The Structural and Social Determinants of Intergenerational Health Inequities: How State Policy Contexts and Discrimination Shape Birth Outcomes

by

Allison Stolte

Department of Sociology
Duke University

Date:_______________________

Approved:

____
Scott M. Lynch, Chair

____
M. Giovanna Merli, Co-Chair

____
Tyson H. Brown

____
Kenneth A. Dodge

Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor
of Philosophy in the Department of
Sociology in the Graduate School
of Duke University

2023

ABSTRACT

The Structural and Social Determinants of Intergenerational Health Inequities: How State Policy Contexts and Discrimination Shape Birth Outcomes

by

Allison Stolte

Department of Sociology
Duke University

Date:_______________________
Approved:

____
Scott M. Lynch, Chair

____
M. Giovanna Merli, Co-Chair

____
Tyson H. Brown

____
Kenneth A. Dodge

An abstract of a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Sociology in the Graduate School of Duke University

2023

Abstract

In the United States, geographic and racial-ethnic disparities in adverse birth outcomes have increased over the past decade. High and rising rates of low birth weight, preterm delivery, and infant mortality are concentrated in the South and Midwest and among non-Hispanic Black and other birthing persons of color. These divergent trends are rooted in structural and social systems of inequality, such that cumulative experiences of discrimination and disparate access to resources related to policy contexts and one's social standing systematically place some birthing persons at greater risk of adverse birth outcomes compared to others. Because these outcomes are associated with both birthing persons' social positioning and offspring's later-life socioeconomic status and health, they become mechanisms through which inequality is passed across generations. This dissertation explores the structural and social determinants of intergenerational health inequities by examining how the state policy contexts and discrimination that a mother is exposed to contribute to differences in adverse birth outcomes across US states and two distinct but related status characteristics: race and ethnicity and skin tone.

Chapters 2 and 3 use birth cohort-linked birth/infant death restricted-use micro-data from the National Center for Health Statistics. Chapter 2 focuses on a single policy context and evaluates how rates of preterm birth and infant mortality responded to two policies restricting access to reproductive health care in Texas between 2005 and 2017. Using demographic standardization and decomposition techniques, I find that age-education-prenatal care standardized rates of infant mortality increased significantly in

the years immediately following restrictions to family planning care (2011), but only for births to non-Hispanic (NH) Black mothers. Standardized preterm birth rates increased slightly and temporarily following 2013 restrictions on abortion providers across all racial-ethnic groups. These salient findings underscore the need to consider the infant health and heterogeneous consequences of rapidly evolving reproductive rights across the US.

Chapter 3 takes a multidimensional policy approach to consider, first, how state policies and related characteristics co-occur to form distinct, underlying policy contexts and, second, how those contexts are related to low birth weight and infant mortality. Building on the World Health Organization's structural determinants of health framework and compiling state-level data from several publicly available sources, results from the latent profile analysis suggest three distinct contexts. Contexts defined by high intervention or high constituent engagement (compared to low intervention) are negatively associated with risks of low birth weight and infant mortality. Overall, the protective effects are most pronounced among births to NH white mothers (compared to NH Black or Hispanic). These findings demonstrate how state policies and characteristics *combine* to shape health and underscore the importance of considering how racialized experiences may reduce the benefits of certain state contexts among minoritized groups.

In Chapter 4, I marry weathering and skin tone stratification frameworks to examine how risks of low birth weight differ across maternal age and skin tone, a marker of cumulative discrimination, among NH Black mothers. Using data from the National

Longitudinal Study of Adolescence to Adult Health, I find that, despite similar risks of low birth weight across skin tone at maternal age 16, risks diverge with age such that mothers with the darkest skin tones experience the sharpest increases. These findings underscore the transgenerational consequences of life course exposures to discrimination.

Overall, these findings contribute to health equity, maternal and child health, and life course studies by demonstrating how both "protective" and "harmful" policies contribute to racial-ethnic disparities in birth outcomes and by underscoring the importance of considering heterogeneous experiences across the life course and within racial-ethnic groups when addressing birth inequities. Future research should continue to interrogate how the "protective" effects of policies and contexts vary across race and ethnicity to clarify if such policies exacerbate or mitigate inequities, as well as examine how other cumulative and early life course stressors shape birth outcomes.

Dedication

To Sam—for your unconditional love, unwavering support, and never-ending supply of popcorn.

Contents

List of Tables

List of Figures

Acknowledgments

I am incredibly grateful to my dissertation committee co-chairs, Scott M. Lynch and M. Giovanna Merli, who have supported me since I was a master's student in public policy. Scott Lynch—you have taught me so much through your many classes, teaching assistantships, and insightful feedback. Thank you for always challenging me. Giovanna Merli—I met you on my first day as a Duke graduate student eight years ago. You took me under your wing and have been an unwavering source of support, encouragement, and constructive feedback ever since. I am so grateful for your mentorship and friendship. Thank you also to my other committee members, Tyson H. Brown and Kenneth A. Dodge. Tyson Brown—you have offered countless pieces of professional development advice, and I am always grateful for your encouragement. Ken Dodge—your guidance and encouragement not only shaped my dissertation but have been sources of inspiration as I continue to build out my research agenda. In addition to my committee, I would like to thank the Duke University Population Research Institute (DUPRI), the Social Science Research Institute (SSRI), and the Demography of Health and Aging group for their training and research support.

My years at Duke would not have been the same without the many other people who contributed to my professional and personal growth. Thank you to Linda K. George and Jay Pearson, whose classes shaped my worldview and research—thank you for believing in me and for encouraging me. Thank you also to my public policy and sociology cohorts—you challenged me, improved my research, reminded me of important deadlines, and became friends along the way. In particular, I would like to thank Claire Le Barbenchon—your friendship and our daily Zoom check-ins during the most isolating periods of the pandemic got me through. Thank you also to the Medical Sociology group—you've been a bright light in my weeks and have helped me grow as a scholar.

Finally, I would like to thank my family and friends for their love and support. Special thank you to my grandparents, parents, and sister for shaping me into the person I am today, to Caitlyn for being an all-around top human, and to Meredith, Sadie, and Baxter for the extra room. Thank you also to the Wordle crew for keeping me humble. Finally, thank you to Sam (and Manny). You are the best cheerleader. My love for you is boundless, and I am so excited for this next chapter of our lives.

1. Introduction

Adverse birth outcomes in the United States have increased over the past several years despite public health initiatives aimed at significantly reducing their incidence. Between 2014 and 2018, rates of preterm birth (<37 weeks gestation) increased by 6.6 percent and rates of low birth weight (<2,500 grams) increased by 3.5 percent (Martin 2018; Martin et al. 2019). Over the same period, groups already experiencing the highest rates experienced the steepest increases. Between 2014 and 2016, almost half of all states with increasing preterm birth rates were in the South, where rates of low birth weight and preterm birth were already highest (CDC 2020b; Martin 2018). Over the same period, rates of low birth weight rose 7.0 percent among births to non-Hispanic Black mothers, even as rates decreased among non-Hispanic white mothers (Hamilton et al. 2015; Martin et al. 2019).

These divergent trends are particularly concerning because adverse birth outcomes are mechanisms through which inequality transmits across generations (Aizer and Currie 2014; Goosby and Heidbrink 2013; Kane 2015). Disadvantage begins to accumulate in-utero when prenatal nutrition and exposure to stressors, often shaped by social standing and societal structures, affect fetal development and risks of adverse birth outcomes (Avison 2010; Barker 1995), which are related to later-life socioeconomic status and health (Black, Devereux, and Salvanes 2007; Goldenberg and Culhane 2007; Torche 2018). Burgeoning literatures separately consider the relationship between state contexts and health and varying health patterns within racial-ethnic groups to clarify persisting and diverging inequalities, largely focusing on adult health outcomes. This dissertation explores these lines of research with a focus on birth outcomes to clarify the structural and social determinants of intergenerational health inequities.

In Chapter 2, I assess if and how trends in rates of preterm birth and infant mortality, stratified by maternal race-ethnicity-nativity, respond to two sets of policies that reduced access to reproductive health care in Texas between 2005 and 2017. Previous studies find that the focal policies of interest, which were enacted in 2011 and 2013, restructured access to affordable family planning and abortion services throughout the state (Grossman et al. 2017; White et al. 2012), resulting in fewer Texas women accessing contraceptive and abortion services in the years following (Grossman et al. 2014a; White et al. 2015) and creating new reproductive- and pregnancy-related stressors, particularly for lower resourced and teen women (Baum et al. 2016; Fuentes et al. 2016). Using birth cohort-linked birth/infant death restricted-use micro-data and demographic and standardization techniques (Das Gupta 1993), I find that age-education-prenatal care standardized rates of infant mortality increased significantly in the year following reductions in family planning funding (2011-2012) but only for births to US-born non-Hispanic Black mothers. Standardized rates of preterm term birth increased slightly in the year immediately following the introduction of restrictions on abortion providers (2013-2014) for all groups, including births to foreign- and US-born Hispanic, US-born Black, and NH white mothers. These results emphasize the importance of examining the infant health consequences of the many restrictive abortion- and contraception-related laws following the overturning of *Roe v. Wade* in June 2022 and underscore the importance of recognizing and addressing potential disparities in such impacts across maternal race, ethnicity, and nativity groups.

In Chapter 3, I acknowledge that state policies and related factors tend to co-occur and thus consider the joint effects of unique state-level policy contexts on risks of low birth weight and infant mortality. In the US context, the co-occurrence of policies is often recognized by measuring the liberalness or welfare generosity of policies in states, finding that more liberal or generous policies are associated with lower risks of adverse health outcomes (Fenelon and Witko 2021; Montez et al. 2022). In this chapter, I build on the World Health Organization's structural determinants of health framework (Solar and Irwin 2010) to consider possible multidimensional social and policy contexts at the state level and their association with birth and infant health outcomes. Using several sources of publicly available state-level data, latent profile analyses suggest that there are three latent profiles of state policy contexts, defined by low intervention, high intervention, and high constituent engagement. After merging the estimated state policy contexts to cohort-linked birth and infant death micro-data, I find that both high intervention and high constituent engagement contexts are associated with lower risks of low birth weight and infant mortality, but that the protective effects are concentrated among births to NH white mothers. These findings highlight the importance of considering multidimensional policy contexts when examining how state factors combine to shape health and align with previous work that suggests muted "protective" effects of certain policies for minoritized race and ethnicity groups (Soss et al. 2004).

In Chapter 4, I move away from structural determinants to consider how stratifying systems within race and ethnicity groups shape the accumulation of racialized stressors in ways that impact low birth weight. This chapter builds on the weathering hypothesis, which posits that the accumulation of racialized stressors contributes to diverging risks of adverse birth outcomes across maternal age for NH Black compared to NH white mothers (Geronimus 1992). Using the weathering framework, I consider how differences in racialized experiences related to skin tone—which serves as a marker of a distinct form of racism termed colorism, or skin tone stratification (Monk 2015; Roth 2016)—shape risks of low birth weight across maternal age for NH Black mothers. Results from analyses using data from the National Study of Adolescent to Adult Health suggest that, despite similar risks of low birth weight across skin tone at maternal age 16, risks diverge with age, such that births to mothers with the darkest skin tones experience the sharpest increases. These findings align with previous research examining skin tone stratification and health among Black women in the US (Hargrove 2018b, 2018a). They also extend skin tone stratification research to demonstrate the transgenerational consequences of colorism.

Throughout this dissertation, I use the term "birthing persons" in recognition that individuals who may become pregnant do not always identify as women. I used gendered language such as "woman" and mother" when constrained by data collection procedures or language used in prior studies.

The studies included in this dissertation are important for several reasons. First, the US has some of the highest rates of adverse birth outcomes among high-income countries (Chen, Oster, and Williams 2016; Woolf and Aron 2013). This societal-level problem requires a societal-level response (Siddiqi et al. 2016). Chapters 2 and 3 thus demonstrate how the reproductive health climate—a timely state policy issue—and broader state policy contexts impact birth outcomes. Results suggest that policies and contexts that expand access to health-relevant resources and promote community engagement may be particularly important for reducing adverse risks. Second, rates of preterm birth and low birth weight continue to increase most rapidly among socially disadvantaged groups (Hamilton et al. 2015; Martin et al. 2019) despite public health initiatives and the development of new medical technologies that are aimed at reducing incidences of adverse birth outcomes overall (Healthy People 2020). Results from Chapter 3 emphasize the importance of considering how seemingly "protective" policies or interventions may contribute to health inequities by concentrating the protective effects among more privileged groups. Third, mothers' social pathways, which are intrinsically associated with the accumulation of disadvantage, are linked to birth outcomes (Kane 2015; Kane, Harris, and Siega-Riz 2018). Chapter 4 builds on this work by emphasizing the need to consider how maternal stressors that occur throughout the life course may have long-term consequences that impact offspring's health and underscores the importance of examining multiple dimensions of racism to clarify the ways in which racism shapes health.

2. (A Decomposition of) Changes in Infant Health Following Texas Laws Restricting Access to Reproductive Health Care

Over the last decade, there has been a surge in state-level laws aimed at reshaping access to reproductive care across the US. Between 2010 and 2020, US states passed 474 restrictive abortion-related laws, accounting for almost 40 percent of all restrictions enacted since the *Roe v. Wade* Supreme Court decision (*Roe*) protected the right to abortion in 1973 (Guttmacher Institute 2022; Nash 2021; Nash et al. 2018, 2019, 2020; Nash and Ephross 2022). With the Supreme Court's overturning of *Roe* in June 2022, many states have become further emboldened in their efforts to restrict access to abortion and contraceptive care (Nash and Guarnieri 2023). These laws threaten the ability of birthing persons to receive adequate reproductive care (Gerdts et al. 2016; Hopkins et al. 2015; White et al. 2012) and disproportionately harm those already experiencing the highest rates of adverse pregnancy and birth outcomes (Fuentes 2023).

Given the rapidly changing reproductive health climate across the US, there is an urgent need to assess the birth and infant health (e.g., preterm birth and infant mortality) consequences of restrictive state policies. Previous studies find that expanding access to abortion and related reproductive care around the time of *Roe* (1973) reduced infant mortality (Grossman and Jacobowitz 1981; Krieger et al. 2015), suggesting that the reversal of access to such services may increase rates of infant mortality and other adverse birth outcomes today.

In this study, I focus on Texas—considered the paradigm of the anti-abortion movement (Hasstedt 2014; Venator and Fletcher 2021)—and two specific state policies that restricted access to reproductive health care. The first policy decreased state funding for family planning clinics and services in 2011 (White et al. 2012) and the second policy, known as HB2, implemented burdensome restrictions on abortion providers in 2013 (Baum et al. 2016; Grossman et al. 2014b). These restrictions fundamentally changed the structure of, and thus access to, affordable reproductive care for birthing persons across the state (Grossman et al. 2017; White et al. 2012) and may have increased rates of adverse birth and infant health outcomes—namely preterm birth and infant mortality—in three ways. First, the policies may have shifted the composition of births to lower SES and teen women (Frost, Gold, and Bucek 2012; Fuentes 2023; White et al. 2012), who experience relatively high rates of adverse outcomes (Akseer et al. 2022; Blumenshine et al. 2010), by targeting reproductive care providers that often serve low-SES communities and individuals. Second, because many family planning clinics offer prenatal care services (Zolna and Frost 2016), policy-related clinic closures may have reduced access to first-trimester prenatal care ("adequate" care), which is protective of adverse birth outcomes (Institute of Medicine (US) Committee to Study Outreach for Prenatal Care 1988). Third, in addition to compositional shifts, standardized preterm birth and infant mortality rates may have increased due to policy-related maternal stressors and strains on the healthcare system (Fuentes et al. 2016; Grossman and Jacobowitz 1981; Lobel et al. 2008).

Given these likely changes, I assess the birth and infant health consequences of the 2011 and 2013 policies. I calculate the standardized rates of preterm birth (PTB) and infant mortality in Texas between 2005 and 2017 and decompose those rates into compositional (maternal age, socioeconomic status, and adequate prenatal care use) and rate effects. I stratify the main analyses across maternal race and ethnicity (Hispanic, non-Hispanic Black, and non-Hispanic white) to examine if the compositional and rate effects vary, with the understanding that race-ethnicity-specific stressors and barriers to care may result in meaningfully different compositional and rate responses. In a second set of analyses, I also stratify by maternal race and ethnicity and county, grouped by distance change to nearest abortion provided, to examine if the policy changes disproportionately burdened those counties experiencing the largest change in distance.

2.1 Texas Reproductive Health Care Legislation and Their Consequences

2.1.1 Timeline of Reproductive Health Care Legislation: 2005-2017

In 2007, the Texas legislature seemed invested in expanding access to reproductive health care for women across the state when they established the Women's Health Program (WHP), a Medicaid waiver program that received 90 percent of its funds from the federal government (Stevenson et al. 2016) and extended Medicaid family planning services to women of reproductive age with incomes up to 185% of the federal poverty level (White et al. 2015). However, over the next 10 years, the legislature changed course. In 2011 and 2013, they passed groundbreaking pieces of legislation that fundamentally changed the structure and accessibility of reproductive health care for birthing persons in the state of Texas, disproportionately affecting those from low-income and historically marginalized communities. At the time, they were considered the most radical and restrictive laws governing reproductive health in the country (Grossman et al. 2017; White et al. 2012).

The 2011 Texas legislature enacted a series of policies limiting state-level funding for family planning services. First, they cut overall funding for family planning services in the 2012-2013 budget by about 65 percent (Tan 2011). Second, they created a three-tiered system for distributing funds (White et al. 2015). Specialized clinics, including those offering family planning and other reproductive health services, were in tier 3 and given the lowest priority for receiving funding. Third, the legislature renewed the Women's Health Program (WHP) with newly enforced restrictions that excluded organizations affiliated with abortion providers from the program (Ramshaw and Tan 2012; White et al. 2015).

Although the 2013 legislature reversed some of the funding cuts, they also passed a restrictive omnibus abortion bill (HB2) that implemented targeted restrictions of abortion providers (TRAP laws) (Gerdts et al. 2016). This bill focused on two particularly restrictive laws. First, effective November 1, 2013, doctors providing abortion services were required to have admitting privileges at a hospital within 30 miles of the facility at which they practiced (Grossman et al. 2014b). Second, abortion facilities, including those providing only medication abortions, were required to meet the standards of ambulatory surgical centers by September 1, 2014 (Fischer, Royer, and White 2017; Grossman et al. 2014b). Reproductive rights advocates and several medical associations immediately deemed these parts of the bill as detached from health and safety and challenged them in the District Court, arguing that the laws created undue burdens for abortion seekers (ACLU of Texas 2021; Totenberg 2016). Although they remained enforceable for about a year, these portions of the bill were struck down by the

Supreme Court in 2016 (*Whole Woman's Health v. Hellerstedt*) (Center for Reproductive Rights 2018).

2.1.2 Consequences of the 2011 Texas Funding Cuts and HB2

2.1.2.1 Changes in Clinic Characteristics and Access to Reproductive Health Care

When clinics and other reproductive healthcare organizations lost financial support from the state government in the 2012-2013 budget, many were forced to restructure their operations. Overall, the Texas Department of State Services continued to support only 41 of 76 family planning organizations that had previously received funding from the state, and some of those 41 organizations had their funding reduced by as much as 75 percent (White et al. 2012). Between 2011 and 2013, 25 percent of Texas' family planning clinics closed as a result and several others reduced their service hours, increased their service costs, and/or changed the types of services they offered (White et al. 2015). Consequently, clinics served 54 percent fewer clients (White et al. 2015) and provided fewer contraceptives to clients in 2013 compared to 2011 (Pogue 2017; White et al. 2015), with overall decreases in receipt of reproductive care services from any provider across the state (Hopkins et al. 2015; Stevenson et al. 2016).

The implementation of HB2 further reshaped clinic services and use. The number of facilities providing abortion services dropped from 41 in 17 counties in 2012 to 21 in 6 counties in 2014 (Grossman et al. 2017). With those changes, the average distance to each county's closest abortion provider rose by an average of 51 miles (Grossman et al. 2017) and the estimated number of women of reproductive age living over 200 miles from an abortion clinic rose from only 10,000 in May 2013 to 290,000 in May 2014

(Grossman et al. 2014b). Consequently, the rate of Texas women receiving an abortion dropped by 13 percent between two six-month periods immediately before and after the implementation of HB2 (Grossman et al. 2014b).

Overall, legislation-related decreases in the use of both contraceptive and abortion services could signal an increase in unintended pregnancies and births, with effects concentrated among birthing persons most at-risk of adverse outcomes.

2.1.2.2 Expected Changes in the Composition of Births: Maternal Age, SES, and Prenatal Care Use

Prior work discusses that limited access to family planning services disproportionately affects low-income and minoritized women (Dehlendorf et al. 2010), suggesting that these groups were likely hit hardest by the restrictions in Texas. In fact, prior to the funding changes (2011), over 50 percent of women covered by the WHP received services from Planned Parenthood (White et al. 2015), a provider newly excluded from the WHP coverage (Hopkins et al. 2015; White et al. 2015). Furthermore, 40 percent of women accessing state-funded services—which were concentrated in low-income communities—received care from specialized clinics whose funding was deprioritized in the 2012-2013 budget (White et al. 2015). This translated to steep increases in clinic prices that disproportionately burdened lower-income women, such that they often reported switching to less effective contraceptives or skipping care completely due to their inability to cover the new costs (Hopkins et al. 2015). In similar ways, HB2 was linked to increasing costs and travel times for abortion procedures (Baum et al. 2016; Gerdts et al. 2016). These barriers prevented some lower-resourced birthing persons from obtaining wanted abortions due to an inability to pay for the abortion itself, to cover childcare or transportation costs, or to take time off work (Fuentes et al. 2016).

At the same time, the clinic closures and increased costs of services may have disproportionately harmed teenagers. Specialized family planning clinics often offer confidential and affordable options for minors who may be otherwise unable to receive reproductive health care (Frost et al. 2012). As these clinics closed throughout the state, teens had fewer options from which to receive reproductive health services. Furthermore, because the 2011 cuts included Title X funding (family planning and related service grants from the federal government), many of the clinics that remained open could no longer leverage their Title X status for an exemption to the Texas law requiring parental consent for teens accessing contraceptives (White et al. 2012). Of the 45 tier 3 clinics that offered contraceptive services to minors without parental consent in 2011, only 13 offered such services in 2013 (White et al. 2015). Texas teens have confirmed this post-2011 barrier to accessing contraceptives and other reproductive health care (Hopkins et al. 2015). The HB2-related changes likely also disproportionately harmed teens, who generally have fewer resources to travel long distances or to pay for high-cost abortion procedures.

While much of the focus of clinic closures has been on changes in access to care prior to or at the earliest stages of pregnancy, there were likely consequences associated with accessing affordable prenatal care during pregnancy. Because many clinics offer prenatal services (Zolna and Frost 2016), the restructuring of family planning clinics likely decreased access to affordable prenatal care, particularly in low-income communities.

