decreased communication barriers between patients with limited English proficiency and their providers; the measures were cost-effective as well (Maher et al. 2012). These studies also conclude that doula support is a successful approach to providing enhanced patient-centered care in high-volume clinical settings (Chor et al. 2018, 2012; Maher et al. 2012).

Research demonstrates the need for and utility of doula services in increasing access to reproductive healthcare services and information, providing emotional support during emotionally strenuous procedures and processes, and increasing the quality of patient care while maximizing provider efficiency (Chor et al. 2016, 2018, 2012). These findings suggest that the provision of full-spectrum doulas would be an effective intervention in a variety of reproductive contexts, which collectively can enhance the overall satisfaction and quality of care of patients as they navigate the reproductive healthcare system in the United States. Indeed, increased quality of maternal and reproductive care in a holistic sense could help insulate women from adverse health outcomes that increase the risk for maternal death.

Finally—and based on prior discussion of doulas as well as Chapter 3's discussion of the current relationship between the Reproductive Justice and Reproductive Freedom frameworks—future work needs to expand the concept and measurement of Reproductive Freedom to include some of the key foci of the Reproductive Justice framework that are now left out of discussions of Reproductive Freedom. Conceptually expanding Reproductive Freedom to explicitly include a focus on doulas would make it more likely that future research in this area would further examine whether and how training, provision of, and access to doula services provide a central policy pathway to reduce maternal mortality rates and racial disparities therein. Gleaning insights from my dissertation, future research may establish that doula policies are central mechanisms that can compensate for the negative effects of racial and class inequalities on maternal health outcomes.

Overall, this dissertation has documented the utility of the NIRH LRFI as a policy package as one factor helping to explain variability in maternal health outcomes, particularly city-level maternal mortality and racial gaps in maternal mortality. My analyses have also provided an important discussion on the ways in which city composition may act as an aggregate level analog of FCT. Again, future research with a larger sample size of cities and longitudinal data should re-examine the degree to which policy variability is a mechanism through which city demographic composition has at least part of its impact on maternal health outcomes.

This dissertation has emphasized the ways the NIRH LRFI as a policy package, individual policy measures, and city demographic composition factors work independently and in their inter-relations to improve or worsen overall MMR and racial gaps in MMR. The dissertation itself, and the future research I have suggested that builds on it, can help not only improve scholarly understanding but also can inform policy interventions that cities can implement to effectively reduce adverse maternal health outcomes and racial disparities in maternal health outcomes in their communities.

APPENDIX A. IRB EXEMPTION

Relevant Information on IRB Exemption

The IRB form for this project (IRB-2020-382 Reproductive Policy Packages Addressing Racial Disparities in Maternal Mortality Rates) was submitted on February 28, 2020 and approved on March 16, 2020. IRB determined that the project was exempt under Category 4 non-human subjects research using secondary samples or data.

APPENDIX B. WEIGHTS FOR INDIVIDUAL INDICATORS ON THE NIRH LRFI

Policy Indicators Tracked in the Local Index

Category	*Measure*	*Point Value*
Protecting Abortion Access	Clinic safety ordinance	2
	Regulations on deceptive practices of anti-abortion pregnancy centers	2
	Local protections for abortion clinics and providers	2
	Public awareness about access to abortion care	1
	Anti-discrimination ordinances for employees: reproductive health decisions	2
	Anti-discrimination ordinances for housing: reproductive health decisions	2
Funding and Coverage for Reproductive Health Care	Funding for abortion	2
	Funding for STD/STI testing and prevention	1
	Municipal insurance coverage of abortion	2
	Funding to train providers in reproductive health care	2
	Funding for contraception	1
	Funding for community-based organizations to provide comprehensive sexuality education	1
Supporting Young People	Support for pregnant and parenting youth	1
	Funding for comprehensive sexuality education	1
	Comprehensive sexuality education policy	1
	Reproductive health care in school-based health centers (SBHCs)	2
Supporting Families	Supportive breastfeeding policies	1
	Paid family leave for municipal employees	1
	Environmental protections for maternal and reproductive health	1
	Anti-discrimination ordinances for employees: pregnancy and family status	1
	Anti-discrimination ordinances for housing: pregnancy and family status	1
Building Healthy and Just Communities	Positive public awareness campaigns on sexual and reproductive health	1
	Menstrual equity initiative	1
	"Shield" law for victim reporting	1
	Paid sick leave	1
	$15 minimum wage	1
	Support for immigrants to access reproductive health care	1
	Advancing democracy	2
	Anti-discrimination ordinances for employees: gender identity	1
	Anti-discrimination ordinances for housing: gender identity	1
Taking a Stand	Opposition to deceptive practices of anti-abortion pregnancy centers	1
	Support for abortion coverage, including the EACH Woman Act	1
	Pro-choice stance on legislation or ballot initiatives	1
	Support for anti-discrimination	1

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APPENDIX C. EXAMPLE OF AN EMAIL REQUEST

Hello NIRH representative,

My name is Abigail Nawrocki. I am a PhD student in the department of sociology at Purdue University. I am working on my dissertation and it explores the relationship between reproductive policy packages and maternal mortality, and also the relationship among racial disparities in maternal health.

I am thrilled to be able to use the insights from the Local Reproductive Freedom Index! I know it is going to be an invaluable part of my project, as it will allow me to create explanatory models that address my research questions.

I am wondering if I can request access to the 10-point scale used in constructing the Star Scores for the 50 cities? This would greatly improve the explanatory power of my models and allow me to better understand the nuances between cities. As I move forward in my research, I am happy to share my findings and models with the NIRH Local Reproductive Freedom Index team.

Please feel free to contact my advisor, Dr. Robin Stryker, who can speak to the integrity of my project. Her email is rstryker@purdue.edu and you can find more information about her at https://cla.purdue.edu/directory/profiles/robin-stryker.html

I am very excited by the work the NIRH has done in expanding the Local Reproductive Freedom Index and I am looking forward to exploring the insights it will be able to lend to questions of policy packages and health outcomes.

Thank you for your time,
Abigail Nawrocki, M.S.
Purdue University
Department of Sociology
Office: Stone Hall 326 A

NOTE: Very quickly, I received an e-mail response to my inquiry from Jenny Mistry, Associate Directory of Local Advocacy, and we now have had multiple helpful telephone conversations. .

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