2.1.3 A Framework for Linking the Policy Restrictions to Birth and Infant Health Outcomes

The changes outlined above likely shaped patterns of adverse birth and infant health outcomes. First, shifting the composition of births to lower SES and teen mothers would contribute to higher rates of adverse outcomes at the population level by increasing the fraction of high-risk births (Grossman and Jacobowitz 1981), since low-SES and teen births are associated with higher risks of preterm delivery and infant mortality (Akseer et al. 2022; Blumenshine et al. 2010). Second, the clinic closures may have increased barriers to receiving prenatal care in the first trimester—considered "adequate" care (Institute of Medicine (US) Committee to Study Outreach for Prenatal Care 1988)—which is associated with increased risks of pregnancy complications, including maternal, birth and infant health outcomes (Baldwin et al. 1998; Liu 1998). Even if pregnant persons were able to access prenatal care through those clinics that remained open or other health care providers, potential delays in care related to changes in clinic access or costs could be detrimental. A decrease in the proportion of births with adequate prenatal care may be amplified by the greater proportion of births to lower SES and teen mothers as well as increases in unintended births, all of which are linked to lower rates of adequate prenatal care use (Dehlendorf et al. 2010; Kost and Lindberg 2015).

Figure 1., below, summarizes the link between the 2011 and 2013 policies and potential changes in the composition of births and rates of preterm birth and infant mortality.

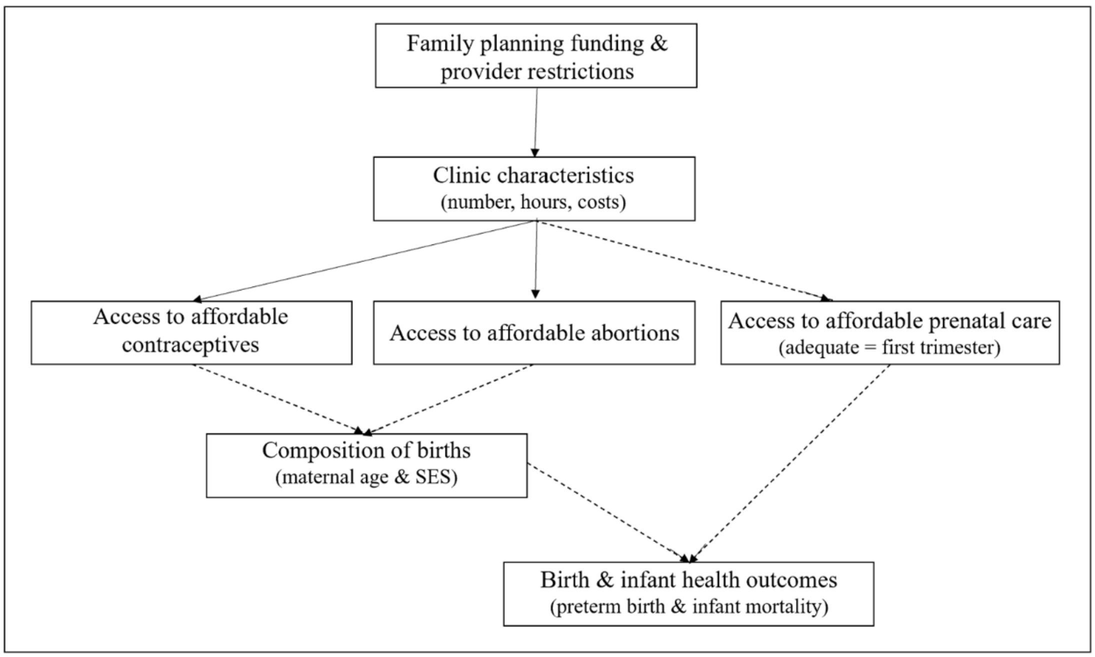

Figure 1: Conceptual Model Linking Policy Changes to Birth and Infant Health Outcomes

Independent of compositional and prenatal care changes, the Texas legislation may have shaped population birth and infant health outcomes by increasing the rates of adverse outcomes within population subgroups, or "risk categories" (Grossman and Jacobowitz 1981). For example, a sudden increase in the number of births to Texas women could increase demands for prenatal, pregnancy, and post-pregnancy care, which, coinciding with clinic closures, could strain health systems in ways that lower the survival probability of infants (Grossman and Jacobowitz 1981). The confusion and challenges associated with the policy changes (Baum et al. 2016; Fuentes et al. 2016) may have also imposed additional stressors on birthing persons during pregnancy and birth in ways that heightened the risk of adverse birth and child development outcomes (Lobel et al. 2008). Mothers having unintended births, which likely increased following the restrictive legislation, may have experienced additional stressors associated with their unplanned or mistimed pregnancies (Orr et al. 2000; Stevenson and Potter 2015) that could contribute to rising rates of adverse outcomes across maternal socioeconomic status and age.

2.1.3.1 Heterogeneity in the Consequences of Reproductive Health Care Policies

The process outlined above likely interacts with structural inequalities to compound pre-existing racial-ethnic disparities. During the expansion of abortion rights in the early 1970s, decreases in infant mortality rates were largest among births to Black women (Krieger et al. 2015), which may suggest that the pre-Roe restrictive policies had been particularly harmful to Black birthing persons. More recently, Hispanic women experienced the largest decreases in abortion rates following HB2 (Goyal, Brooks, and Powers 2020), and, in 2015, states with restrictive policy contexts had higher average risks of low birth weight, but only among NH Black mothers (Sudhinaraset et al. 2020). These findings emphasize the need to consider the race-ethnicity-specific consequences of restrictive reproductive laws.

The reproductive justice movement offers a critical framework for understanding how historical and ongoing forms of racial discrimination intersect with classed and gendered politics to form unique structural challenges related to reproductive health (Ross and Solinger 2017; Vilda et al. 2021). It centers social context, rather than rights, to demonstrate how intersecting systems of oppression shape the education, access, and decisions available to birthing persons related to their fertility and reproductive well-being. Following this framework, it is likely that the social contexts that put Black and other birthing persons of color at higher risks of not having a regular source of care (Anderson 2020; Caldwell et al. 2017; Gaskin et al. 2009), of biased medical care (Altman et al. 2019; Reed et al. 2022; Saluja and Bryant 2021; Schut 2021), and of adverse pregnancy and birth outcomes (Geronimus 1992; Goosby and Heidbrink 2013; Mehra, Boyd, and Ickovics 2017) interact with the 2011 and 2013 Texas legislation to heterogeneously shape birth and infant health trends. Relatedly, because the protective effect of prenatal care is strongest for high-risk pregnancies (Abrevaya 2001; Mukhopadhyay and Wendel 2008), the consequences of the Texas legislation may concentrate among births to NH Black birthing persons who are already at higher risk of adverse outcomes compared to their NH white counterparts due to the weathering effects of racism.

Separately, Hispanic birthing persons generally have lower risks of adverse birth and infant health outcomes compared to their NH white counterparts (MacDorman 2011). This relationship is often explained by differences in nativity (Flores et al. 2012) and the immigrant health advantages associated with the migration process (Hamilton 2015; Turra and Goldman 2007). Thus, the overall lower risks of adverse outcomes before the Texas policies could minimize the consequences of decreased access to reproductive care for this group. Furthermore, in Texas, many foreign-born mothers were already excluded from publicly funded health programs before the restrictive legislation due to nativity and citizenship status (Hasstedt 2014; Hopkins et al. 2015). This suggests that the 2011 and 2013 restrictions on these services may have smaller impacts on the pregnancy or birth outcomes of foreign-born Hispanic birthing persons. On the other hand, it is possible that foreign-born mothers may be disproportionately dependent on local clinics if they lack access to private health insurance related to their migration status.

Together, the unique social contexts of birthing persons based on race, ethnicity, and nativity emphasize the need to examine the consequences of the Texas funding cuts and HB2 separately across maternal race, ethnicity, and nativity.

Furthermore, while the funding changes and their cascading effects apply to the entire state, studies examining the geographic heterogeneity of the policy effects find that some counties were disproportionately burdened by the clinic closures (Fischer et al. 2017). After the 2011 funding cuts and HB2, 2012-2014 abortion rates decreased by 35 percent in counties experiencing a 50–99 mile increase in distance to the closest abortion provider and by 50 percent in counties experiencing a 100+ mile increase, compared to 20 percent state-wide (Grossman et al. 2017). Women living in counties experiencing any HB2-related clinic closure experienced the sharpest declines in abortion rates (Goyal et al. 2020) and the greatest increases in the numbers of births (Fischer et al. 2017) between 2012 and 2015. Similar patterns unfolded when about half of Wisconsin's family planning clinics closed during the same period (Venator and Fletcher 2021). These findings emphasize the need to consider geographic heterogeneity in analyses when examining the effects of the 2011 funding cuts and HB2 on the composition of births and rates of adverse birth outcomes.

2.1.4 Current Study

The current study uses demographic standardization and decomposition techniques developed by Das Gupta (1993) to assess if the 2011 and 2013 laws that restricted access to reproductive care had birth and infant health consequences. I examine trends in the composition of births and rates of preterm birth and infant mortality between 2005 and 2017 and stratify analyses across maternal race, ethnicity, and nativity to answer the following questions:

1) Were there trend changes in (a) the number of births, (b) the composition of births by maternal age, education, and adequate prenatal care use, and (c) the observed rates of preterm birth and infant mortality in Texas between 2005 and 2017?
2) To what extent are the over-time changes in observed rates of preterm birth and infant mortality attributed to changes in the maternal age-education-prenatal care composition of births v. rate changes?
3) Are policy-related compositional and rate changes concentrated in counties that experienced the largest distance increase to the nearest abortion facility?

In this research, I build on prior studies describing the health care utilization and pregnancy consequences of the 2011 and 2013 policy changes by assessing the impacts on infant health. I also use an extended timeline of analysis compared to those prior studies. This allows me to contextualize changes in rates of preterm birth and infant mortality across time and to better distinguish natural dips and spikes in rates of adverse outcomes from policy-related rate changes, as well as to examine the effects of the two policies simultaneously. Texas provides the ideal state setting for this analysis because it is a paradigm for the anti-abortion movement (Hasstedt 2014; Venator and Fletcher 2021) and has a large, diverse population spread across 254 counties, thus allowing for stratified analyses.

2.2 Data and Methods

2.2.1 Data

I use birth cohort-linked birth/infant death restricted-use micro-data between 2005 and 2017 from the National Center for Health Statistics for the analyses. This time range is selected based on data limitations: (1) Texas began using an updated birth certificate in 2005, such that pre-2005 education measures are inconsistent with the 2005+ data; and, (2) 2017 is the most recent year for which the birth cohort-linked birth/infant death data is available. These linked cohort data are ideal for this study as they contain information on all births occurring within the U.S. each year, including maternal, pregnancy, and birth characteristics, and the associated death records for each of those infants who died within their first year of life in the U.S.

Using the national data, I limit the sample of live births to mothers residing in Texas at the time of birth (N=5,874,023). Selecting births based on residency rather than place of birth accounts for any biases from mothers, particularly those living near border states, who chose to give birth outside of Texas in response to current reproductive health laws. Between 2005 and 2017, 99.73 percent of all Texas mothers who gave birth did so within the state of Texas; this percentage is consistent across the period, suggesting that birth state selections introduce low bias into the analyses. National-level data are retained to compare the Texas analyses to national trends as well as border-state trends (Louisiana and Oklahoma), which are discussed in Appendix A.

Due to low numbers of births and deaths across some maternal race, ethnicity, and nativity groups, I limit the final population cohort to births/deaths to residential mothers identifying as Hispanic (US- or foreign-born), non-Hispanic Black (NH Black; US-born), and non-Hispanic white (NH white; US- or foreign-born), accounting for 93.13 percent of the total births to Texas mothers during the 2005-2017 period (N=5,470,495). This population of residential Texas births has low levels of missingness on their birth and death certificates. Among the study-relevant measures, information on prenatal care use has the highest level of missingness (1.49 percent), with questions pertaining to maternal or birth characteristics all having <0.10 percent missing. Births missing information on any of these variables were dropped (1.63 percent). The final population cohort includes 5,381,171 births and 26,297 deaths.

2.2.1.1 Measures

The analyses in this paper rely on measures of maternal, pregnancy, and birth characteristics. Relevant maternal characteristics include maternal age and socioeconomic status to identify the yearly composition of births to teenaged and socioeconomically disadvantaged mothers. Teen births are measured as births to mothers who are less than 20 years old at the time of the birth, although analyses defining teen births as those to mothers who are aged <19 or <18 produce substantially similar results in the decomposition analyses (i.e., year-to-year differences in the age and rate effects are largely unchanged). To approximate births to socioeconomically disadvantaged mothers, I measure educational attainment as births to mothers who had not completed high school at the time of birth; decomposition results are similar when measuring educational attainment as completion of high school degree, some college, or college (i.e., year-to-year differences in the education and rate effects are largely unchanged).

To identify the yearly composition of births with adequate prenatal care, I use a binary measure of whether the first prenatal care visit occurred during the first trimester of pregnancy (the first 3 months of gestation).

The birth and infant health outcomes of interest are preterm birth and infant mortality. Preterm birth (PTB) measures births occurring before 37 completed weeks of gestation, as estimated by the obstetrician on the birth certificate. Infant mortality measures whether an infant died within the first year of life. Yearly rates of both preterm birth (PTB rates) and infant mortality (IMR) are calculated using the year of birth.

In the analyses, the compositional (i.e., age, education, and prenatal care) and PTB rates are presented in percentages (per 100 live births), and the IMR is presented as the number of infant deaths per 1,000 live births.

To conduct stratified analyses, I measure maternal race-ethnicity as follows: Hispanic, foreign-born; Hispanic, US-born; NH Black, US-born; and NH white (foreign- and US-born). Births to foreign- and US-born Hispanic women are measured separately as the women in each group have distinct lived experiences related to their nativity, particularly relating to access to publicly-funded reproductive health care in Texas (Hasstedt 2014; Hopkins et al. 2015), and each group accounts for a large portion of births to Texas women during the 2005-2017 period (about 23 and 29 percent, respectively). Births to foreign-born NH Black women rose significantly over the study period, accounting for less than 5 percent of births to all NH Black women in 2005 and over 15 percent of births in 2017. Examining birth and infant health trends for a combined foreign- and US-born NH Black group would prevent me from disentangling the change in the rate trends from the changing nativity composition of the group. However, examining the trends for the foreign-born NH Black group separately or accounting for the foreign- v. US-born composition of births in the analysis is not advisable, as the counts of foreign-born NH Black births are extremely low in the early years of the study period (for example, 3,814 births, 558 preterm births, and 449 infant deaths in 2005), and thus the rate trends are very sensitive to small changes in the counts of adverse outcomes. The NH white foreign- and US-born populations are examined together, as the foreign-born composition of this group is low and steady over time.

For the analyses stratified by county, I use county-level data compiled by Grossman et al. (2017) that identify the change in distance to the closest abortion facility for each Texas county between 2012 and 2014. Grossman et al. define abortion facilities as those facilities that provided abortions and were open for at least 6 months in 2012 or 2014. Changes in distance are measured if a county had an abortion facility open in 2012 but not in 2014, and the distance change is calculated as the distance from the centroid of the county to the nearest open facility in another county, which may include facilities outside of Texas. I collapse the distance change measures into two groups to align with similar categories in other studies (Goyal et al. 2020; Grossman et al. 2017; Venator and Fletcher 2021): less than 100 miles (109 counties; N=862,932 births) and 100 or more miles (60 counties; N=813,511). The remaining counties are defined accordingly: no clinics, for those counties that did not have an abortion facility in 2012 (79 counties; N=1,085,494); and 1 or more clinics, for those counties that had at least one clinic open in 2012 and 2014 (6 counties; N=2,619,234).

2.2.2 Methods

To answer my first research question, I graphically examine trends in the number and composition of births (by maternal age, education, and prenatal care use) and in observed rates of PTB and IM for births to Texas women between 2005 and 2017. To best inform analyses for the second research question, I examine these trends across the four maternal race, ethnicity, and nativity groups defined above.

To answer my second research question—to what extent do changes in the composition of births v. rate changes contribute to changing trends in observed PTB and IM rates following the Texas funding cuts and HB2—I use the demographic standardization and decomposition method developed by Das Gupta (1993) for cross-classified data. The method is well-suited for this research question because the yearly PTB and IM rates include overlapping populations (i.e., the age, education, and prenatal care groupings are not hierarchical or nested within each other). Importantly, the method incorporates the proportion of the total population of births in each age-education-prenatal care-specific subgroup to identify the additive contributions of the compositional (i.e., age, education, and prenatal care) and rate effects to the changes in observed rates of PTB and IM over time. This method is commonly used in studies that decompose rate trends (DeLeone, Lichter, and Strawderman 2009; Raley 2001; Smith, Morgan, and Koropeckyj-Cox 1996).

Das Gupta (1993) and Smith et al. (1996) demonstrate how to decompose rates on multiple factors over several years to produce a single set of standardized factor-specific rates. Using PTB as an example and stratifying across maternal race-ethnicity-nativity, I first calculate standardized factor-specific PTB rates for each pairwise comparison of years between 2005 and 2017 (Das Gupta 1993: Ch. 6). This results in four factor-standardized PTB rates for each of the 78 pairwise comparisons, representing the following: (1) the education-prenatal care-rate standardized PTB rates for years t and $t+1$, which reflect what the PTB rates would be if the education and prenatal care composition of births and within-subgroup rates were identical across the two years and only the maternal age composition varied; (2) the age-prenatal care-rate standardized PTB rates for years t and $t+1$, which reflect what the PTB rates would be if the age and prenatal care composition of births and within-subgroup rates were identical across the two years and only the maternal education composition varied; (3) the age-education-rate standardized PTB rates for years t and $t+1$, which reflect what the PTB rates would be if the age and education composition of births and within-subgroup rates were identical across the two years and only the prenatal care composition varied; and, (4) the age-education-prenatal care standardized PTB rates for years t and $t+1$, which reflect what the PTB rates would be if the age, education, and prenatal care composition of births were identical across the two years and only the within-subgroups rates varied.

These pairwise comparisons create a set of 156 standardized rates that are internally inconsistent. This means, for example, that the age effect between years *t* and *t +1* and the age effect between years *t+1* and *t+2* do not sum to the age effect between years *t* and *t+2*.

Das Gupta (1993) provides a way to calculate a final set of standardized rates that include a single factor-specific rate for each factor and year, and for which the factor effects are internally consistent across the period. The process entails taking the average of the many possible ways to revise the 156 sets of standardized pairwise rates for internal consistency. The final set of standardized rates includes four factor-specific standardized rates for years 2005 to 2017 such that, for any two years, the difference in the observed rates can be decomposed into standardized age, education, and prenatal care compositional effects and a rate effect:

$$T_2 - T_1 = [\alpha_{2.\{Y2\}} - \alpha_{1.\{Y1\}}] + [\beta_{2.\{Y2\}} - \beta_{1.\{Y1\}}] + [\gamma_{2.\{Y2\}} - \gamma_{1.\{Y1\}}] + [\tau_{2.\{Y2\}} - \tau_{1.\{Y1\}}], \quad (1)$$

Such that T_2 is the observed PTB rate in year 2 and T_1 is the observed PTB rate in year 1; $\alpha_{2.\{Y2\}}$ denotes the education-prenatal care-rate standardized PTB rate when the population of births in year 2 is compared to all other years; $\alpha_{1.\{Y1\}}$ denotes the education-prenatal care-rate standardized PTB rate when the population of births in year 1 is compared to all other years; $\beta_{2.\{Y2\}}$ and $\beta_{1.\{Y1\}}$ denote the age-prenatal care-rate standardized PTB rates when the population of births in years 2 and 1 are compared to all other years, respectively; $\gamma_{2.\{Y2\}}$ and $\gamma_{1.\{Y1\}}$ denote the age-education-rate standardized

PTB rates when the population of births in years 2 and 1 are compared to all other years, respectively; and $\tau_{2.\{Y2\}}$ and $\tau_{1.\{Y1\}}$ denote the age-education-prenatal care standardized PTB rates when the population of births in years 2 and 1 are compared to all other years, respectively.

Equation (1) allows me to decompose the difference in observed rates between any two years into four additive effects: three compositional effects that measure the extent to which year-to-year rate changes result from changes in the proportion of births to persons who (1) were teenagers at the time of birth (age effect; $[\alpha_{2.\{Y2\}} - \alpha_{1.\{Y1\}}]$), (2) had less than a high school degree at the time of birth (education effect; $[\beta_{2.\{Y2\}} - \beta_{1.\{Y1\}}]$), and (3) received adequate prenatal care (prenatal care effect; $[\gamma_{2.\{Y2\}} - \gamma_{1.\{Y1\}}]$); and the (4) the "real" difference in subgroup-specific rates over time (rate effect; $[\tau_{2.\{Y2\}} - \tau_{1.\{Y1\}}]$).

To answer the third research question, I use the same method discussed above, stratified by both maternal race-ethnicity-nativity and county category.

Due to the sensitivity of the record-level birth and infant death certificate data, all analyses were conducted on a secure virtual machine (VM) on Duke's Protected Research Data Network (PRDN) using Stata 17.0. The use of restricted data and the analyses were approved by Duke University's Institutional Review Board.

2.3 Results

2.3.1 Descriptive Statistics

Figure 2. plots the number of yearly births to Hispanic, NH Black, and NH white women residing in Texas between 2005 and 2017, with different axes to account for the wide range of births across maternal race-ethnicity-nativity groups. Vertical lines are placed at years 2011 and 2013, aligning with the passage of the restrictive policies. The results illustrate two clear patterns. First, for all groups, births begin declining almost immediately after 2007, which aligns with the creation of the Women's Health Program in 2007 (Hasstedt 2014). Second, in 2011, the trends change such that almost all groups experience an increase in the number of births from about 2011 to 2015. This rise in births coincides with the 2011 family planning funding cuts in Texas. Trends in the total fertility rates for the total Texas population suggest that these increases may be partially explained by changes in the number of reproductive-age women residing in Texas over the same period (Appendix A, Figure 11), but that there is a clear trend change in 2011 even when accounting for those changes by estimating the total fertility rate.

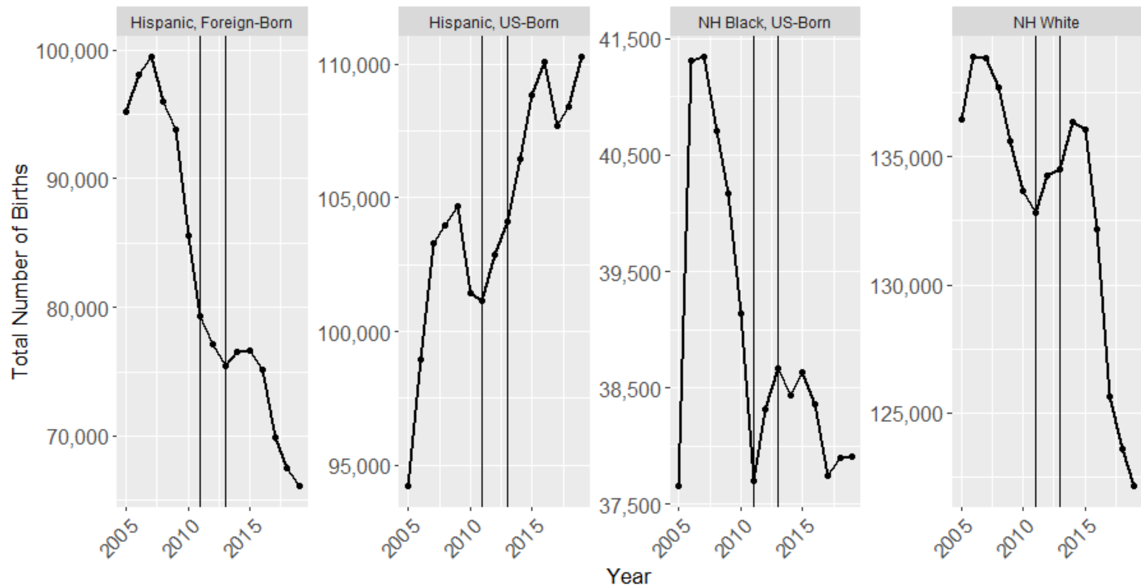

Figure 2: Total Number of Births to Mothers Residing in Texas, USA, by Maternal Race-Ethnicity, 2005-2017.

Figures 3 and 4 examine trends in the characteristics and outcomes of these births. Figure 3 plots the composition of births to women who are less than 20 years of age (panel 1) and have not completed high school (panel 2) at the time of birth and of births receiving adequate prenatal care (prenatal care beginning in the first trimester of pregnancy; panel 3). This figure shows that, by 2008, the proportions of births to young (panel 1) and lower educated (panel 2) women are decreasing across the study period for all maternal race-ethnicity-nativity groups, such that the trends are not interrupted by the 2011 or 2013 policy changes. However, patterns in the receipt of adequate prenatal care (panel 3) are less linear across time. Across all groups, the proportion of births receiving prenatal care in the first trimester decreases between 2005 and about 2008, after which time the rates of adequate prenatal care begin increasing. Then, in 2011, rates of adequate prenatal care use begin to either slightly decrease (foreign-born Hispanic) or stagnate

(NH white, US-born Hispanic, and NH Black)— aligning with the 2011 funding changes—before beginning to increase again after 2013.

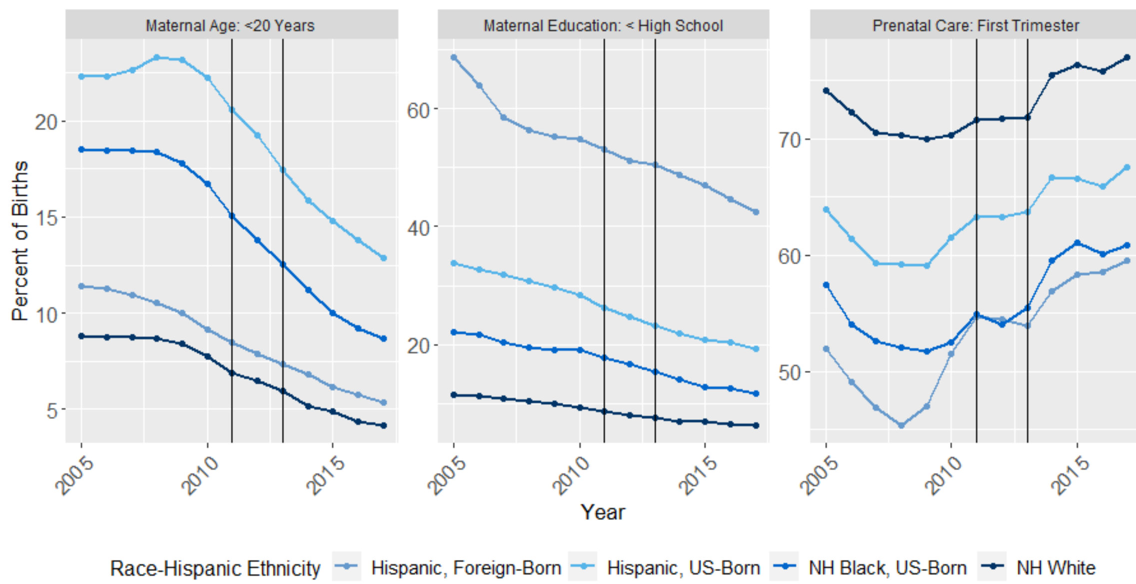

Figure 3: Composition of Births Related to Maternal and Prenatal Care Characteristics, by Maternal Race-Ethnicity, Texas, USA 2005-2017

The observed (unstandardized) rates of PTB (Figure 4, panel 1) and infant mortality (Figure 4, panel 2) demonstrate more heterogeneous trends across maternal race and ethnicity. Among births to US-born Hispanic, NH Black, and NH white women, PTB rates are steadily decreasing between 2005 and 2015, with small, single-year increases between 2013 and 2014. However, among births to foreign-born Hispanic women, the PTB rates during this same period are slightly volatile, with a relatively flat underlying trend. After 2015, PTB rates continue to decrease among births to NH white mothers while the rates are increasing among births to Hispanic (FB and USB) and NH Black mothers.

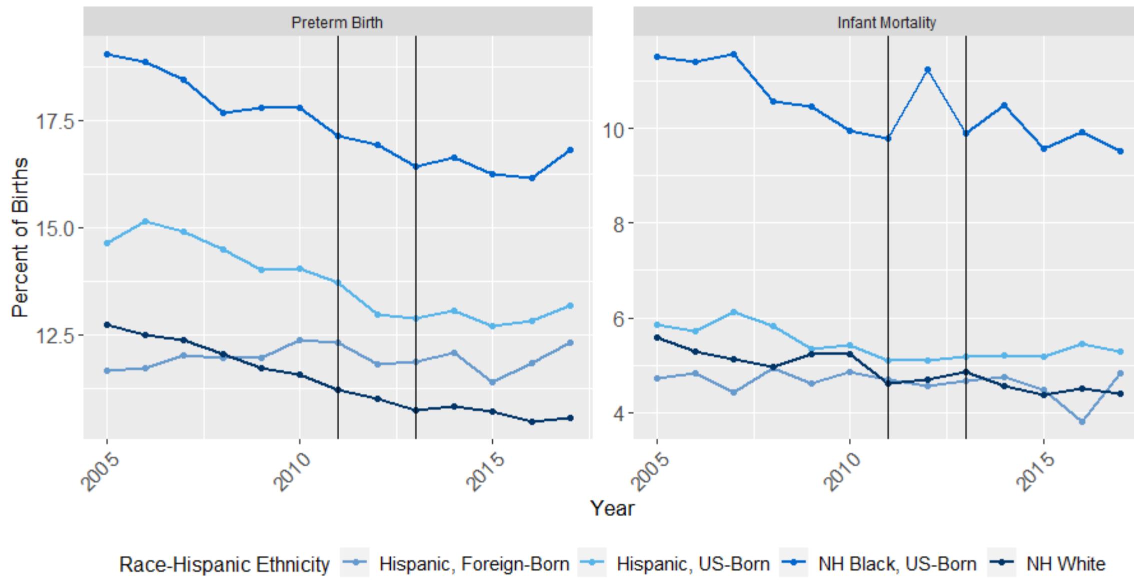

Figure 4: Observed Rates of Adverse Birth Outcomes Among Births Mothers Residing in Texas, USA, by Maternal Race-Ethnicity, 2005-2017

The observed IMRs (Figure 4, panel 2) are generally decreasing, or relatively flat, over the study period for births to all Hispanic and NH white mothers. Although there is a slight increase in the standardized IMR for births to NH white mothers between 2011 and 2013, the increase is commensurate to other increases earlier in the period. Trends in the IMR of births to US-born NH Black mothers, however, demonstrate a substantial increase between 2011 and 2012, corresponding with the 2011 cuts to family planning funding. After 2012, the yearly IMR is more volatile for this group compared to the 2012-2017 IMR trends for the other maternal race-ethnicity-nativity groups.

2.3.2 Standardization and Decomposition

The results of the demographic standardization and decomposition are presented graphically in Figures 5 (PTB rates) and 6 (IMRs) and allow us to decompose change over time. The figures plot the four factor-standardized rates of PTB and infant mortality overall (panel 1) and for births to foreign-born Hispanic (panel 2), US-born Hispanic (panel 3), US-born NH Black (panel 4), and NH white (panel 5) women. In each panel, the meaning of the standardized rates is derived from comparing changes in standardized rates over time, such that the slope between any two years on the maternal age, education, prenatal care, and rate lines represent how much the age, education, prenatal care, and rate effects, respectively, contribute to changes in the observed PTB and IM rates between those two years.

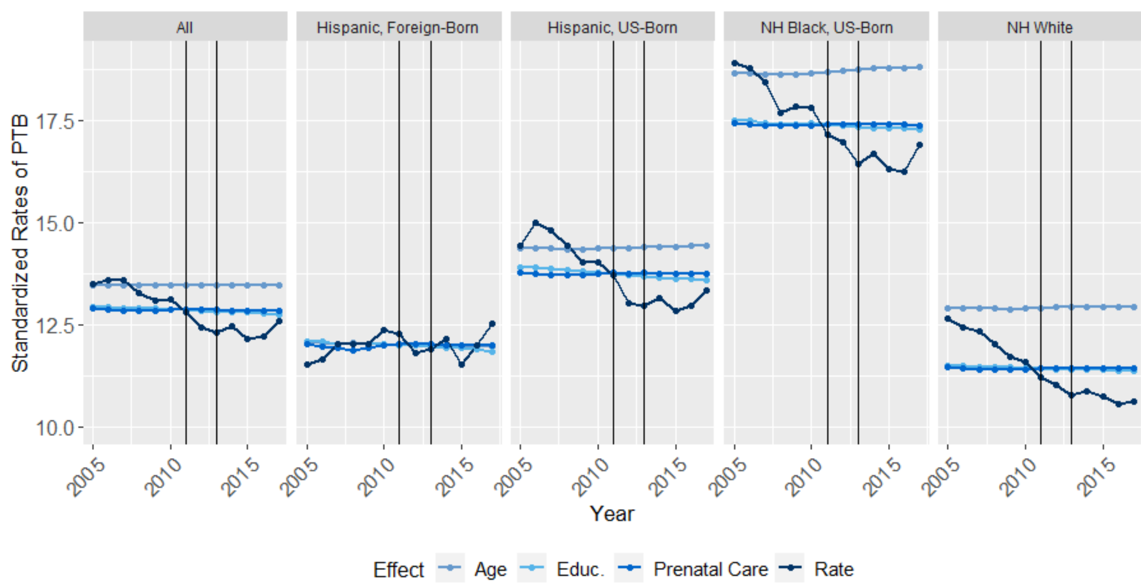

Figure 5: Yearly Factor-Standardized Rates of Preterm Birth, by Maternal Race-Ethnicity, Texas, USA 2005-2017

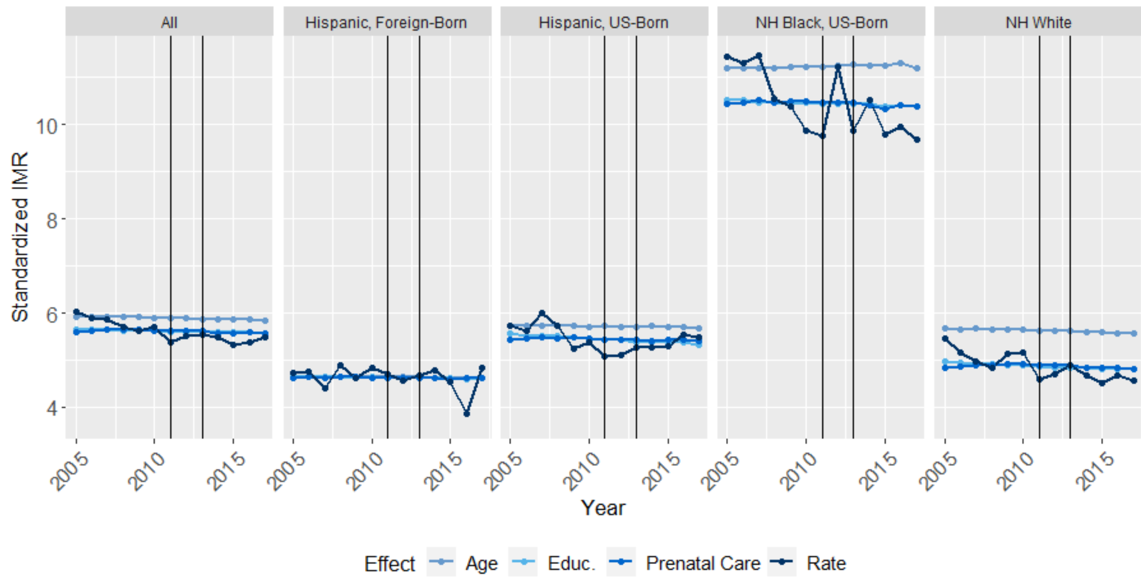

Figure 6: Yearly Factor-Standardized Infant Mortality Rates, by Maternal Race-Ethnicity, Texas, USA 2005-2017

In Figure 5, for all groups, the relatively flat age, education, and prenatal care lines demonstrate that changes in the composition of births contribute minimally to changes in the observed PTB rates between 2005 and 2017 (although, among births to US-born Hispanic and NH Black mothers, the education effect contributes to small but consistent decreases in PTB rates over the study period; see Table 7 in Appendix for factor-standardized PTB rates). Instead, the figure clearly demonstrates that changes in the age-education-prenatal care-specific rates (the rate effect) are driving the observed PTB rate patterns. In general, the rate effect contributes to decreases in the observed PTB rate across the study period, with small, single-year increases between 2013 and 2014. The increases are largest among foreign-born Hispanic (0.24 st. rate increase), US-born Hispanic (0.20 st. rate increase), and US-born NH Black (0.16 st. rate increase) mothers; these same groups also experience an increase in the age-education-prenatal care standardized rates at the end of the study period. The patterns discussed are also represented in panel 1, which displays the standardized rates for the total population of births included in the study (i.e., the combined group of births to mothers identifying as Hispanic, US-born NH Black, or NH white).

Figure 6 presents the factor-standardized IMRs. The figure clearly demonstrates that increases in the IMR among births to US-born NH Black mothers between 2011 and 2012 and again between 2013 and 2014 are driven by the rate effect. In other words, the rates within the age-education-prenatal care-specific subgroups are increasing over these intervals, and the composition of births does not significantly contribute to increases in the observed IMR. For example, between 2011 and 2012, the observed IMR increased by 1.46 infant deaths per thousand (2011 IMR=9.79; 2012 IMR=11.25) and the age-education-prenatal care standardized rate increased by 1.47 (2011=9.77; 2012=11.24), accounting for 101 percent of the observed IMR increase. Similarly, the rate effect accounts for 112 percent of the increase in the observed IMR between 2012 and 2013 (0.58 deaths per thousand increase in the observed rate v. 0.65 increase in the standardized rate). The >100 percent contribution reveals that the observed rate would have increased by more if the composition of the births had not changed in a way that contributed to lower IMRs.

The standardized rates establish two additional patterns. First, while age-education-prenatal care standardized IMRs are decreasing for births to US-born Hispanic mothers prior to 2011, those rates begin increasing after 2011. Second, the rate effect is responsible for a significant, single-year decrease in IMR between 2015 and 2016 among births to foreign-born Hispanic mothers.

Tables with the yearly observed PTB (Table 7) and IM rates (Table 8) and the standardized values for the factor-standardized rates are included in Appendix A.

2.3.3 Standardization and Decomposition: Heterogeneity Across Counties

Figures 7 and 8 display the maternal race-ethnicity-nativity-specific rate effects across the four categories that measure change in distance to the nearest abortion facility between 2012 and 2014 based on maternal county of residence. Only the age-education-prenatal care standardized rates are presented here for ease of interpretation and because the age, education, and prenatal care effects minimally contributed to the observed PTB and IM rates over the study period even when disaggregating the analyses by the county categories. The vertical lines on these graphs are placed at the years 2012 and 2014 to demonstrate the focus on understanding how changes in access to abortion facilities align with changing trends in the standardized rates of PTB and IM.

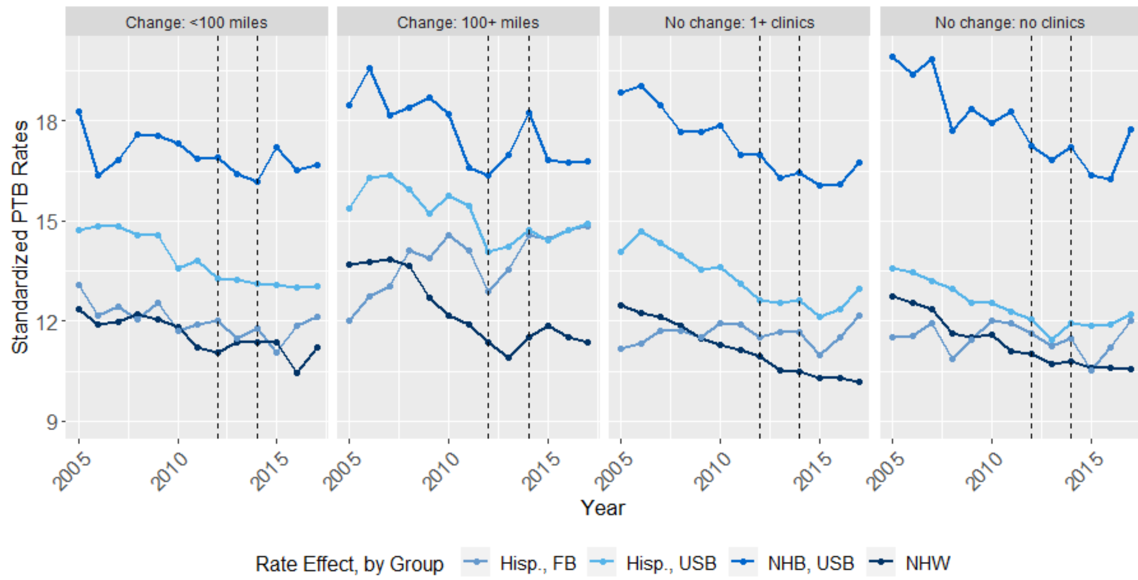

Figure 7: Yearly Standardized Preterm Birth Rates for Births to Mothers Residing in Texas, USA 2005-2017, by County Change in Distance to Nearest Abortion Provider

Figure 7 presents the results for the standardized PTB rates. The results demonstrate heterogeneity in the standardized trends across all four categories. Most notably, regardless of race-ethnicity, births to mothers living in counties that experienced an increase of 100 or more miles to the closest abortion facility between 2012 and 2014 also experienced large increases in their standardized PTB rates. The standardized PTB rates across all other counties remain relatively stable, or even decrease, over the 2012-2014 period.

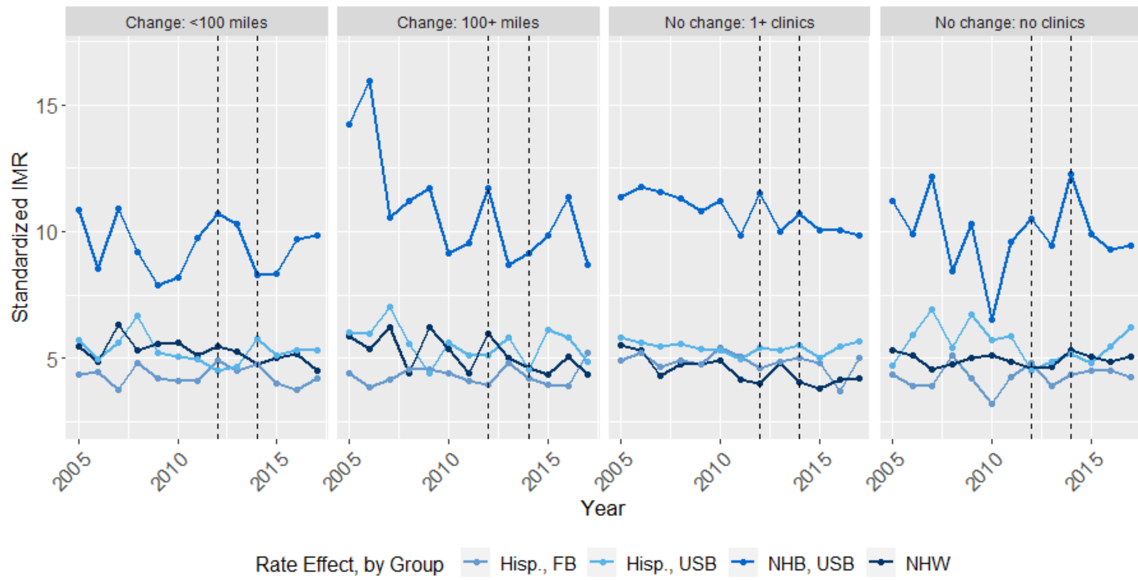

Figure 8: Yearly Standardized Infant Mortality Rates for Births to Mothers Residing in Texas, USA 2005-2017, by County Change in Distance to Nearest Abortion Provider

The standardized IMR rates displayed in Figure 8 present a less clear picture of how the 2012-2014 abortion facility closures may be associated with standardized IMR trends. The results from the initial standardization and decomposition demonstrate that trends in standardized IMRs are relatively stable over the study period, albeit a dramatic increase in the standardized IMR for births to US-born NH black mothers between 2011 and 2012 and 2013 and 2014. In Figure 8, this increase appears to be concentrated among births to mothers living in counties that had no abortion facility in 2012. The county-disaggregated results also show that there is a 2012-2014 increase in standardized IMRs among births to US-born Hispanic and NH white women living in counties with no abortion facility, although these increases are relatively small compared to earlier fluctuations in the period, as well as among births to US-born Hispanic women in counties with an increase in distance of fewer than 100 miles. Furthermore, the previously identified 2015-2016 decrease in the standardized IMR for births to foreign-born Hispanic mothers appears to be driven by a sudden decrease in the standardized IMR for births to mothers living in counties that had at least one clinic remain open in 2014; these counties include the largest cities in Texas.

2.4 Discussion

Since 2010, US states have passed an unprecedented number of restrictive reproductive health care laws (Guttmacher Institute 2022) with detrimental impacts on pregnancy and maternal health outcomes (MacDorman et al. 2016; Stevenson and Potter 2015). Recent studies examining the health consequences of these laws focus on Texas and demonstrate that cuts to public family planning funding and TRAP laws are associated with family planning clinic closures (Grossman et al. 2017; White et al. 2015), changes in clinic service hours and prices (White et al. 2015), reductions in the use of contraceptives (Pogue 2017; White et al. 2015) and the number of abortions (Fischer et al. 2017; Grossman et al. 2014b, 2017), and increases in maternal mortality (Baeva et al. 2016; MacDorman et al. 2016). However, few studies consider how the consequences of these most recent laws may extend to shape birth and infant health outcomes. Given the Supreme Court's recent overturning of the *Roe v. Wade* decision (Nash and Ephross 2022) and the escalation of state-level restrictions on reproductive health care (Nash and Guarnieri 2023), understanding if and how infant health outcomes respond to the current wave of reproductive health care restrictions is timely and important.

This study fills this knowledge gap by examining changes in preterm birth and infant mortality rates across a period that includes the enactment of two significant reproductive health laws in Texas (2005-2017). The period encompasses an initial law in 2007 that expanded lower-income women's access to family planning services (White et al. 2015) and two restrictive laws that (1) reduced public funding for family planning clinics and services (2011) (White et al. 2015) and (2) implemented targeted restrictions of abortion providers (TRAP laws; 2013) (Grossman et al. 2014b). These laws most directly impacted lower SES and young birthing persons (Fuentes et al. 2016; Hopkins et al. 2015; White et al. 2015). They also threatened access to prenatal care services, which are commonly offered at family planning clinics (Zolna and Frost 2016). Given these changes, I examine the 2005-2017 trends in the rates of preterm birth and infant mortality and investigate how changes in the observed rates over time are explained by policy-related rate changes v. changes in the composition of births related to maternal age (teen births), maternal education (completion of high school), and adequate prenatal care use (receipt of prenatal care in the first trimester).

2.4.1 Trends in the Composition of Births Over the Study Period

Between 2005 and 2017, changes in the number of births to Texas women closely align with the implementation of new reproductive health care policies. At first, across all maternal racial-ethnic groups, births began decreasing after the 2007 creation of the state-funded Women's Health Program (WHP), which expanded Medicaid coverage of family planning services (Ramshaw and Tan 2012; White et al. 2015). However, births began increasing again after the 2011 cuts to family planning.

These trends suggest that population-level birth counts are broadly responsive to the expansion and contraction of family planning services. While the WHP-related expansion of family planning access in 2007 likely improved lower SES birthing persons' access to contraceptive and abortion services in ways that reduced births, the clinic closures and related increases in service prices following the 2011 funding cuts likely inhibited birthing persons' ability to access reproductive care in ways that increased the numbers of pregnancies and births (White et al. 2012, 2015). In fact, prior work finds a reduction in the use of contraceptives following the 2011 funding cuts (Pogue 2017; White et al. 2015). The TRAP laws included in HB2 may have also contributed to increasing births, as the plots in Figure 2 show steeper or new increases in births after 2013 for all maternal race-ethnicity-nativity groups. Similar to the funding cuts, these increases are likely driven by reduced access to abortion care and overall closures of facilities offering abortion services (Fischer et al. 2017; Grossman et al. 2014b).

Of course, the pattern demonstrating a dip in births between 2007 and 2012 may reflect fertility timing responses related to broader socioeconomic factors. For example, prior research demonstrates a national decline in birth rates starting in 2008, corresponding with the Great Recession and changes in fertility behaviors related to economic uncertainty (Livingston and Cohn 2010). However, a comparison with national trends (shown in Appendix A, Figure 14) shows that the sudden increase in the number of births in 2011 is unique to Texas. In fact, national trends show that the timing of the rebound in birth counts differs across maternal race, ethnicity, and nativity (foreign-born Hispanic, US-born Hispanic, foreign-born NH Black, and NH white). Given that the post-

2011 increases in births are specific to Texas, it is likely that these increases are at least partially related to the 2011 funding cuts.

However, the increases in births following the 2011 funding cuts and 2013 TRAP laws are not driven by disproportionate increases among lower SES and younger women as predicted. Instead, Figure 3 demonstrates that the proportion of births to mothers who are teenagers or who have not completed high school decreased over the entire study period. Furthermore, the trends are relatively linear, such that the decreasing proportions are not slowed down by the restrictive reproductive health care policies. This suggests that the overall increase in births between 2011 and about 2015 is driven by increases across maternal age and education status categories.

Several factors may explain this unexpected finding. First, while teen births are decreasing over the study period, comparisons to national birth rates suggest that, at the time, teen birth rates in Texas were decreasing at a much slower rate than the national average (MacLaggan 2014). Texas teen birth rates were also consistently among the highest in the country (MacLaggan 2014). These state comparisons suggest that Texas teens were already experiencing such high barriers to reproductive health care prior to the restrictive policies that the new barriers may have had little impact on the experiences of this group. However, the continued decrease in teen births is more likely attributed to effective state-wide initiatives that sought to reduce teen pregnancies. For example, the Texas Campaign to Prevent Teen Pregnancy was created in 2009 to collaborate with and provide evidence-based information to local communities to reduce teen pregnancy across the state (Wiley 2011). The Campaign had its first state-wide conference at the end of 2010 (Wiley 2011) and remains active today. Relatedly, between the 2007-8 and 2010-11 school years, the percentage of Texas districts providing information on contraceptives in their sexual education classes rose from 3.6 to 25.4 percent (MacLaggan 2014). This progress suggests that efforts to expand teens' access to comprehensive reproductive education and care around the time of the 2011 funding cuts likely counteracted the negative consequences of the cuts as well as the implementation of HB2 in 2013. This supports previous findings that comprehensive sex education is effective at reducing teen pregnancies and birth (Mark and Wu 2022). It also suggests that the effectiveness of such programs may mask the consequences of the 2011 and 2013 policies on teens in population-level data. Other forms of analysis, including qualitative studies, may be better suited to identify the unique burdens such policies place on Texas teens.

Maternal education is closely related to maternal age, which may partially explain the decreasing proportions of lower-educated mothers over the study period despite the hypothesis that the 2011 and 2013 policies would disproportionately impact this group. It is also possible that education status is not an effective proxy for identifying the lower SES birthing persons who were most affected by the policy changes, or that the policies did not disproportionately impact this group.

The utilization of prenatal care, however, does appear somewhat responsive to family planning-related policies. First, the proportions of births with adequate prenatal care stopped decreasing and ultimately began increasing shortly after 2007 when the WHP was created. This suggests a larger proportion of women may have accessed prenatal care earlier in their pregnancies because of the expanded reproductive care coverage offered by the WHP. However, the increases stagnated after 2011. This is likely due to increased barriers to receiving prenatal care across the state after the clinic closures, as many family planning clinics offer prenatal care services Frost 2016). However, like the increases in the number of births, this stagnating trend was short-lived. In fact, the proportions of births receiving adequate prenatal care began increasing again after 2013, suggesting that HB2 did not suppress access to prenatal care.

2.4.2 Standardization and Decomposition of the Observed Preterm Birth and Infant Mortality Rates

The standardization and decomposition analyses underscore four main findings. First, the changing compositions of births related to maternal age, maternal education, and adequate prenatal care only minimally contributed to changes in the observed rates of PTB and infant mortality over the study period. Instead, the trends in the observed rates are driven almost entirely by the rate effect, or the age-education-prenatal care standardized rates.

Second, the responsiveness of the rate effect to the policy changes differs across measures of infant health and maternal race, ethnicity, and nativity. Although there do not appear to be significant preterm birth consequences of the 2011 funding cuts—the standardized rates of PTB are relatively uninterrupted by funding cuts when examining trends from 2011-2013—the rate effects contributed to a substantial increase in IMR for births to NH Black mothers immediately following 2011. The PTB rates do, however, appear to respond to HB2 more broadly. There are small, single-year increases in the age-education-prenatal care standardized rates of PTB for all maternal race-ethnicity-nativity groups between 2013 and 2014, while IMR trends do not conclusively rise following 2013.

Ancillary analyses (available in Appendix A, Figures 12 and 13) demonstrate that the spike in infant mortality following the 2011 funding cuts for births to US-born NH Black mothers is accompanied by a spike in the neonatal mortality rate (deaths in the first 27 days of life), suggesting that the IMR increase is driven by deaths in the earliest days of life and not by policy-related challenges that emerge later after birth. Furthermore, there are also sharp increases in the rate of very preterm birth (born at 28 to <32 weeks of gestation) but not preterm birth for this group between 2011 and 2013. The findings that standardized rates of very preterm birth—a subset of preterm births—increased while standardized rates of preterm births remained stable suggest that the births already most at risk of being preterm were more likely to result in very preterm birth pregnancies. Because very preterm birth is closely tied to neonatal infant mortality (Barfield 2018), these ancillary findings imply that the rise in NH Black infant deaths is concentrated among those births that were already at risk of adverse outcomes before the policy change. It is possible that the within-subgroup increases in very PTB rates and IMRs for births to NH Black mothers are driven by pregnancy and maternal health complications that result in early spontaneous or medically induced births. This would align with previous work demonstrating that increases in Texas maternal mortality rates between 2006-2010 and 2011-2015 were particularly high among NH Black women, with NH Black maternal mortality rates increasing by more than twice as much as increases among

NH white and Hispanic women over the period (MacDorman, Declercq, and Thoma 2018).

Together, these findings underscore that reduced access to family planning clinics may create unique barriers to the appropriate provision of care for NH Black women. While the rates of adequate prenatal care—measured as care beginning in the first trimester—remained flat for this group immediately following the 2011 funding cuts, it is possible that the quality of care suffered for NH Black women given both the very PTB and infant mortality results.

The single-year increases in standardized PTB rates after HB2, however, are likely driven by broad changes in access to abortion care. Rather than limiting or changing the care that birthing persons receive during pregnancy, the biggest consequences of HB2 are related to obtaining abortions. As such, the small increases in PTB rates across all maternal race-ethnicity-nativity groups may signal increases within each age-education-prenatal subgroup in the proportion of unintended births, which are at higher risk of adverse birth outcomes (Nelson et al. 2022), or the proportion of births at higher risk of pregnancy complications that may have otherwise been terminated.

Notably, the standardized preterm birth and infant mortality rates for births to foreign-born Hispanic women largely do not respond to the policies or mirror the trends of other groups. For example, the PTB rate effect contributes to increases in the observed PTB rate between 2005 and 2011 while the standardized rates are decreasing among other groups. This likely reflects the unique lived experiences of Hispanic immigrant women who were likely less able to take advantage of the state-funded WHP due to nativity and citizenship status requirements (Hasstedt 2014; Hopkins et al. 2015). Then, in 2012, the standardized rates of preterm birth dropped, aligning with findings that related the implementation of the 2012 Deferred Action for Childhood Arrivals (DACA) to decreases in rates of adverse birth outcomes among Hispanic immigrant women (Hamilton, Langer, and Patler 2021). Similarly, the 2016 increases in the standardized PTB rates for foreign- and US-born Hispanic births align with prior research demonstrating that the 2016 Presidential election fostered a uniquely stressful environment that is associated with increased rates of PTB among Hispanic women across the US (Gemmill et al. 2019). The dramatic decrease in the standardized infant mortality rate for foreign-born Hispanic women in the same year may be an indication that some mothers and infants left the country for a less hostile environment within the infant's first year, such that fewer infant deaths occurred within the US and thus were not recorded in the US data (US-based deaths outside of Texas are included in the data).

Third, there is substantial heterogeneity in the rate effects across counties based on the increase in distance to the nearest abortion facility in 2014 compared to 2012. For example, increases in the age-education-prenatal care standardized PTB rates are concentrated in counties experiencing a 100+ mile distance increase. This adds support to previous findings that rate changes in reproductive- and birth-related outcomes are largest in counties experiencing the largest change in distance to the closest provider (Goyal et al. 2020; Grossman et al. 2017; Venator and Fletcher 2021). However, changes in the standardized IMRs do not align with the 2012-2014 distance changes. The largest increase in standardized IMRs occurs between 2011 and 2012, before the baseline distance to an abortion provider is measured. Among births to NH Black mothers, counties that did not have an abortion provider open in 2012 ("No change: no clinics") had the largest increase in the standardized IMR between 2011 and 2012, and the rates remained high for the remainder of the study period. It is possible that these counties experienced early clinic closures in 2011 or early 2012, such that the post-funding cut changes in distance are not measured in the 2012-2014 data, and that the risks of infant mortality remained high in these counties throughout the remainder of the period as clinics and abortion providers in the surrounding counties continued to close.

Fourth, except for NH Black IMRs after 2011, the birth and infant health changes following the 2011 and 2013 policies are short-lived. The changes in the trends of birth, prenatal care, and standardized PTB rates all last for one to four years. These patterns suggest that the adverse birth and infant health consequences of restrictive legislation may not be long-term. In Texas, the relatively quick returns to baseline trends may be attributable to public and political reactions to the policies, which eventually lead to a partial reversal of the harmful policies. Community and national activists and organizations have a history of fighting against restrictive and anti-abortion laws in Texas and seeking to fill the gap in services by connecting Texas women to necessary reproductive care (Hellmann 2017). These efforts were effective over the study period. After the public's focus on the negative effects of the funding cuts, the Texas legislature passed a 2014-2015 budget that included the state's largest-ever financial package for women's health services, doubling the allocation from the previous fiscal period (Aaronson 2013) so that some closed clinics were able to re-open (Hasstedt 2014). Texas also created the Expanded Primary Health Care Program to extend reproductive care services to women with incomes up to 200% (v. 185% for WHP) of the federal poverty line (Hopkins et al. 2015). Furthermore, in 2016, the Supreme Court struck down the HB2 TRAP laws that required abortion providers to have admitting privileges at a nearby hospital and abortion facilities to meet ambulatory surgical center standards (Center for Reproductive Rights 2018).

A standardization and decomposition analysis of national and regional (Oklahoma and Louisiana) trends, available in Appendix A, demonstrates that the post-2011 and -2013 rate effects are unique to Texas (Figures 15 and 16). Rather than following similar trends to those discussed above, the standardized rates of preterm birth and infant mortality are largely flat for the US overall, while the increases and decreases in the Louisiana and Oklahoma data better align with their own state-specific policies related to reproductive care. Together, these comparisons suggest that the Texas results presented here are unique to the state and not reflective of broader regional or national trends.

2.4.3 Policy and Public Health Implications

These findings have important policy and public health implications. First, they emphasize the link between reproductive health care policies and infant health outcomes. While this connection is established in studies examining *Roe*-era trends (Grossman and Jacobowitz 1981; Krieger et al. 2015), recent public attention often focuses on the abortion and maternal health consequences of such US policies. Additional attention should be spent on highlighting how restrictive policies shape infant health, which may provide an additional avenue for holding politicians accountable for implementing harmful reproductive health laws. Furthermore, community and activist efforts that seek to fill the gaps in care should consider expanding their efforts or partnering with other organizations to ensure that pregnant persons in restrictive states are receiving culturally appropriate and quality prenatal care in the early pregnancy and perinatal periods.

Second, studies examining the consequences of restrictive policies should stratify analyses by maternal race, ethnicity, and nativity. Although the standardized graphs demonstrate clear increases in the age-education-prenatal care standardized IMRs for births to NH Black mothers in 2012, this consequence of the 2011 funding cuts is masked in the graph of combined births (Figure 5, panel 1). Results also demonstrate unique trends in standardized rates by Hispanic ethnicity and nativity. Failing to examine the consequences separately by maternal race, ethnicity, and nativity may lead to inefficient or delayed public health interventions.

Third, while this study suggests that the 2011 funding cuts and HB2 are linked to short-term birth and infant health consequences, the changing political landscape suggests that the consequences of new restrictive policies may have a longer reach. The restrictive policies in this study were followed by a funding cut reversal in the next budget year and the Supreme Court overturning the 2013 TRAP laws by 2016, likely limiting any long-term effects. However, with the overturning of *Roe*, states now have the authority to restrict abortion access long-term (Lazzarini 2022), suggesting that the short-term birth, preterm birth, and infant mortality consequences presented in this study may persist over longer periods as new restrictions are enacted.

Fourth, and relatedly, the overturning of *Roe* has emboldened many Republicans in anti-abortion states to expand their fight to threaten access to other reproductive care services, such as contraceptives (Ollove 2022; Wang and Kitchener 2022), which may be particularly detrimental for infant health. The standardized trends presented here show sharp increases in the standardized IMR for NH Black births after the 2011 funding cuts, suggesting that restrictions on family planning services may have significant infant health consequences for racially minoritized groups. As such, expansive anti-abortion policies that target access to broader reproductive health care services may widen existing racial-ethnic inequities in infant health in states with restrictive reproductive health policy contexts.

2.4.4 Limitations and Future Work

While this study sheds light on how the current landscape of states' reproductive health policy contexts may shape birth and infant health outcomes, there are limitations. First, the study period ends in 2017 even though the Texas legislature enacted significant reproductive health-related policies in 2019 and 2021 and the Supreme Court overturned *Roe* in 2022. This is because cohort-level birth and infant death data are not yet available beyond the year 2017. As later data become available, future analysis should consider if and how the most recent reproductive laws shape birth and infant health outcomes differently, and potentially in longer-term ways, than those examined in this study. Second, low counts prevented the inclusion of births to foreign-born NH Black and to Asian, Indigenous, and other birthing persons of color in the analyses. However, these groups are also affected by restrictive reproductive health policies in unique ways (see example: Ortiz 2021). Future studies using alternative analyses (such as differences-in-differences models) may be better able to include and identify heterogeneity in effects across more inclusive maternal race and ethnicity categories.

Third, the operationalization of the low-income and county measures did not efficiently identify the most affected groups. Although education is often used as a proxy for lower income or SES more broadly, it does not perfectly predict maternal income or, for this study, WHP eligibility or use of clinic services. Future studies should consider using data that provide measures of income, health insurance type (public, private, or none), or receipt of WIC, which may better identify the birthing persons most directly impacted by state funding and other restrictive changes. Relatedly, the 2012-2014 changes in distance to the closest abortion facility are helpful for identifying if HB2, which specifically targeted abortion providers in the 2013 legislation, had heterogenous effects across geography. However, this measure is less informative when considering changes in trends related to the 2011 funding cuts. Given the significant consequences of the cuts for births to NH Black mothers, future studies should consider an additional county-level measure that identifies changes in distance to the closest family planning clinic, regardless of whether they provide abortion services.

Fourth, while this study focuses specifically on restrictive reproductive health care laws, it is important to emphasize that other social policy contexts likely interact to shape birth and infant health outcomes. This is evident by the 2012 (Hispanic, foreign-born) and 2016 (Hispanic, foreign- and US-born) PTB rate effects that may be connected to the enactment of DACA and the 2016 Presidential election. In addition to studies like this one focusing on single-issue policies, future studies should also consider how policies across a broad range of issues interact to uniquely shape birth and infant health outcomes.

2.5 Conclusion

In this study, I leverage two sets of restrictive reproductive health policies in Texas to assess the birth and infant health consequences of limiting access to family planning (2011) and abortion services (2013). I use birth cohort-linked birth/infant death restricted-use micro-data to identify changing patterns in preterm birth and infant mortality between 2005 and 2017 for births to foreign-born Hispanic, US-born Hispanic, US-born NH Black, and NH White women. This approach allows me to identify how the implementation of consecutive reproductive health care policies shapes birth and infant outcomes across time. Overall, I find a short-term increase in the number of births to Texas women (2011-2015) and that the previously increasing proportions of births with adequate prenatal care temporarily stalled (2011-2013) following the legislation. Somewhat unexpectedly, these changes are not concentrated among lower SES women or teens. Using standardization and decomposition techniques, I find that a sharp increase in infant mortality rates among births to NH Black women following the 2011 family planning funding cuts and that small, single-year increases in rates of preterm births among all groups after the 2013 TRAP laws are driven by rate effects, rather than changes in the composition of births or prenatal care use. These findings underscore the need to focus on understanding and addressing how the rapidly changing reproductive health climate in the US is shaping rates of adverse birth and infant health outcomes.

Importantly, results suggest that anti-abortion states' newfound focus on targeting access to broader reproductive health services, such as contraceptives, following the overturning of *Roe* may widen the already existing and significant birth and infant health inequities across maternal race and ethnicity.

3. US States and Disparities in Infant Health: How Underlying Policy Contexts Shape Birth Outcomes

Geographic disparities in adverse birth and infant health outcomes have increased over the last several decades despite widespread public health initiatives to reduce their incidence. While infant mortality rates have decreased relatively steadily across the US since the early 1900s, relative differences in state-level rates have widened over time (Singh and Yu 2019). Recently, increasing rates of low birth weight (<2,500 grams) have concentrated in the US South, where rates of adverse outcomes were already highest (Martin 2018; Martin et al. 2019). These trends are particularly concerning since birth outcomes are important predictors of socioeconomic status and health across the life course (Black et al. 2007; Torche 2018), and thus mechanisms through which health (dis)advantages are passed across generations (Aizer and Currie 2014; Goosby and Heidbrink 2013; Kane 2015).

Burgeoning sociological research finds that state-level policies and socioeconomic conditions help explain similar geographic disparities in health (Montez, Hayward, and Wolf 2017; Schut and Boen 2022; Siddiqi et al. 2016) and diverging patterns over time (Fenelon 2013). These studies argue that state political institutions and socioeconomic structures contribute to geographic health disparities by creating policies that redistribute health-relevant resources and provide health services within a state (Bergqvist, Yngwe, and Lundberg 2013; Montez et al. 2017; Navarro and Shi 2001). Because these policies and conditions are powerful predictors of women's health (Montez et al. 2019, 2017; Montez, Zajacova, and Hayward 2016), they likely play an important role in determining birth and infant health outcomes such as risks of low birth weight and infant mortality, which are intrinsically tied to maternal health.

Individual policies and social conditions, however, do not combine randomly (Bergqvist et al. 2013). Instead, there are overarching social and policy contexts that differ in how they shape and address social inequalities and overall well-being. At the US state level, studies find that bi-dimensional measures of liberalness (Montez et al. 2022; Riley et al. 2021) and welfare generosity (Fenelon and Witko 2021) are related to health, such that states with more generous or liberal policies tend to have lower rates of adult and infant mortality. The World Health Organization offers a multi-pronged framework for investigating the structural determinants of health and related inequities and recommends examining and addressing these determinants in tandem (Solar and Irwin 2010). This suggests that there may be additional dimensions of US state policies and socioeconomic conditions, beyond liberalness or generosity, that uniquely combine and relate to health.

In this study, I extend work examining geographic disparities in health by leveraging the WHO framework to consider how distinct, multidimensional profiles of state-level policy contexts relate to risks of adverse birth outcomes. First, using latent profile analysis and state-level data, I identify profiles of state policy contexts that are defined by unique combinations of socioeconomic and political conditions. Second, I merge the estimated profiles of each state's policy context with individual-level birth and infant death certificate data to examine the relationship between the latent state profiles and risks of low birth weight (LBW) and infant mortality. I also investigate if maternal race and ethnicity modify the relationship between state profiles and LBW and infant mortality, as previous work finds that structural and interpersonal forms of racial-ethnic discrimination may limit the protective effects of certain policies (Clouser, McCann, and Jardina 2022). In doing so, this study demonstrates how unique combinations of state policies and socioeconomic conditions (profiles of policy contexts) contribute to geographic and racial-ethnic disparities in birth outcomes.

3.1 State Policies and Health Outcomes

3.1.1 State Policies, Structural Factors, and Health

Burgeoning sociological research demonstrates US states' growing power to implement policies that redistribute health-relevant resources and provide health services (Montez 2017, 2020). Since the 1980s, state policies and health outcomes have diverged alongside the introduction of industry deregulation (changing the standards and provision of resources and services across states), devolution (empowering states to decide which programs and policies to fund and how to implement them), and state-level preemptive laws (taking the power away from local governments to set laws and bans differing from the state) (Montez 2017). These changes in states' power, along with increases in political polarization, have occurred alongside comparatively small gains (and, more recently, small declines) and increasing disparities in life expectancy across the US (Montez 2020). State-level policies and other factors help explain geographic health patterns like these across the US (Montez et al. 2019, 2017; Siddiqi et al. 2016), as well as divergence over time (Fenelon and Witko 2021).

3.1.1.1 State Policies, Women's Health, and Birth Outcomes

State-level social and policy contexts may be particularly relevant for shaping birth outcomes, as the relationships between state characteristics and health tend to be strongest for women, whose health is intrinsically tied to their offspring's in-utero health. Prior work finds that multiple domains of state policies and socioeconomic characteristics independently explain variation in women's disability status and mortality across states (Montez et al. 2019, 2017; Montez, Zajacova, and Hayward 2016), while increases in minimum wage are associated with reduced depressive symptoms among women, but not men (Horn, Maclean, and Strain 2017). These studies posit that state-level policies, such as Medicaid generosity, abortion regulations, health care services, and affordable housing, are particularly important for women's health as women are more likely than men to be economically disadvantaged, raising children, and interacting with the healthcare system (Montez et al. 2017, 2016). Although not all birthing persons identify as women, the health of all birthing persons is likely similarly sensitive to states' social and policy contexts due to their minoritized gender status.

As women and birthing persons interact within a social structure and with state institutions throughout their reproductive years, and particularly during pregnancy, it is likely that those same social and policy contexts shape infant health. For example, states' introduction of an Earned Income Tax Credit is associated with increases in offspring's gestational age at birth and decreases in risk of low birth weight, with the greatest improvements among states with the most generous EITC laws (Komro et al. 2019). In contrast, the introduction of binding time limits for TANF recipients has led to increases in infant mortality (Leonard and Mas 2008). Together, these findings suggest the potential (dis)advantages of redistributive policies for infant health. Social conditions that are related to redistributive policies, then, likely also shape birth outcomes. For example, births in states with higher unemployment rates during the first trimester of pregnancy (Margerison-Zilko, Li, and Luo 2017) or with increasing state-level income inequality (Pabayo et al. 2019) are at higher risk of adverse birth outcomes, including offspring's gestational age at birth and infant and neonatal mortality. Furthermore, infant mortality rates are lower in states and years with higher percentages of women in the state legislatures, a measure of state gender inequality (Homan 2017).

These state contexts, compared to more localized contexts, have become particularly relevant for shaping birth outcomes following the regionalization of prenatal care across US states. In the 1960s and 1970s, the structure of perinatal care changed, such that health institutions and transportation between them became organized to easily connect pregnant mothers and their infants to the most appropriate care (Goldenberg and Culhane 2007). This means that pregnant birthing persons, and especially those at the highest risk of experiencing adverse pregnancy or birth outcomes, are now more likely to receive prenatal care or give birth outside of their residential community or nearest hospital, making the state-level social and policy contexts an important indicator of care. In fact, differences in medical system institutions across states are associated with heterogeneity in disparities in birth outcomes by mothers' educational attainment (Sosnaud 2019). States with more widespread neonatal intensive care availability tend to have smaller inequality in infant mortality between mothers with lower and higher levels of educational attainment, while states with a greater supply of primary care tend to have larger differences in infant mortality.

3.1.1.2 Policy Contexts and Health

While individual state-level policies and factors are undeniably important for shaping health, they do not combine randomly. Instead, underlying social and policy contexts shape the macro-level factors that are associated with disparate health outcomes across states. In cross-country comparisons, studies often acknowledge the co-occurrence of policies by identifying the policy approaches that underly national governments (such as classifying distinct types of welfare regimes or political traditions) (Bergqvist et al. 2013; Navarro and Shi 2001) or by estimating general policy contexts (such as welfare generosity) (Beckfield and Bambra 2016) to examine their unique health and well-being consequences, rather than focusing on individual policies or factors. Within the US context, research emphasizes the importance of considering how state policies cluster together in ways that multiplicatively impact health (Montez et al. 2019) or how multiple domains of contextual factors independently relate to health outcomes (Montez et al. 2016).

In the US, previous work suggests that policy contexts may be defined by partisanship or political structure and have health consequences. For example, infant mortality rates are lower when national political structures are led by Democratic presidents (compared to Republican) (Rodriguez, Bound, and Geronimus 2014; Torche and Rauf 2021) and when state lawmakers include more women (Homan 2017). Recent research also finds that the partisan policy orientation of states plays an important role in shaping birth outcomes and life expectancy across states. Those states characterized by more liberal policies tend to have lower rates of infant mortality (Riley et al. 2021) and higher life expectancies (Montez et al. 2020), and more generous welfare states have, on average, greater reductions in mortality over time (Fenelon and Witko 2021). These studies importantly demonstrate the need to consider broader policy contexts, in addition to singular policies and factors, when examining the relationships between state-level contexts and population health. While current research largely focuses on bi-dimensional measures of policy contexts (e.g., the liberalness or generosity of policies, or having more or fewer women in state legislatures), considering multi-dimensional measures of policy contexts may deepen our understanding of how policies shape health and help identify other aspects of policies that are important in shaping birth and health outcomes.

The World Health Organization's (WHO) Commission on the Social Determinants of Health (CSDH) offers a framework for examining the relationship between multi-dimensional measures of geographically-bound social and policy contexts and various health outcomes (Solar and Irwin 2010). The CSDH presents a three-layered system that contributes to health inequities in society, defining both structural and intermediary determinants of health (Solar and Irwin 2010). Most relevant for this study, the top layer encompasses social and policy contexts. These contexts cannot be measured at the individual level and encompass a powerful set of "structural, cultural and functional aspects" that shape systems of social stratification and ultimately individuals' health (Solar and Irwin 2010:25). They include governance, macroeconomic policies, social policies, other relevant public policies, and culture and societal values. The middle layer is composed of systems of social stratification, such as socioeconomic status, gender, and race and ethnicity, and the bottom layer contains proximal factors, such as health behaviors, biological factors, and physical environment. While the middle and bottom layers are not the focus of this study, the multi-level system proposed by the WHO CSDH is a useful tool for examining how the three levels contribute to inequality either separately or together.

The WHO CSDH is intentionally broad, with the recognition that the appropriate categories and the factors used to measure those categories will differ across geographic areas. A recent study examining the relationship between individual US state-level contextual factors and health finds that the main CSDH domains of social and policy contexts account for 61-65% of the state-level variation in disability among older adults (Montez et al. 2017). The flexibility of the WHO's structural determinants of health inequities framework as well as the precedent of using the framework to study health across US states make it an ideal framework for examining the relationship between distinct profiles of state social and policy contexts and birth outcomes.

3.1.2 Heterogeneity in the Relationships Between State Policy Contexts and Health

While certain social and policy contexts may be associated with lower risks of adverse birth or health outcomes, their protective effects may be muted for racially and ethnically minoritized groups by interpersonal and structural forms of discrimination. In the US, the link between racial-ethnic discrimination and health is well-established (Goosby, Cheadle, and Mitchell 2018; Phelan and Link 2015; Williams and Mohammed

2009). Individuals who are deemed lower status in the US racial hierarchy experience heightened exposure to discrimination, which is a chronic stressor that both increases the risk of adverse health outcomes (Thoits 2010; Williams and Mohammed 2009) and constrains access to protective health resources (Colen 2011) in ways that may reduce the protective effects of certain state social and policy contexts. Social institutions then reinforce these inequities by systematically treating individuals differently based on social status (Freese and Lutfey 2011) and creating structural barriers, such as residential racial segregation, that further constrain resource availability and dictate opportunities, experiences, and stressors (Williams and Collins 2001). Such structural barriers are thought to contribute to the muted impact of socioeconomic status (Farmer and Ferraro 2005) and upward mobility (Colen et al. 2006, 2018) on individual health and birth outcomes for Black Americans compared to white Americans. Similar barriers may dampen the effects of protective state social and policy contexts.

At the same time, some policies have successfully reduced racial-ethnic disparities in health and related outcomes, suggesting that certain social and policy contexts may do the same. For example, recent research finds that states' decision to expand Medicaid under the Affordable Care Act was associated with decreased racial-ethnic inequities related to birth outcomes. Compared to non-expanding states, Black-white disparities in preterm birth, very preterm birth, low birth weight, and very low birth weight decreased in expanding states in the years following (Brown et al. 2019). This study demonstrates the potential for other policies and related policy contexts to exacerbate or mitigate racial-ethnic health inequities and underscores the need to consider heterogeneity in the effects of state policy contexts moving forward.

3.1.3 Current Study

Growing research demonstrates the importance of state-level policies and related factors in shaping diverging risks of adverse health outcomes across the US, while cross-country studies of the structural determinants of health often emphasize that macro-level socioeconomic and political conditions and the social and policy contexts that drive them do not combine randomly. I apply this idea to US state-level research, using the WHO CSDH's structural determinants of health inequities framework to identify profiles of state social and policy contexts and their association with birth outcomes. First, I use state-level data and latent profile analysis to identify distinct profiles of US states' social and policy contexts. Second, I merge the estimated state profiles to individual birth and infant death certificate data to examine the extent to which the latent profiles of policy contexts explain variation in risks of low birth weight and infant mortality. In doing so, I also consider how maternal race and ethnicity (non-Hispanic white, non-Hispanic Black, and Hispanic) moderates the relationship between state profiles and risks of adverse birth outcomes to better understand if certain state policy contexts are associated with larger or smaller racial and ethnic inequities in birth outcomes. The findings demonstrate that profiles of state policy contexts defined by high levels of intervention or high levels of constituent engagement have protective effects that vary by maternal race and ethnicity, underscoring the importance of considering both how state policies and related conditions *combine* to shape health and how structural and interpersonal forms of discrimination modify the benefits of certain state policy contexts among racially minoritized groups.

3.2 Data and Methods

3.2.1 Data and Measures

This study draws on two types of data: (1) state-level data on socioeconomic and political conditions to estimate the profiles of state social and policy contexts, and (2) individual-level data on maternal, pregnancy, birth, and infant death characteristics.

3.2.1.1 Data and Measures: State-level Socioeconomic and Political Conditions

I use the WHO's structural determinants of health framework (Solar and Irwin 2010) to assess the number and profiles of social and policy contexts that exist among US states. The WHO suggests that social and policy contexts are defined by six components of socioeconomic and political conditions: (1) governance; (2) macroeconomic policy; (3) social policies; (4) public policy; (5) cultural and societal values; and (6) epidemiological conditions (Solar and Irwin 2010). In line with past research relying on the same WHO framework (Montez et al. 2017), I exclude epidemiological conditions from the state-level analysis and compile data on the remaining five categories, as well as a measure of social cohesion, for the year 2018 as described below.

Governance is defined broadly as a system that shapes how individuals, governments, and the private sector interact to make decisions about policies and how they are implemented (Solar and Irwin 2010). I measure governance using voter turnout (percentage of eligible voters) in the 2018 November elections, which is available from the Election Project and indicates civic engagement and political accountability. Other measures of governance, such as voter disenfranchisement, were tested but excluded from analyses after considering model fit indices.

Macroeconomic policy is measured as GDP per capita in current dollars, a common measure used to assess macroeconomic prosperity, and available from the US Bureau of Economic Analysis (USBEA 2019).

Social policy is defined by the WHO as social welfare and income redistribution (Solar and Irwin 2010). For an indicator of social policy, I use the average monthly Temporary Assistance for Needy Families (TANF) caseloads in 2018, as a percentage of the total population. TANF is one of the largest anti-poverty programs and is uniquely suited for this study as it is aimed at helping families with children, which is important when considering birth outcomes. Data on average monthly caseloads are available through the Urban Institute (Urban Institute 2019) and proportions are calculated using 2018 Census estimates of the state populations.

Public policy reflects other relevant areas of policy, such as education and public health. Similar to Montez et al. (2017), I measure public policy using the sales tax on cigarettes, an important health policy that varies widely across states and is available from the CDC (CDC 2020c). Tobacco taxes are associated with broader state-level policies and attitudes (Golden, Ribisl, and Perreira 2014) and population health (Goodchild, Perucic, and Nargis 2016; Moore 1996), making it an appropriate indicator of state-level public health policy. Furthermore, cigarette smoking is related to birth outcomes (Dietz et al. 2010; Wehby et al. 2011), making the indicator particularly important for this study.

The WHO structural determinants of health inequities framework defines cultural and societal values as society's prioritization of health, including the collective and redistributive responsibilities they are willing to take to improve health through the provision of health services and health-relevant resources (Solar and Irwin 2010). For this study, I specifically consider these values as they relate to the health of women and birthing persons, and the agency and rights that women and birthing persons are afforded to access wide-ranging reproductive health and related care services. I use an index of the protectiveness of reproductive rights (ranging from 0 to 1), which is a composite score measuring states' pro-choice governor and legislature, percent of women living in counties with abortion providers, parental consent/notification required for abortions, waiting period required for abortions, public funding of abortions, and same-sex marriage or second-parent adoptions. These data are available through the Institute for Women's Policy Research, and the composite measure yields acceptable internal consistency (Cronbach's alpha = 0.842). A measure of state-level Medicaid generosity, available from the Public Health Citizen Research Group. (Wolfe 2007), was also tested as an indicator of cultural and societal values but excluded from final analyses due to model fit and substantive considerations.

The WHO framework also highlights the need to consider social capital/social cohesion, which they consider a cross-cutting determinant of health inequities (i.e., existing at both the structural and intermediate levels of determinants). There are several methods for defining and measuring social capital, including the communitarian, network, and resource distribution approaches (Solar and Irwin 2010). For this study, I measure social capital using the resource distribution approach, as it is most aligned with policy and the ability to promote structural change. As such, and in line with previous work (Montez et al. 2017), I measure social capital using the 5-year (2014-2018) averaged state Gini coefficient, a measure of income inequality. Results are substantively similar when using a 1-year (2018) measure of the Gini coefficient. The Gini coefficient can range from 0-1, and US state Gini coefficients in 2018 ranged from 0.4237 (Alaska) to 0.5137 (New York). Supplemental analyses tested the inclusion of state-wide measures of a social capital index and subindices developed by the US Congress Joint Economic Committee's Social Capital Project. While results are similar to those presented here, goodness of fit indices suggest the inclusion of the Gini coefficient rather than other social capital measures.

Although the measures of expenditures or caseloads outlined above could represent need rather than underlying social and policy contexts, previous work assuages these concerns by finding that these types of measures are more so indicative of the redistribution of resources rather than the magnitude of need (Dahl and van der Wel 2013).

I also include two additional measures at the state level to assist in describing the estimated state policy contexts. First, an indicator of whether the state's Governor was a Democrat (=1) or Republican (=0) in 2018 is included in the descriptive statistics of the latent profiles and in the individual-level analyses relating policy contexts to birth outcomes to better understand how state policy contexts align with political parties and if the profiles shape birth outcomes independent of state partisanship. Second, the state-level social capital index created by the U.S. Congress Joint Economic Committee's Social Capital Project is included in the descriptive statistics to facilitate the discussion of how identified policy contexts are unique (U.S. Congress, Joint Economic Committee, Social Capital Project 2018). The social capital index is a composite score measuring multiple dimensions of social capital, including family unity, family interaction, social support, community health, institutional health, collective efficacy, and philanthropic health. Higher scores on this measure indicate higher, or 'more', social capital.

3.2.1.2 Data and Measures: Maternal and Pregnancy Characteristics and Birth Outcomes

Information on maternal, pregnancy, birth, and infant death characteristics comes from the 2018 birth cohort-linked birth/infant death restricted-use micro-data from the National Center for Health Statistics. These birth certificate data include information on all infants born in the US in 2018 and the associated death records for those who died in the US within their first year of life (these deaths could have occurred in 2018 or 2019). All but 0.6 percent of infant death records are linked to their corresponding birth certificates for infants born in 2018. In 2018, there were 3,804,178 total births reported in the US, of which 3,790,704 occurred within one of the 50 US states and are included in the analytic sample. I limit the analytic sample to births to mothers identifying as non-Hispanic (NH) white, non-Hispanic (NH) Black, or Hispanic (N=3,393,831). I exclude all other births (<10%) due to the low numbers of mothers identifying with other distinct races or ethnicities (including those identifying as multiracial) across US states and the inappropriate erasure of the unique histories and experiences of those distinct race-ethnicity groups when including collapsed racial-ethnic categories (e.g., "Other") in analyses (Martinez et al. 2021). There is no missingness on the outcome variables[1], and missingness is low for maternal, pregnancy, and birth covariates (<4%). Using listwise deletion[2], the final analytic sample of births includes 3,281,243 births.

The key dependent measures of infant health include low birth weight (LBW) and infant mortality. LBW measures whether an infant was born less than 2,500 grams (5.5 pounds) (=1), while infant mortality measures whether an infant died within their first year of life (=1). In 2018, 8.7 percent of all US births were LBW (Hamilton et al. 2019) and the US infant mortality rate was 5.7 deaths per 1,000 live births (CDC 2020a). These two outcomes are important and distinct measures of infant and population health, with LBW serving as both an indicator of infant health at birth and a predictor of later-life health, developmental, and socioeconomic outcomes (Black et al. 2007; Torche 2018) and infant mortality serving as a marker of infant well-being and overall population health (Reidpath and Allotey 2003). While LBW is an important predictor of infant mortality, over one-third of infant deaths in our sample were not born LBW, demonstrating the importance of examining both LBW and infant mortality.

Maternal race-ethnicity is included in the analysis as a social construct and is measured categorically as mother-identified NH white, NH Black, or Hispanic. The measure serves as a marker of mothers' lived experiences, which are shaped by social

---

[1] Birth weight is imputed on birth certificates for 0.10% of all births and 5.25% of births associated with infant deaths. Excluding births with imputed birth weights from the analyses predicting low birth weight yields similar results to those presented in this paper.
[2] Analyses are robust to using multiple imputation by chained equations. In the final models, listwise deletion is used for ease of analysis given the large sample size.

divisions, discrimination, and unequal access to social privileges and resources, as well as often shared histories, cultural heritage, and/or ancestry (American Sociological Association 2003; Krieger 2001; Martinez et al. 2021). Because racial hierarchies are maintained by systems of oppression that serve to benefit one group, I use NH white as the reference group to assess if the strength or direction of associations between state policy contexts and birth outcomes differ for minoritized racial-ethnic groups in the US.

The analyses also include several birth-level covariates. First, maternal characteristics for each birth include continuous variables of maternal age and age squared, as age typically has a quadratic association with birth outcomes such that risks of adverse birth outcomes are highest at the youngest and oldest maternal ages. Binary variables measuring maternal education (at least some college=1) and nativity (foreign-born=1) are also included in the models, as both are associated with birth outcomes and may be related to policy contexts. Although marital status is also often included in similar analyses as a predictor of adverse birth outcomes, I do not include this measure in the study because of statutory restrictions that prevent the release of record-level data on marital status for births occurring in California after 2017 (see NCHS user guide). Analyses that include marital status using listwise deletion (i.e., dropping all California births) and multiple imputation (i.e., imputing marital status for California births) demonstrate substantively similar results as those presented in this paper.

Covariates related to pregnancy and birth characteristics include prenatal care received within the first trimester (=1), which is associated with decreased risk of adverse birth outcomes, an ordinal measure of live birth order, and an indicator of infant sex (male=1), which is associated with increased risk of adverse birth outcomes. In addition to their relationship with birth outcomes, these measures may also be shaped by a state's social and policy contexts, making them important potential confounders to include in the models.

3.2.2 Methods

I use latent profile analysis (LPA) to assess the number and types, or "profiles", of state policy contexts that exist in the US. Latent profile models assume that there are subgroups of observations that have distinct patterns or similarities on a set of observed continuous variables (Collins and Lanza 2009). For this study, the observations are the US states and the observed variables are the measures of socioeconomic and political conditions. The aim of the LPA, then, is to identify meaningful subgroups, or latent profiles, of state policy contexts that are not pre-determined by the researcher and that reflect similarities on the set of socioeconomic and political conditions described above.

To do this, I first estimate a sequence of LPA models with increasing numbers of latent profiles in each successive model. I then assess the optimal number of state profiles by comparing goodness-of-fit statistics, including the Bayesian Information Criteria (BIC) and the Akaike Information Criteria (AIC) (Berlin, Williams, and Parra 2014; Lynch and Taylor 2016), as well as entropy, size of the smallest profile, and substantive considerations (Berlin et al. 2014). After identifying the final model, I use the within-profile means and variances of the socioeconomic and political conditions to create meaningful labels for each state policy context. Each state is then assigned an estimated policy context profile based on the profile for which they have the highest posterior probability of belonging (Lynch and Taylor 2016).

Once I identify the optimal number of profiles and assign each state to its most probable policy context, I merge the state profile data to record-level birth certificate data based on the state of birth to assess the relationship between latent profiles of state policy contexts and birth outcomes. First, I estimate logit models to assess the baseline relationship between the latent profiles and LBW and infant mortality, independent of maternal race and ethnicity and all other covariates. I then consider the moderating effect of maternal race and ethnicity on the relationship between the state policy contexts and LBW and infant mortality by interacting the latent profiles with the measure of maternal race-ethnicity. These interactive effects identify if the relationships between state policy contexts and birth outcomes are heterogeneous across maternal race and ethnicity and, if so, which contexts are associated with smaller or larger racial and ethnic inequities in low birth weight and infant mortality.

Because the birth data contain information on the entire population of births to NH white, NH Black, and Hispanic women in the United States in 2018, the presentation and discussion of results do not focus on the statistical significance but rather the substantive significance. While statistical significance helps identify if we can make inferences about a population based on results estimated using a sample, these analyses include the full population of births. Furthermore, because of the large number of births, almost all coefficients are significant at a $p=0.000$ level. However, larger p-values (>0.01) are noted in the Results and Discussion sections as appropriate.

All state-level measures of socioeconomic and political contexts were cleaned and compiled in Stata 16.1 and LPA analyses were conducted in MPlus 8. Visual presentations of the state profiles were created using ArcMap 10.7. Due to the sensitivity of the record-level birth certificate data, all analyses that included the birth data were conducted on a secure virtual machine (VM) in Duke's Protected Research Data Network (PRDN) using Stata 17.0. The use of restricted data and the analyses were approved by Duke University's Institutional Review Board.

3.3 Results

3.3.1 Latent Profile Analysis of State Policy Contexts

Goodness of fit indices suggest that the three-profile LPA model best fits the data, suggesting that there are three distinct latent profiles of state policy and social contexts (Appendix B, Table 9). Compared to two- and four-profile models, the three profile-model has the lowest BIC and the highest entropy, which measures separation between the identified profiles. The entropy of the three-profile model is 0.932, well above the acceptable value of 0.8 (Weller, Bowen, and Faubert 2020).

The means and variances of the six measures of socioeconomic and political conditions are provided in Table 1 for each latent profile. The three identified profiles represent social and policy contexts that I label and define as: (1) Low Intervention by state institutions and broader society in terms of redistributing resources and prioritizing both health and the protection of health care rights; (2) High Intervention by state institutions and society in terms of redistributing resources and prioritizing both health and the protection of health care rights; and, (3) High Constituent Engagement, which is marked by relatively high voter turnout (about 7 percentage points, or 15 percent, higher than the other two groups) alongside moderate levels of the redistribution of resources and the prioritization of health and health care protections. Most states are estimated to have policy contexts that fall within the Low Intervention (N=26) or High Constituent Engagement (N=18) profiles, while only six states are estimated to have High Intervention profiles. The high and low intervention profiles are most similar to pre-existing notions of US state policies defined by liberalness or welfare generosity (Fenelon and Witko 2021; Montez 2020; Montez et al. 2022). These profiles tend to follow partisan lines, with only 12 percent of Low Intervention states having a Democratic Governor in 2018 compared to 83 percent of High Intervention states. The High Constituent Engagement (HCE) profile does not fall within partisan lines (about 44 percent of states with an HCE context had a Democratic Governor in 2018) and instead suggests an additional dimension of social and policy contexts related to constituent or community engagement. This dimension is further supported by the across-profile means of the social capital index, which demonstrate that, on average, states with a High Constituent Engagement policy orientation have more social capital (=0.04) than the Low and High Intervention states (both =-0.02).

Table 1: Descriptive Statistics by Latent Profile of State Policy Context

	Profile 1 – Low Intervention		Profile 2 – High Intervention		Profile 3 – High Constituent Engagement	
Variable	Mean	SE	Mean	SE	Mean	SE
State socioeconomic and political indicators						
Voter turnout (proportion of eligible voters)	0.49	0.01	0.49	0.03	0.56	0.01
GDP per capita (in 1000s $)	49.02	1.65	65.62	3.61	55.72	2.22
TANF caseloads (per 1,000 residents)	3.74	0.41	10.17	2.00	7.14	0.63
Cigarette tax ($)	0.96	0.11	3.72	0.29	2.11	0.20
Gini coefficient (0-1)	0.47	0.00	0.48	0.01	0.46	0.00
Reproductive health rights (composite score; 0-1)	0.20	0.03	0.82	0.08	0.62	0.06
Average posterior probability of profile membership	0.99		1.00		0.99	
Political party of the Governor (Democrat=1; %)[a]	11.5		83.3		44.4	
Social Capital Index (state range: -0.22, 0.21)	-0.02	0.02	-0.02	0.03	0.04	0.02
N (states)	*26*		*6*		*18*	
Variable	Mean or %	SD	Mean or %	SD	Mean or %	SD
Maternal, pregnancy, and birth characteristics						
Maternal Race-Ethnicity (%)						
NH white	58.6		45.8		66.2	
NH Black	19.0		10.2		13.1	

Hispanic	22.4		44.0		20.7	
Birth Outcomes						
Low birth weight (%)	8.6		7.1		7.6	
Infant mortality (per 1,000 live births; 2018 cohort)	5.8		3.9		4.8	
Other maternal & pregnancy characteristics						
Maternal age (years)	28.2	5.7	29.9	5.9	29.4	5.7
Maternal nativity (foreign-born; %)	15.4		28.3		16.6	
Maternal education (some college; %)	58.4		61.3		64.7	
Prenatal care in the first trimester (%)	74.7		83.6		78.9	
Live birth order	2.2	1.3	2.1	1.3	2.2	1.3
Infant sex (female=1)	48.9		49.1		48.9	
N (births)	*1,850,539*		*643,100*		*787,604*	

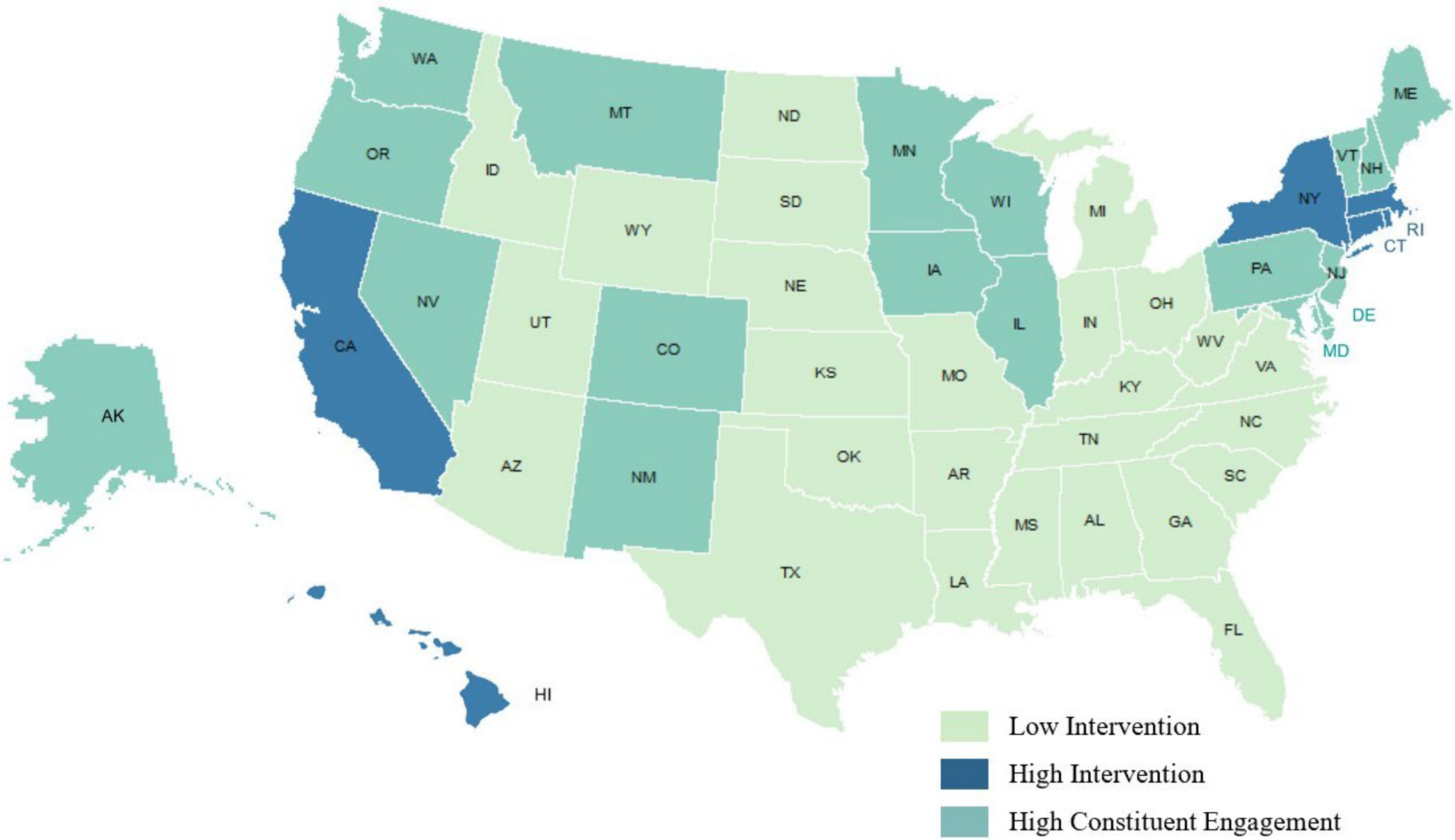

Figure 9: Geographic Distribution of Profiles of State Policy Contexts, US States 2018

Figure 9 presents the geographic distribution of these policy contexts across the US. States with High Intervention or High Constituent Engagement policy contexts are concentrated in the Northeast and West, with a few additional High Constituent Engagement states in the Midwest. Information on each state's socioeconomic and political measures, posterior probabilities of profile membership, and estimated profile are included in Appendix B (Table 10).

Table 1 also includes descriptive statistics on maternal, pregnancy, and birth characteristics across the three profiles of state policy contexts, with some notable differences across state profiles. Low Intervention states have the highest proportion of births to NH Black mothers and the lowest rate of mothers having at least some college education. High Intervention states have the highest proportions of births to Hispanic mothers, mothers born outside of the US, and mothers receiving prenatal care within the first trimester of pregnancy. High Constituent Engagement states have the highest proportions of births to NH white mothers and mothers having at least some college education. In terms of birth outcomes, Low Intervention states have the highest rates of both LBW (8.6% of all births) and infant mortality (5.8 infant deaths per 1,000 live births), while High Intervention states have the lowest rates of each (LBW=7.1%; IM=3.9 per 1,000).

3.3.2 Latent Profiles of State Policy Contexts and Birth Outcomes

Table 2 presents results from the logit models predicting risks of LBW (Models 1 and 2) and infant mortality (Models 3 and 4). The coefficients represent the log odds of LBW or infant mortality relative to the log odds for the associated reference group;

coefficients <0 represent, on average, lower risks of LBW or infant mortality and coefficients >0 represent, on average, higher risks of the adverse birth outcomes. Models 1 and 3 provide the baseline estimates of the relationship between the latent state policy contexts and LBW and infant mortality, respectively, independent of maternal race and ethnicity and all other covariates. Results from Models 1 and 3 suggest that, compared to being born in a state with a Low Intervention latent policy profile, the log odds of LBW and infant mortality are <0 for infants born in High Intervention and High Constituent Engagement states, suggesting that these state profiles are protective of adverse birth outcomes compared to states with Low Intervention profiles. Results also suggest that infants born to mothers who identify as NH Black or Hispanic are, on average, more likely to be born LBW or die within the first year of life compared to infants born to NH white mothers. However, the magnitude of this relationship is small for Hispanic births and the p-value of the coefficient is >0.05, suggesting there may not be a significant H-NHW disparity in risk, holding all else equal.

Table 2: Logit Models Predicting Low Birth Weight and Infant Mortality: State Policy Contexts, Maternal Race-Ethnicity, and Their Interaction

	Low Birth Weight				Infant Mortality			
	Model 1		Model 2		Model 3		Model 4	
Variable	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.
State Policy Context								
Low Intervention (LI)	Ref.		Ref.		Ref.		Ref.	
High Intervention (HI)	-0.13	0.01	-0.16	0.01	-0.21	0.03	-0.34	0.04
High Constituent Engagement (HCE)	-0.07	0.01	-0.09	0.01	-0.08	0.02	-0.14	0.03
Maternal Race/Ethnicity								
NH white	Ref.		Ref.		Ref.		Ref.	
NH Black	0.76	0.01	0.76	0.01	0.70	0.02	0.66	0.02
Hispanic	0.14	0.01	0.09	0.01	0.04	0.02	-0.04	0.03
Context x Race/Ethnicity								
HI x NH Black			0.01	0.02			0.18	0.06
HI x Hispanic			0.11	0.01			0.26	0.05
HCE x NH Black			-0.03	0.01			0.09	0.04
HCE x Hispanic			0.13	0.01			0.14	0.05
Covariates								
Maternal characteristics								
Age (years)	-0.09	0.00	-0.09	0.00	-0.12	0.01	-0.12	0.01
Age squared (years)	0.002	0.00	0.002	0.00	0.002	0.00	0.002	0.00

Some college (=1)	-0.27	0.00	-0.27	0.00	-0.38	0.02	-0.37	0.02
Nativity (foreign-born=1)	-0.31	0.01	-0.31	0.01	-0.33	0.02	-0.33	0.02
Pregnancy & birth characteristics								
Prenatal care (first trimester=1)	-0.09	0.00	-0.09	0.00	-0.29	0.02	-0.29	0.02
Live birth order	-0.01	0.00	-0.01	0.00	0.06	0.01	0.06	0.01
Infant sex (male=1)	0.18	0.00	0.18	0.00	-0.22	0.02	-0.22	0.02
Party of Governor (Democrat=1)	-0.01	0.01	-0.01	0.01	-0.31	0.02	-0.03	0.02
Constant	-1.37	0.04	-1.34	0.04	-3.17	0.14	-3.14	0.14

Table 3: Predicted Probabilities of Low Birth Weight and Infant Mortality, by State Policy Context (Table 2; Models 1 & 3)

Policy Context Profile	Low Birth Weight (%)	Infant Mortality (per 1,000 live births)
Low Intervention	8.0	4.9
High Intervention	7.1	4.0
High Constituent Engagement	7.4	4.6

Table 3 includes the predicted probabilities of LBW and infant mortality (per 1,000 live births) estimated using Models 1 and 3, holding all other variables at their means. The predicted probability of being born LBW ranges from 7.1 for infants born in High Intervention states to 8.0 for infants born in Low Intervention states, with the predicted probability in High Constituent Engagement states falling in between (7.4 percent). These differences are relatively small considering that, among the analytic population of births, state-level rates of LBW range from 5.7 percent in Alaska to 11.7 percent in Mississippi. Still, because of the large number of births, the differences in the predicted probabilities across latent state policy contexts signal excess LBW births. For example, if infants born in Low Intervention states had the same predicted probability of being born LBW as those born in High Intervention states in 2018, there would have been an estimated 1,8457 (11.3%) fewer LBW births in 2018. If infants born in Low Intervention states had the same probability of being born LBW as those in High Constituent Engagement states, there would have been an estimated 12,305 (7.5%) fewer LBW births.

The relative differences in the predicted probabilities (or likelihoods, measured per 1,000 live births for ease of interpretation) are slightly larger for infant mortality (Table 3). The predicted likelihood of dying within the first year of life ranges from 4.0 per 1,000 live births in High Intervention states to 4.9 per 1,000 live births in Low Intervention states, with the predicted likelihood of dying within the first year of life falling in between for infants born in High Constituent Engagement states (4.6 per 1,000 live births). If births in Low Intervention states had the same predicted probability of dying within the first year of life as births in High Intervention or High Constituent Engagement states, there could have been an estimated 1,845 (18.4%) or 615 (6.1%) fewer infant deaths, respectively, in those Low Intervention states in 2018.

In Table 2, Models 2 and 4 introduce the interaction of state policy contexts and maternal race and ethnicity, allowing me to assess if the direction or strength of the protective effects of High Intervention and High Constituent Engagement contexts differ across maternal race-ethnicity. The main effects of the latent state policy profiles reflect the relationship between each policy context and birth outcome for births to NH white mothers. Results suggest that infants born in High Intervention or High Constituent Engagement states to NH white mothers are less likely to be born LBW or die within their first year of life compared to those born in Low Intervention states, with High Intervention states having the most protective effects. However, these relationships are moderated by maternal race and ethnicity. When comparing predicted risks in High v. Low Intervention states, the protective effects of the High Intervention contexts are, in general, smaller for births to NH Black and Hispanic mothers. The results suggest that the High Constituent Engagement (v. Low Intervention) policy context may actually harm infants born to Hispanic mothers: the positive coefficients on the HCE x Hispanic term in Models 2 and 4 are larger (in absolute terms) than the negative coefficients on the main effect of HCE in those same models. The one exception, however, is that the protective effect of the High Constituent Engagement profile on the risk of LBW is larger for births to NH Black v. NH white mothers (i.e., the coefficient on HCE x NHB is negative).

Table 4 presents the predicted probabilities of LBW and infant mortality using results from Models 2 and 4. For infants born to NH white and NH Black mothers, the predicted probabilities of LBW and infant mortality (per 1,000 live births) are lowest for those born in High Intervention states and are highest for those born in Low Intervention states. Among births to Hispanic mothers, infants born in High Intervention states also have the lowest predicted probabilities of LBW and infant mortality; however, among this group, those born in states marked by High Constituent Engagement policy contexts have the highest predicted probabilities of LBW and infant mortality.

These predicted probabilities shed light on how the three distinct policy contexts may contribute to racial-ethnic inequities in the likelihood of being born LBW or dying within the first year of life. In both absolute and relative terms, the NH Black-NH white (NHB-NHW) disparity in the predicted probability of LBW is smallest for infants born in High Constituent Engagement states, suggesting that the protective effect of this policy context may mitigate Black-white inequities in LBW. However, the NHB-NHW disparity in the predicted probability of infant mortality and the Hispanic-NH white (H-NHW) disparities in the predicted probabilities of LBW and infant mortality are smallest in the Low Intervention states, which is the policy context with the highest predicted probabilities of LBW and infant mortality for the NHB and NHW racial-ethnic groups.

Table 4: Predicted Probabilities of Low Birth Weight and Infant Mortality, by State Policy Context and Maternal Race-Ethnicity (Table 2; Models 2 & 4)

	Maternal Race-Ethnicity						
Policy Context Profile	NH white	NH Black	Hispanic	NHB-NHW absolute diff.	H-NHW absolute diff.	NHB/NHW ratio	H/NHW ratio
				Low Birth Weight (%)			
Low Intervention	6.9	13.8	7.5	6.9	0.6	2.00	1.09
High Intervention	5.9	12.1	7.1	6.2	1.2	2.05	1.20
High Constituent Engagement	6.4	12.5	7.8	6.1	1.4	1.95	1.22
				Infant Mortality (per 1,000 live births)			
Low Intervention	4.5	8.7	4.3	4.2	-0.2	1.93	0.96
High Intervention	3.2	7.4	4	4.2	0.8	2.31	1.25
High Constituent Engagement	3.9	8.3	4.4	4.4	0.5	2.13	1.13

Overall, the results from models 2 and 4 (Table 4) suggest that while the High Intervention and High Constituent Engagement contexts are, in general, associated with lower risks of adverse birth outcomes, they may also exacerbate racial-ethnic disparities in birth outcomes when comparing NH white to NH Black or Hispanic infants.

Notably, the political party of the Governor (Democrat=1) is not related to birth outcomes independent of the three policy contexts (see Table 2). Furthermore, supplemental analyses comparing the pseudo-R-squared indicators for models including only policy contexts or only the political party of the Governor demonstrate that the three profiles of policy contexts explain more of the variation in birth outcomes than Governor's party. These results suggest that profiles of state policy contexts relate to birth outcomes independent of measures of state partisanship.

3.4 Discussion

Growing sociological research emphasizes the importance of considering how state policies and related factors contribute to geographic health disparities across the US. The World Health Organization offers a framework for understanding how state-level structural factors relate to health: social and policy contexts, which encompass six domains of socioeconomic and political conditions, are broadly responsible for generating health inequities by creating systems of stratification that determine and maintain inequitable access to privileges and resources across social classes (Solar and Irwin 2010). Several studies consider how the six dimensions of the social and economic conditions independently relate to health outcomes (Montez et al. 2017) or how broad measures of policy contexts shape health (Fenelon and Witko 2021; Montez 2020;

Montez et al. 2022). However, few studies consider how the different dimensions of socioeconomic, political, and/or policy conditions uniquely combine to explain geographic differences in health outcomes across states. In this paper, I take a multidimensional policy approach to examine how distinct latent profiles of state policy contexts contribute to birth outcomes, which are important indicators of population health and mechanisms through which inequality and health (dis)advantages are passed across generations. In doing so, I also assess heterogeneity in the relationships between latent state policy profiles and birth outcomes across maternal race and ethnicity.

Overall, the LPA models identify three latent profiles of state policy contexts (Low Intervention, High Intervention, and High Constituent Engagement) that shape birth outcomes heterogeneously across maternal race and ethnicity. The largest policy profile includes states whose policy contexts are defined by relatively low intervention in terms of the redistribution of resources and the provision or protection of health-related services (Low Intervention), with almost all states in this group having a Republican Governor in 2018. The Low Intervention latent profile is associated with the highest overall risks of LBW and infant mortality. In contrast, the smallest latent profile includes states with relatively high levels of intervention in terms of the redistribution of resources and the provision or protection of health-related services (High Intervention), with almost all states having a Democrat Governor in 2018. The High Intervention latent profile is associated with the lowest overall risks of LBW and infant mortality. Together, these findings align with prior work that finds more generous welfare states and more liberal policies are protective of health and drive the widening geographic disparities in health across US states (Fenelon and Witko 2021; Montez 2020; Montez et al. 2022). The findings also align with reports demonstrating a concentration of poor health outcomes in the US South and Midwest (CDC 2020a, 2020b), as all Southern, and many Midwest, states' policy contexts are defined by the Low Intervention latent profile.

While the High Intervention latent profile is, on average, protective of birth outcomes for all racial-ethnic groups in the analyses, the latent policy context does not appear to mitigate racial-ethnic birth inequities. For example, although the absolute difference in the NHB-NHW predicted probabilities of LBW is lower for High v. Low Intervention profiles, the relative NH Black-NH white (NHB/NHW) disparities in both LBW and infant mortality are largest for the High Intervention group (Table 4). Furthermore, the H-NHW disparities in the predicted probabilities of LBW and infant mortality are consistently higher in High v. Low Intervention states, whether considering the absolute difference in rates or the rate ratios. The higher NHB/NHW and H/NHW ratios are driven by more pronounced protections for births to NH white mothers in High v. Low Intervention states compared to their NH Black and Hispanic counterparts: while the predicted probabilities of LBW and infant mortality were 14 and 29 percent lower, respectively, in High v. Low Intervention states for births to NH white mothers, the predicted probabilities were only 12 and 15 percent lower, respectively, for births to NH Black mothers and 5 and 7 percent lower, respectively, for births to Hispanic mothers. These findings align with previous work finding that the protective effects of socioeconomic conditions, such as socioeconomic status and upward mobility, have muted effects for Black compared to white Americans (Colen et al. 2006, 2018; Farmer and Ferraro 2005), suggesting that discrimination and other structural barriers may similarly dampen the protective effects of social and policy contexts for minoritized racial and ethnic groups in the US.

Adding a dimension beyond 'redistribution' or 'liberalness' to our conception of state social and policy contexts, the third latent profile identified by the LPA models is defined by relatively high voter turnout or community engagement (High Constituent Engagement). This aligns well with the WHO framework, which emphasizes the importance of power—both in terms of social participation in shaping social and health policies and collective action—as foundational to our understanding of social and policy contexts and to our ability to address health inequities (Solar and Irwin 2010).

The results of this study suggest that a High Constituent Engagement context is heterogeneously associated with risks of LBW and infant mortality. Overall, infants born in states with a High Constituent Engagement (v. Low Intervention) context have lower risks of adverse birth outcomes, but this relationship differs across both maternal race and ethnicity and the outcome examined. For example, although a High Constituent Engagement context is associated with lower risks of LBW for births to NH Black and NH white mothers, the protective effect is largest for births to NH Black mothers such that the expected NHB-NHW disparities in risks of LBW are smallest in High Constitute Engagement states. However, on average, the protective effect is stronger among births to NH white mothers when examining infant mortality. Furthermore, births to Hispanic mothers did not receive any protective effect from the High Constituent Engagement policy context, which instead is associated with negative birth and infant health consequences. Among Hispanic infants, those born in High Constituent Engagement states are estimated to have the highest risks of LBW and infant mortality and the largest H-NHW disparities, which are driven by both higher risks among Hispanic births and lower risks among NH white births in the High Constituent Engagement v. Low Intervention context.

Overall, the presence of a latent state policy context that is defined by high constituent engagement underscores the importance of considering other policy contexts beyond partisanship or liberalness that may shape health outcomes and suggests that policies supporting constituent empowerment may be an important avenue for improving population health. At the same time, the mixed results call attention to the need to better understand how and why the same policy contexts can exacerbate and mitigate racial-ethnic health disparities differently based on both the outcomes examined (i.e., LBW v. infant mortality) and maternal race and ethnicity. It is possible that the latent policy context defined by high voter turnout better supports Black constituents' and their allies' ability to fight both socially and politically for the changes that are most important to them and their communities (Solar and Irwin 2010), thus reducing the risk of adverse birth outcomes among NH Black infants. It is also possible that social engagement through avenues such as voting holds politicians accountable for fulfilling the demands of constituents. These reasonings align with the WHO framework, which urges that "realizing health equity requires empowering people, particularly socially disadvantaged groups, to exercise increased collective control over the factors that shape their health" (Solar and Irwin 2010, p. 12), as well as with prior work and community advocates who identify voter participation and turnout as an important measure of community and population health. Alternatively, high voter turnout could be a consequence, rather than a cause, of relatively good health. However, if this was the main driver of the relationship between High Constituent Engagement and birth outcomes, we would likely see a positive relationship among births to Hispanic mothers as well.

The negative consequences of the High Constituent Engagement profile among births to Hispanic mothers could point to the fact that these states place the most value on the voices of other (likely NH white) constituents, such that Hispanic mothers are left out of or harmed by the "benefits" associated with higher constituent engagement. Prior work emphasizes that states often strategically implement welfare policies and programs in ways that leave out NH Black or Hispanic individuals from receiving benefits (such as introducing administrative burdens) (Soss et al. 2004). High Constituent Engagement states may strategically implement policies and programs that are beneficial for NH white mothers but are less available or even harmful to Hispanic mothers. However, for this to be the main driver of the relationship, we might also expect a negative relationship between the High Constituent Engagement profile and birth outcomes for NH Black mothers, as they also have been historically and are currently structurally left out of receiving the benefits of many social policies and welfare programs. It is also possible that the relatively high proportion of foreign-born Hispanic mothers may contribute to the overall positive relationship between high constituent engagement and adverse birth outcomes if some of these mothers are less able to take advantage of protective state policies or programs due to specific citizenship status standards. However, supplemental analyses that include only US-born Hispanic births or further stratify by maternal race-ethnicity-nativity find a substantively similar relationship between the High Constituent Engagement profile and adverse outcomes for Hispanic births, suggesting that differences in nativity across maternal race and ethnicity are not driving the heterogeneity in the profile's protective effect. Thus, additional work is needed to better understand these relationships and why the High Constituent Engagement profile is particularly harmful for births to Hispanic mothers.

3.4.1 Limitations and Future Work

While this study improves our understanding of how social and policy contexts combine to shape birth and infant health outcomes across states, there are limitations. First, the LPA includes only one indicator for each of the six socioeconomic and political domains included in the WHO's structural determinants of health framework. This methodology intentionally builds on previous studies that consider how single indicators of each of the WHO domains shape health outcomes (Montez et al. 2017), and the LPA analyses find that the measures used in this study perform well compared to alternative or additional domain measures (such as voter disenfranchisement, minimum wage, SNAP caseload rates, Medicaid generosity, and an index of social capital). Still, future work may consider multiple or composite measures for each domain to identify if analyses provide a more nuanced understanding of underlying state policies. Furthermore, because state power and politics (Montez et al. 2020) and indicators of socioeconomic and political conditions, such as income inequality (Pabayo et al. 2019), have changed over the last several decades, it is important to consider how state social and policy contexts and their relationships with birth and other health outcomes have and continue to change. Future analyses should consider estimating multi-level models that include both states and years to estimate state profiles of policy contexts and their relationship with health across time in the US.

Relatedly, while this study follows the WHO framework to identify state-level social and policy contexts related to the structural determinants of health inequities, other policies and structural factors, such as partisanship or political party (Rodriguez et al. 2014), immigration policy context (Hatzenbuehler et al. 2017), structural racism (Krieger et al. 2013; Lukachko, Hatzenbuehler, and Keyes 2014), and sexism (Homan 2019), reveal additional structural components that are both related to policy contexts and associated with birth outcomes. Future studies should consider how these other inequities intersect with the structural components identified by the WHO to shape health and birth outcomes.

The analyses for this study are limited to births to mothers identifying as NH white, NH Black, or Hispanic. This restriction recognizes the importance of including race and ethnicity categories that meaningfully measure distinct histories and/or lived experiences in the US context, rather than collapsing smaller racial-ethnic groups into an "Other" category. Still, there is a need to understand how the latent profiles of state policy contexts may heterogeneously shape birth outcomes for other racial and ethnic identities.

Finally, while this study considers how state policy contexts shape birth outcomes, there are also more localized social and policy contexts, such as at the county or neighborhood levels, that relate to health outcomes. Future studies should consider the unique policy contexts that exist across US counties, and how they may independently predict and interact with state policy contexts to shape health outcomes. Continuing to study how social and policy contexts interact to shape health at varying levels of geography will help explain geographic disparities in health outcomes across the US, as well as point to overarching strategies that governments and localities can take to improve health.

3.5 Conclusion

A burgeoning literature examines how state factors and policies contribute to enduring and widening geographic disparities in health across US states. Recent work considers how state policies and welfare services cluster together along lines of liberalness or generosity, importantly pointing to the need to consider the overarching social and policy contexts when assessing relationships between state social conditions and health. I extend this work by using latent profile analysis to identify three, multi-dimensional state policy contexts and their associations with low birth weight—an important predictor of later life health and well-being—and infant mortality—an indicator of population health. I find that contexts defined by either high levels of intervention or high levels of constituent engagement have protective effects compared to states defined by low levels of intervention. Furthermore, these protective effects vary by maternal race and ethnicity. These findings underscore the importance of taking multidimensional approaches to study how state social and policy contexts shape health, as well as the need to consider how unique contexts exacerbate or mitigate racial-ethnic health inequities.

4. Revisiting the Weathering Hypothesis: Skin Tone Stratification and Risk of Low Birth Weight Among Non-Hispanic Black Mothers in the US

In the United States, adverse birth outcomes have consistently concentrated among NH Black Americans (Hummer 1993; MacDorman 2011; Slaughter-Acey et al. 2020). In 2021, infants born to NH Black women were more than twice as likely to be low birth weight (14.66 v. 7.03 percent) and more than 1.5 times as likely to be preterm (14.75 v. 9.50 percent) compared to their NH white counterparts (Osterman et al. 2023). These disparities are particularly concerning because adverse birth outcomes such as low birth weight are important predictors of later-life socioeconomic status and health (Barker 1995; Black et al. 2007; Torche 2018), emphasizing the importance of mitigating racial-ethnic health inequities at birth.

One factor leading to the heightened risks of adverse birth outcomes for NH Black women is cumulative exposure to racialized stressors across the life course, which leads to early health deterioration or "weathering" among racially minorized women over their reproductive years (Geronimus 1992, 1996; Jones et al. 2017). The weathering hypothesis posits that this early health deterioration results in rapidly increasing risks of adverse birth outcomes among NH Black compared to NH white women across maternal age. The initial findings demonstrate that while risks of infant mortality increase linearly across maternal age among NH Black women, there is a curvilinear relationship between maternal age and infant mortality among NH white women, such that age provides a protective effect for NH white women until they reach their mid-30's (Geronimus 1992).

Since the early 1990s, several studies provide evidence supporting these heterogeneous age patterns (Forde et al. 2019; Geronimus 1996; Jones et al. 2017; Love et al. 2010).

Still, most studies on weathering and birth outcomes focus on examining heterogeneity in age patterns across self-identified race and ethnicity, thus limiting our understanding of the weathering process to one dimension of racism. Health and equality scholars underscore the need to investigate how additional dimensions of racism—such as colorism, or skin tone stratification—help contextualize our understanding of how racism impacts health (Gee, Walsemann, and Brondolo 2012; Monk 2015; Roth 2016). Indeed, recent studies find that skin tone is associated with a broad set of health outcomes (Cobb et al. 2016; DeAngelis, Hargrove, and Hummer 2022; Monk 2015), particularly among NH Black women (Hargrove 2018a, 2018b). These findings emphasize the importance of investigating how skin tone bias shapes diverging patterns of adverse birth outcomes across maternal age.

This study extends prior literature on the weathering hypothesis to consider how skin tone variations correspond to disparate maternal age and birth outcome patterns among NH Black women in the US racialized context. To explore this research question, I use birth data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) to examine how maternal age at birth and maternal skin tone interact to uniquely shape risks of low birth weight among non-Hispanic Black mothers aged 16-34. Results suggest that patterns in the relationship between maternal age and risk of low birth weight differ across maternal skin tone, such that risks increase fastest with age for mothers with dark (v. medium) skin tones.

4.1 The Weathering Hypothesis and Skin Tone Stratification

4.1.1 The Weathering Hypothesis and Racial-Ethnic Health Inequities

Since the conception of the weathering hypothesis by Geronimus in 1992, evidence of the early onset of disease and accelerated health deterioration among socially disadvantaged versus advantaged groups has been well-documented in the literature, with a focus on Black-white comparisons (Forde et al. 2019). Studies interrogating the weathering framework assume a cumulative stress model and understand that, compared to their NH white counterparts, NH Black Americans are more likely to experience life course socioeconomic and environmental stressors as a result of living in the US as racialized actors (Geronimus et al. 2015; Phelan and Link 2015; Williams and Collins 1995). These stressors then shape health through access to health-relevant resources (Feagin and Bennefield 2014; Phelan and Link 2015), the availability of stress-buffering coping strategies (Thoits 2010), and stress-induced physiological dysregulation (Geronimus et al. 2006; Goosby et al. 2018; Lu and Halfon 2003). This process may start as young as childhood, when risks of low-grade inflammation are higher among NH Black children compared to their NH white counterparts (Schmeer and Tarrence 2018). As racialized stressors accumulate and proliferate across the life course, they shape aging patterns in ways that result in diverging Black-white health profiles across age (Levine and Crimmins 2014; Warner and Brown 2011), including increasing risks of adverse birth outcomes for NH Black but not NH white women between their teenage years and mid-30s (Geronimus et al. 2006, 2015)

As there is no clear single measure of weathering (Geronimus et al. 2006), several studies focus on understanding the biological underpinnings of the weathering process to provide more direct evidence that higher levels of exposure to stressors are associated with accelerated aging. For example, prior work finds that measures of discrimination and other racialized stressors are associated with allostatic load (Allen et al. 2019; Geronimus et al. 2006; Goosby et al. 2018), a biological measure of "wear and tear" on the body (McEwen and Seeman 1999). Furthermore, individuals with higher indices of cumulative disadvantage present as biologically older than their peers, such that a two standard deviation higher cumulative disadvantage score equates to a 2.5-year older biological age (Simons et al. 2019). These patterns persist among subgroups of mothers. In fact, the average length of telomeres—a measure of cellular aging—in the placenta of Black mothers is significantly shorter than the average length of telomeres in the placenta of white mothers (Jones et al. 2017). As maternal health is intrinsically tied to fetal and infant health, these findings suggest that accelerated cellular aging among Black mothers will spill over to increase risks of adverse birth outcomes, including low birth weight, among their offspring.

Unsurprisingly, then, findings from weathering studies consistently support the hypothesis that the accelerated aging associated with racialized stressors leads to rapidly increasing risks of adverse birth outcomes among NH Black mothers (Forde et al. 2019). Age patterns demonstrate that risks of infant mortality (Cohen 2016; Geronimus 1992), low birth weight (Geronimus 1996; Love et al. 2010; Rauh, Andrews, and Garfinkel 2001), preterm birth (Love et al. 2010), and stillbirth (Brisendine et al. 2020) increase steadily and faster across maternal age for births to NH Black compared to NH white women. Prior work also finds that weathering is strongest for Black mothers who have consistently lived in poor neighborhoods (Love et al. 2010), demonstrating how the intersection of social privileges may shape the weathering process and emphasizing the need to consider how additional dimensions of racism and inequality may stratify patterns of weathering among NH Black women.

4.1.2 Skin Tone Stratification and Health

Skin tone is a salient status characteristic that determines assigned social privileges within racial groups and is related to but distinct from traditional measures of racism (Bonilla-Silva 2017; Hunter 2002; Monk 2015). In the US context, colorism, or skin tone bias, is rooted in European colonialism and chattel slavery, when phenotypical characteristics such as skin tone were used in the creation of racial hierarchies (Hunter 2002). Colorism remains an ideological and stratifying social system today, affording social advantages to individuals with lighter skin tones and more Eurocentric phenotypical characteristics (Dixon and Telles 2017; Hunter 2002). In social interactions, skin tone serves as a visible cue that triggers culturally embedded racial stereotypes and prejudices that are enmeshed with white supremacy (Adams, Kurtz-Costes, and Hoffman 2016; Hargrove 2018b; Slaughter-Acey et al. 2019, 2020).

Studies interrogating skin tone-related stereotypes find that Black Americans with lighter skin tones are, on average, perceived as more intelligent, more attractive, and less dangerous than their darker complexioned counterparts (Adams et al. 2016; Monk 2015), although Black Americans with light skin tones experience more in-group discrimination compared to their medium and dark complexioned counterparts (Monk 2015; Uzogara and Jackson 2016). These skin tone-related biases are linked to education and employment outcomes (Adams et al. 2016; Monk 2014), criminal justice outcomes (Monk 2018; White 2015), and exposure to discrimination and racialized stressors (Monk 2015; Slaughter-Acey et al. 2019), with more favorable outcomes concentrated among Black Americans with lighter, compared to darker, skin tones.

A burgeoning literature considers how the stratifying principles of colorism relate to health outcomes among NH Black Americans. These studies use skin tone as a proxy for colorism (Slaughter-Acey et al. 2019), and often use skin tone measures to capture either internalized perceptions of one's own skin tone-based experiences of discrimination (self-reported) (Hargrove 2018b; Monk 2015; Slaughter-Acey et al. 2020) or external, societal perceptions of one's inherent worthiness (interviewer-ascribed) (Cobb et al. 2016; Monk 2015). Results suggest that, on average, Black Americans with darker skin tones have worse health outcomes compared to their lighter complexioned counterparts when examining hypertension, blood pressure, and cardiometabolic risks (Monk 2015; Sweet 2007; Wassink et al. 2017), although this relationship does not extend to self-rated health (Borrell et al. 2006; Monk 2015).

Skin tone as a stratifying social characteristic may be particularly salient for women's health. Due to the proximity of lighter skin tones to Eurocentric beauty standards which were created as, and still are, a form of social currency, lighter skin tones may function as a form of social capital for women of color (Hargrove 2018b; Hunter 2002; Roth 2016). Indeed, prior work finds that the relationship between skin tone and health is strongest among Black women compared to men. On average, Black women with darker skin tones report worse health and have higher measures of BMI compared to Black women with lighter skin tones, even as those same relationships are insignificant or weaker among Black men (Hargrove 2018a, 2018b).

4.1.3 Weathering Hypothesis, Skin Tone Stratification, and Birth Outcomes

Just as racialized systems stratify Black women's access to health-relevant resources and exposure to stressors in ways that accelerate the aging process, so too might colorism. Among NH Black women, one study finds that darker skin tones are associated with higher scores of cumulative biological risk—a measure of physiological deterioration—even when accounting for socioeconomic factors, stressors, or discrimination levels (Hargrove 2018b). A similar study that does not stratify by gender finds that Black-white differences in allostatic load are largest between white and dark complexioned Black Americans and smallest between white and light complexioned Black Americans (Cobb et al. 2016). These findings suggest that Black women with darker skin tones experience premature aging compared to their counterparts with light skin tones. Consequently, the social privileges associated with skin tone stratification may spill over to impact related disparities in birth outcomes across maternal age, such that Black women with darker skin tones experience more rapid age-related increases in rates of adverse birth outcomes (e.g., low birth weight) compared to their lighter complexioned counterparts.

Although no studies yet examine variations in weathering and birth outcomes across maternal skin tones, recent work on maternal skin tone stratification and birth outcomes affirm that skin tone biases do extend to pregnancy and birth. For example, a study of NH Black mothers in Detroit, MI finds that skin tone predicts risks of preterm birth, but that results vary based on the cohort of mothers (Slaughter-Acey et al. 2020). Infants born to Generation X mothers with light skin tones have, on average, lower risks of preterm birth compared to their medium or dark complexioned counterparts, while births to light complexioned Millennial mothers have higher relative risks of preterm birth. Among the same sample of mothers, maternal skin tone is associated with prenatal care use, such that higher discrimination scores predict increases in the risk of delaying prenatal care among NH Black mothers with light or dark brown skin tones but not among their counterparts with medium brown skin tones (Slaughter-Acey et al. 2019).

Together, these studies underscore the complexity of colorism and the importance of considering how skin tone, as a unique dimension of racism, is associated with risks of adverse birth outcomes across maternal age for NH Black women in the US.

4.1.4 Current Study

A large literature demonstrates how cumulative exposure to racism-related stressors damages health and shapes diverging trajectories of aging across race. While recent studies provide growing evidence that this process of weathering may stratify aging trajectories across other dimensions of racism—such as skin tone bias— research on how these stratified processes relate to birth outcomes is limited. This study builds on the weathering hypothesis to consider how the relationship between maternal age and low birth weight varies across maternal skin tone for NH Black mothers in the US. The study assesses the contribution of skin tone bias and related discrimination—operationalized by skin tone—to heightened risks of low birth weight across maternal age for births to NH Black women. In doing so, it joins previous work in demonstrating the need to consider how additional dimensions of racism shape health inequities.

4.2 Data and Methods

4.2.1 Data

This study uses four waves of data from the National Longitudinal Study of Adolescent and Adult Health (Add Health): Waves I (1994-1995), III (2001-2002), IV (2008-2009), and V (2016-2018)(Harris et al. 2009). Add Health selected a school-based, nationally representative sample of 20,745 adolescents in grades 7-12 in 1994-1995 (Wave I) who were followed over time. Black respondents with highly educated parents were oversampled. Relevant for this study, Wave I provides information on self-reported race and family socioeconomic measures and Wave III provides information on interviewer-ascribed skin tone. Waves III-V provide information on all of the respondents' live births; this study uses birth data from the respondent's most recently completed survey. At Wave V, respondents were aged 33-44.

The sample is restricted to NH Black women who reported at least one birth in Waves III-V (N=1,571). Women are included in the sample if they identify as non-Hispanic and Black, regardless of other racial identities, in Wave I. This classification of race is consistent with Add Health guidelines. The sample is further restricted to those who completed Wave III to ensure they have an interviewer-ascribed skin tone (N=1,325).

Among this sample of women, there are 2,970 births. Births are then restricted to those occurring between maternal ages 16-34 to: (1) allow for complete information on all births occurring before maternal age 35 because the youngest respondents in our restricted sample are aged 34 in Wave V; and, (2) account for the low numbers of births occurring after maternal age 35 in the sample, which are outliers that bias results (N=2,735). Births missing birth weight data are dropped from the analysis. The final sample includes 2,673 births to 1,252 NH Black mothers between 1991 and 2016.

4.2.1.1 Measures

The dependent variable is low birth weight (LBW) and indicates births to infants weighing less than 2,500 grams, or 5.5. pounds, at birth (=1). In Waves III-V, respondents were asked to report the birth weight (in pounds and ounces) for each of their pregnancies that ended in live births. In Waves IV-V, respondents who reported that their infants weighed <2,500 grams were then asked to confirm the birth was LBW. There are 36 live births in Waves IV-V for which the respondent reported a weight <2,500 grams but then indicated the birth was not LBW; these births are thus coded as not LBW (=0).

This study focuses on two independent variables: maternal age and maternal skin tone. Maternal age is measured as the respondent's age at the time of birth (offspring's birth date – mother's birth date). In the main analyses, maternal age is centered at 16, such that the intercept in the regression models estimates the risk of LBW at maternal age 16.

Maternal skin tone is interviewer-assigned and was assessed by the interviewer in Wave III of the Add Health study. Interviewers were asked to report the respondents' skin tone as white (N=18), light brown (N=408), medium brown (N=864), dark brown (N=749), or black (N=634). The white and light brown categories are collapsed because of the low number of NH Black mothers with interviewer-assigned white skin tones. The medium and dark brown categories are also collapsed to produce a three-level categorization system that is consistent with prior studies (Hargrove 2018b; Slaughter-Acey et al. 2020; Uzogara and Jackson 2016). Descriptive analyses demonstrate that respondents with medium and dark brown skin tones have similar socioeconomic and birth profiles, and supplemental analyses that include four categories of skin tone rather than three provide substantively similar findings to those presented here, with no statistical difference across medium and dark brown skin tones in the main analyses. The final categories are labeled Light (=white or light brown; N=436), Medium (=medium or dark brown; N=1,647), and Dark (=black; N=652). Medium skin tone is used as the reference category in accordance with prior work finding that Black Americans with medium skin tones experience relatively lower rates of both out-group and in-group discrimination compared to their counterparts with dark and light skin tones, respectively (Uzogara and Jackson 2016), and recent work suggesting that mothers with both light and dark skin tones, on average, experience worse birth-related outcomes (e.g., prenatal care use and preterm deliveries) compared to their medium complexioned counterparts (Slaughter-Acey et al. 2019, 2020).

The interaction between maternal age at birth and maternal skin tone tests whether the process of weathering—and, conceptually, cumulative exposure to skin tone-related biases and discrimination—disproportionately harms Black women with dark or light skin tones (v. medium).

Covariates associated with low birth weight are included in the models. Relevant time-invariant characteristics include nativity, which measures if the respondent was born outside of the US (=1) and is included in the models because immigrants tend to have more favorable birth outcomes compared to their US-born counterparts. Median income of the respondent's adolescent census block, which is in the Add Health Wave I contextual data, serves as a measure of respondents' socioeconomic status since socioeconomic measures were not collected at the time of the offspring's birth (measured in thousands of dollars). The model also includes pregnancy-specific characteristics. Married measures if the respondent was married to the offspring's biological father at the time of birth (=1). Adequate prenatal care measures whether the respondent received prenatal care within the first trimester of the pregnancy (=1), which is protective against adverse birth outcomes (Baldwin et al. 1998; Liu 1998). Live birth order is the numerical order of the birth, relative to a respondent's previous live births, which is related both to maternal age and birth weight (Swamy et al. 2012). Indicators of singleton births (=1) and infant sex (female=1) are also included in the models as both are predictive of birth weight.

4.2.2 Methods

I assess the unique relationship between maternal age and risk of LBW across maternal skin tone by estimating a logit model that regresses an indicator of LBW on the interaction between maternal age and maternal skin tone. Because the data used to estimate this relationship are multilevel, such that births are nested within mothers, I estimate the model with random intercepts. This approach allows for both individual intercepts for each mother in the sample and the inclusion of mothers with only one birth. The random intercepts account for the combined effect of omitted maternal-specific covariates on low birth weight. The following model estimates the log odds of LBW:

$$\ln\left[\frac{P(Y_{ij}=1|preg_{ij}, mom_j, st_j*age_{ij}, u_j)}{P(Y_{ij}=0|preg_{ij}, mom_j, st_j*age_{ij}, u_j)}\right] = \beta_0 + \beta_1 preg_{ij} + \beta_2 mom_j + \beta_3 st_j * age_{ij} + u_j,$$

$$u_j \sim N(0, \sigma^2),$$

such that *j* represents mothers and *i* represents births. In the model, Y is the LBW outcome, such that $Y_{ij} = 1$ if a birth is LBW and $Y_{ij} = 0$ otherwise, *preg* is a vector of the pregnancy-specific characteristics discussed above, including maternal age at birth, and *mom* is a vector of time-invariant maternal characteristics that remain constant across births, including maternal skin tone. The *st*age* interaction estimates the skin tone-specific effects of maternal age at birth on the log odds of LBW. The u_j term is the random effect for each jth mother. The distribution of u_j is assumed to be normal, with mean 0 and variance σ^2. Other methods, such as mother fixed effects, are not appropriate because maternal skin tone, the variable of interest, does not vary across births for mothers.

All models cluster standard errors by school ID to account for the sampling design of the Add Health data. Missingness is low for the main and covariate variables, with the highest missingness for the median census block income during adolescence (~7%). Multiple imputation with chained equations (MICE; 15 imputations) (White et al.,

2011) is used to account for this missing data, although results are similar when using listwise deletion. Sampling weights, which are estimated at the respondent but not birth level, are not included in the multilevel models. However, models that use the sampling weights and are estimated without random effects suggest substantively similar results to those presented in this paper.

All analyses were completed on Duke's Protected Research Data Network (PRDN) using Stata 17.0 and approved by Duke University's Institutional Review Board.

4.3. Results

4.3.1 Sample Characteristics

Table 5 summarizes the characteristics of the sample of births. Overall, mothers have similar childhood (time-invariant) characteristics, although mothers with light skin tones are more likely to be foreign-born and to have grown up in communities with, on average, higher median incomes compared to their medium complexioned counterparts.

Among the 2,735 births in the sample, the average age of mothers is about 23 across all skin tone groups. This relatively young age is at least in part attributed to restricting sample births to maternal ages 16-34. About a quarter of mothers are married to their infant's biological father at the time of birth, with slightly higher rates among births to mothers with light skin tones (28 percent), although the difference does not reach statistical significance. On average, the births in the sample are mothers' second live birth, and almost all births are singleton. While almost all births receive adequate prenatal care (about 85 percent for mothers with medium and dark skin tones), rates for light complexioned mothers are slightly higher (91 percent) but the difference (versus medium) is not significant.

Table 5: Descriptive Statistics of Maternal, Pregnancy, and Birth Characteristics among NH Black Women by Maternal Skin Tone

	Maternal Skin Tone					
	Light		Medium		Dark	
Variables	Mean or %	SE	Mean or %	SE	Mean or %	SE
Time-invariant maternal characteristics						
Nativity (foreign-born; %)	3.2		0.9		0.9	
Adol. census block inc. ($1,000)	25.3	0.6	22.4	0.3	22.1	0.5
Number of mothers	207		770		286	
Birth-level characteristics						
Maternal age at birth (years)	23.9	0.2	23.5	0.1	23.4	0.2
Married to bio father at birth (%)	28.3		23.9		23.4	
Adequate prenatal care (%)	90.6		85.3		85.5	
Live birth order	1.9	0.1	1.9	0.0	2.0	0.0
Singleton birth (%)	94.0		95.1		96.0	
Infant sex (female=1; %)	51.4		48.5		51.0	
Low birth weight (%)	10.8		11.7		13.9	
Number of births	*436*		*1647*		*652*	

Although birth outcomes do not vary statistically across skin tone groups, they do vary descriptively. The percentage of female births is lower (49 percent) among mothers with medium skin tones compared to those with light or dark skin tones (51 percent). This suggests a higher sex ratio (number of live male:female births) at birth among lighter complexioned mothers. Furthermore, rates of LBW increase across maternal skin tone, such that births to mothers with light skin tones have the lowest rates of LBW (11 percent), followed by births to mothers with medium (11.7 percent) and dark (13.9 percent) skin tones.

4.3.2 Logit Models: Weathering and Low Birth Weight Across Maternal Skin Tone

Table 6 presents the results from the random intercept models predicting the risk of LBW. The coefficients represent the log odds of being born LBW (probability of LBW / probability not LBW) compared to the log odds of LBW for the reference class of interest (ref. age=16; ref. skin tone=medium). Negative coefficients predict lower risks, or odds, of LBW while positive coefficients predict higher risks. Model 1 predicts the main and interactive effects of maternal age, skin tone, and their interaction without covariates, while Model 2 includes covariates.

The results in both Models 1 and 2 demonstrate that the main effects of maternal age and maternal skin tone do not statistically differ from zero. These results suggest that increases in maternal age are not associated with changing risks of LBW for NH Black mothers with medium skin tones. Furthermore, at maternal age 16, the risk or odds of LBW do not vary by maternal skin tone. However, the Model 1 interaction term demonstrates heterogeneity in the relationship between maternal age and risk of LBW across mothers with medium and dark skin tones (p=0.016). The interaction term Age x Dark is positive and significant in this unadjusted model, suggesting that, while age is not associated with increases in LBW risks for mothers with medium skin tones, the risks do increase across maternal age for mothers with dark skin tones. This relationship remains positive and significant (p=0.047) net of mother's childhood socioeconomic status and pregnancy and birth characteristics (Model 2).

Table 6: Logit Models Predicting Low Birth Weight by Maternal Age, Maternal Skin Tone, and their Interaction Among NH Black Women Aged 16-34 (Add Health)

	Model 1			Model 2		
Variable	Coeff.	St. Err.	Sig.	Coeff.	St. Err.	Sig.
Maternal age (centered at 16)	-0.004	0.027		-0.007	0.031	
Maternal skin tone						
Dark	-0.571	0.378		-0.439	0.397	
Medium	Ref.			Ref.		
Light	-0.899	0.574		-1.047	0.603	
Maternal age x Maternal skin tone						
Age x Dark	0.099	0.041	**	0.085	0.043	*
Age x Medium	Ref.			Ref.		
Age x Light	0.083	0.058		0.097	0.060	
Time-invariant maternal charac.						
Nativity (foreign-born=1)				-0.226	0.624	
Adol. census block inc. ($1,000)				0.004	0.007	
Birth-level characteristics						
Married to bio father (=1)				-0.147	0.223	
Adequate prenatal care (=1)				-0.257	0.247	
Singleton birth (=1)				-2.637	0.424	***
Infant sex (female=1)				0.196	0.157	
Live birth order				-0.004	0.090	
Constant				-0.235	0.524	
lnsig2u				0.987	0.214	***
Observations				2655		

Notes: * p<0.05, ** p<0.01, *** p<0.001

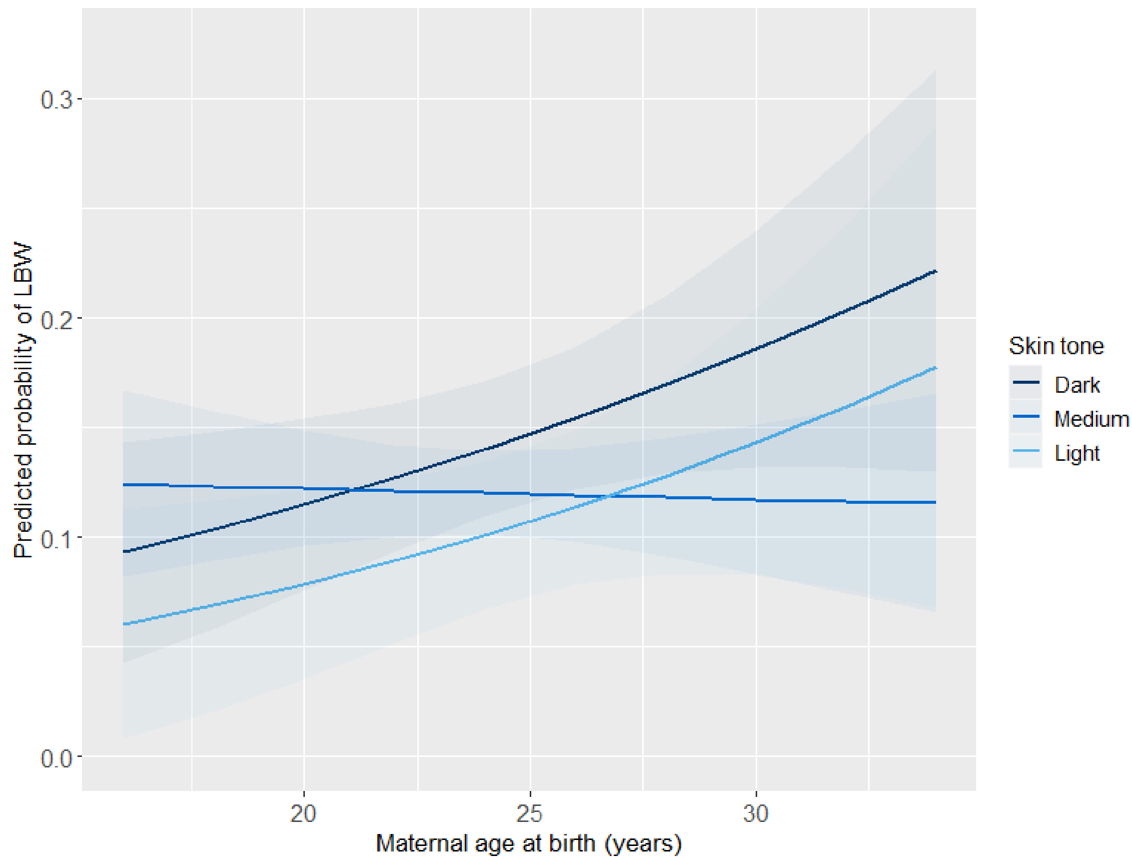

Figure 10: Relationship Between Maternal Age at Birth and Probability of Low Birth Weight Across Maternal Skin Tone (Table 6, Model 2)

For ease of interpretation, Figure 10 plots the associations between maternal age and the predicted probability of LBW for each skin tone group using results from Model 2 and holding covariates at their means. Results demonstrate that the predicted probability of LBW remains relatively constant at 12 percent across maternal age for births to mothers with medium skin tones. However, in the figure, weathering patterns are clear for births to mothers with both dark and light skin tones. The risks of LBW increase across maternal ages for these groups, with parallel slopes. The predicted probability doubles between maternal ages 16 and 34 for births to mothers with dark skin tones (9 v.

22 percent) and triples for births to mothers with light skin tones (6 v. 18 percent). Although the coefficient on Light x Age is not statistically different from zero, suggesting that the slope for this group does not differ from the flat slope for births to mothers with medium brown skin tones, it is possible that, due to the relatively small numbers of births in this category, the model is underpowered to detect significant results at the estimated effect size at alpha=0.05.

4.4. Discussion

Racial inequities in birth outcomes are persistent in the US and shape enduring patterns of disparities across the life course given their long-term consequences. The weathering hypothesis offers an important framework for considering how cumulative exposures to racism-related stressors contribute to birth inequities through accelerated biological aging among Black women (Geronimus 1992, 1996; Jones et al. 2017). However, most studies on weathering and birth outcomes examine racism through a single dimension: self-identified race and ethnicity (Forde et al. 2019). A burgeoning literature on skin tone stratification emphasizes the need to consider how additional dimensions of racism, such as colorism, contribute to health inequities to better inform our understanding of the ways in which racism shapes health (Hargrove 2018b; Hunter 2002; Roth 2016; Slaughter-Acey et al. 2020). To my knowledge, this is the first study to apply theories of skin tone stratification to the investigation of weathering and birth outcomes. In doing so, the study advances our understanding of the ways in which the multidimensional system of racism shapes diverging patterns of birth outcomes across maternal ages.

Results suggest that the weathering process differs across maternal skin tone for NH Black mothers. There is no association between maternal age and risk of LBW for births to mothers with medium skin tones, diverging from previous work that consistently finds increasing risks of adverse birth outcomes across maternal age for NH Black mothers (Geronimus 1992, 1996). However, that positive relationship is quite evident among births to mothers with dark skin tones: risks of LBW increase with maternal age such that the predicted probability of LBW doubles by maternal age 30 (v. age 16) for births to NH Black mothers with dark skin tones. These results are consistent with prior research finding evidence of accelerated aging among NH Black women with dark (v. medium) skin tones in biological measures of aging (e.g., cumulative biological risk and placenta telomere length) (Hargrove 2018b; Jones et al. 2017).

The results are less clear when examining the relationship between maternal age and risks of LBW for mothers with the lightest skin tones. Although the age-LBW pattern appears similar to the pattern among mothers with dark skin tones, the light skin tone x age coefficient is not statistically significant, suggesting that the relationship is no different from the flat age-LBW relationship evident for medium skin tone births. However, because the number of light skin tone births is relatively small, it is possible that risks increase across maternal age for this group but that the model is underpowered to find significant results. This possibility is somewhat supported when examining the sex ratio at birth (Table 5) across maternal skin tones. The sex ratio is measured as the number of live male births per 100 live female births and typically ranges from 103 to 107 (Tong 2022). In our sample, the sex ratio among medium skin tone births is 106, fitting into the typical range. However, the sex ratio at birth is 94.5 and 96 for births to mothers with light and dark skin tones, respectively. These lower sex ratios can be an indication of poor maternal health, exposure to stressors, or environmental toxins (Mathews and Hamilton 2005), as male fetuses are frailer than females and less likely to survive to birth in the presence of stressors. Thus, while results from this study do not support a faster weathering among births to light (v. medium) complexioned mothers, they do point to the need for future studies with larger samples to explore the possibility of accelerated aging among NH Black women with light skin tones, which would align with previous research finding higher in-group discrimination among Black Americans with light skin tones (Monk 2015; Uzogara and Jackson 2016) and higher risks of preterm delivery (Slaughter-Acey et al. 2020) among Black American Millennial mothers with light skin tones.

It is important to note that the "protective" effect afforded to medium complexioned mothers in this study is not equivalent to findings that the weathering process does not apply to this group. The weathering process is inherently relational, in that it posits that minoritized individuals experience faster biological aging due to sustained exposure to racialized stressors compared to their more socially privileged counterparts. Compared to NH white women who experience a decrease in the risk of adverse birth outcomes between their teenage years and mid-30s (Cohen 2016; Geronimus 1992, 1996), the flat relationship between maternal age and risk of LBW for NH Black mothers with medium skin tones presents a clear weathering pattern. Supplemental analyses confirm that NH white mothers in the Add Health sample experience a decreasing risk of LBW across maternal ages 16-34. Furthermore, this relationship is statistically different from the maternal age-LBW relationships among NH Black mothers with the lightest and darkest skin tones. Thus, the results of this study affirm previous findings of weathering related to birth outcomes for NH Black women and point to heterogeneity in the weathering process that is associated with skin tone stratification. The findings also underscore the importance of developing a more complete understanding of the many ways in which the multidimensional and pervasive system of racism impacts health and related inequities.

4.4.1. Limitations and Future Work

These findings should be considered alongside several limitations. First, although the Add Health study offers one of the few datasets that contain information on both respondents' skin tones and birth outcomes, the information available on mothers' socioeconomic status at the time of birth is limited. Ideally, for example, information on mothers' highest educational degree, income, or employment status at the time of each offspring's birth would improve our understanding of how colorism works in tandem with and/or through socioeconomic measures to shape age-patterned birth outcomes across skin tone.

Second, the study restricts births to those occurring between maternal ages 16 and 34, thus limiting our understanding of how weathering shapes patterns of birth outcomes in later maternal years. Several studies find that risks of adverse birth outcomes are highest in later maternal years for all racial-ethnic groups (Cohen 2016; Geronimus 1992), suggesting that different patterns may emerge at those older ages. Our study excludes births after age 34 because of their low numbers in the data, and the 16-34 age range importantly aligns with the original studies on weathering and birth outcomes (Geronimus 1992). Still, future work should examine how colorism stratifies age-patterned outcomes of LBW and other adverse outcomes at older maternal ages. Third, and relatedly, the relatively small number of mothers with more than one birth within each maternal skin tone group precludes fixed effects or trajectory models that examine within-person change in risks of LBW across maternal age. Such models would allow us to better interrogate within-person aging and changes in risks of birth outcomes over time. Still, an advantage of the random effects model used here is the incorporation of births to mothers with a single pregnancy, as these mothers may vary systematically on pertinent characteristics from mothers who have multiple births.

Fourth, the use of interviewer-ascribed skin tone measures a single dimension of colorism, namely society's perceptions of the respondent. The use of interviewer-ascribed skin tone allows for the examination of how one's socially assigned social status impacts weathering and birth outcomes (Cobb et al. 2016; Monk 2015), whereas self-reported measures of skin tone better capture one's own perception of their racialized social interactions and experiences across their life course (Monk 2015; Slaughter-Acey et al. 2020). Future studies should consider how self-reported skin tone shapes weathering processes related to birth outcomes and compare how the results differ from interviewer-ascribed measures presented here. Importantly, there is no single or "correct" way to measure the complexity of colorism (Monk 2015). Interviewer-ascribed and self-reported skin tone measure distinct but related components of colorism, making it important for studies to consider the aging and birth-related consequences of both.

Fifth, interviewers' perceptions of skin tone may vary based on their race, such that white interviewers may more often report darker skin tones for Black respondents compared to similar reports by Black interviewers (Hill 2002; Roth 2016). This means that interview-ascribed measures of skin tone may differ for two individuals with quite similar skin tones based on an interviewer's race. Indeed, in Add Health, interviewers who identified as Black were less likely to report dark skin tones (Black) for NH Black mothers compared to interviewers identifying as any other race. Ancillary analyses that include an indicator measure of the interviewer's race (Black=1) in the full model demonstrate substantively similar results to those presented in this paper, suggesting that unaccounted-for differences in skin tone ascriptions across interviewer race may not bias results.

Future work should also consider how the results presented here vary across generational cohorts. Prior work suggests that sociopolitical contexts shape the relationship between skin tone and health, and particularly birth outcomes, across generations (Slaughter-Acey et al. 2020). Although the findings presented here are informative, they may uniquely apply to the population of NH Black women who grew up in the US in the 1980s and 1990s. As the sociopolitical climate continues to change, both exposure to and the internalization of colorism may have changed over time, thus altering weathering patterns across skin tones for younger generations of women.

4.5 Conclusion

In the US, adverse birth outcomes are concentrated among NH Black and other women of color. The weathering hypothesis theorizes that these inequities are at least partially driven by sustained and accumulative exposure to racialized stressors, which lead to early onsets of disease and accelerated health deterioration among racially minoritized groups (Geronimus 1992, 1996). A large literature demonstrates how NH Black women in the US experience accelerated aging and increased risks of adverse birth outcomes across maternal age (Forde et al. 2019). However, many of these studies focus on a single dimension of racism, defined by self-identified race, and do not explore how other dimensions of racism in the US may shape age-health relationships. A burgeoning literature on skin tone stratification and health suggests that skin tone bias is an important, distinct, and often overlooked dimension of racism in the US context that shapes health outcomes, with particularly strong relationships among NH Black women (Hargrove 2018b; Roth 2016; Slaughter-Acey et al. 2020). Thus, this study extends the weathering hypothesis to consider if the relationship between maternal age and low birth weight, an important birth outcome and measure of infant health, varies across maternal skin tone for NH Black women. Results suggest heterogeneity in the weathering process, such that risks of low birth weight increase across maternal age for births to NH Black women with dark, but not medium, skin tones. These findings align with previous work demonstrating higher risks of adverse health outcomes and accelerating aging among NH Black women with darker skin tones (Hargrove 2018b) and underscore the importance of examining how multiple dimensions of racism contribute to health inequities in the US.

5. Conclusion

In the US, adverse birth outcomes are concentrated in the South and Midwest and among racially minoritized groups. These disparate outcomes at birth are intrinsically connected to maternal well-being and have long-lasting consequences that shape later life socioeconomic status and health. Thus, understanding the structural and social determinants of these disparities is important for not only clarifying current health inequities but also for improving outcomes and disparities across the life course. In this dissertation, I examine how both structural factors—measured by state policies and broad policy contexts—and social factors—measured by an indicator of skin-tone-related experiences of discrimination—determine risks of preterm birth, low birth weight, and infant mortality across time, states, and within and across maternal race and ethnicity.

In Chapter 2, I find that state policies limiting access to reproductive care can have deleterious effects on rates of preterm birth and infant mortality. Focusing on two pieces of Texas legislation that limited access to family planning (2011) and abortion (2013) services, I find that standardized rates of preterm birth increase slightly and temporarily across all maternal race-ethnicity groups following the 2013 legislation, while rates of infant mortality increased sharply in the year following the 2011 family planning funding cuts but only for births to NH Black mothers. Because I also find that the numbers of births increased between the years 2011 and 2016 across maternal race and ethnicity, it is important to note that even stagnate rates of preterm birth and infant mortality would still contribute to increasing numbers of adverse birth outcomes in the years following the enactment of the policies. With the overturning of *Roe v. Wade* in

2022, these findings are particularly timely and point to the need to address the likely infant health consequences of emerging state policies that restrict access to abortion and contraception care. Importantly, the findings also underscore the need to consider how racialized experiences may place Black infants at higher risks of adverse outcomes following restrictive legislation.

Chapter 3 demonstrates how state policies and related factors may combine and relate to low birth weight and infant mortality, with three important takeaways. First, the chapter joins prior work in finding that more liberal or generous policy orientations may be protective of health. Second, beyond liberalness or welfare generosity, the results suggest that there are likely other policy dimensions—such as constituent or community engagement—that should be considered when examining how to improve population health. Together, these findings help clarify the disparate rates of adverse birth outcomes across US states. Third, research and policy evaluations should continue to interrogate heterogeneity in the relationship between policy contexts—including both those thought to be harmful or beneficial—and health across race and ethnicity to clarify how certain policies and contexts may contribute to or exacerbate health inequities.

Chapter 4 adds to growing literature that separately considers how maternal life course stressors contribute to birth inequities and how heterogeneity in racialized experiences within race shape health outcomes. Results demonstrate a clear weathering pattern across maternal age for dark compared to medium complexioned NH Black mothers when examining risks of low birth weight. Supplemental analyses confirm that, regardless of skin tone, all Black mothers experience a weathering in the risks of low birth weight across maternal age compared to NH white mothers. These findings underscore the importance of considering multiple dimensions of racism and racialized discrimination to clarify the relationship between racism and health. They also extend skin tone stratification research to demonstrate the transgenerational consequences of discrimination.

Overall, this dissertation demonstrates how structural and social factors contribute to disparate risks of adverse birth and infant health outcomes, including preterm birth, low birth weight, and infant mortality. Future research should continue to explore how policies and state factors combine to impact health and related disparities and if life course stressors, including early life adversities, have long-term consequences that shape offspring's health. Furthermore, policies and programs that seek to reduce overall rates of adverse birth outcomes and mitigate disparities across states and race-ethnicity must consider how racialized experiences and stressors shape both the risks of adverse outcomes and the effectiveness of those policies or interventions.

Appendix A. Additional Information for Chapter 2

A.1 Total Fertility Rates for Texas, 2005-2017

Figure 11 presents the Total Fertility Rates (TFR) for Texas women between 2005 and 2017. TFR estimates the average number of births a hypothetical woman will have over her lifetime assuming the current age-specific birth rates are constant over her reproductive years. Because the TFR uses age-specific rates, it is not responsive to changes in the size or age distribution of women of reproductive age and thus can be used to compare the fertility patterns of a population over time. Below, Figure 11 suggests three clear changes in fertility patterns in Texas between 2005 and 2017. First, the TFR begins decreasing after 2007, which coincides with the implementation of the Women's Health Program. Second, the TFR flattened after 2011, suggesting a sudden stagnation in the decreasing rates. Third, the TFR rose slightly after the implementation of restrictions on abortion providers in 2013 before beginning to decrease again in 2015. While it would be more informative to examine the TFR over time across the four maternal race, ethnicity, and nativity groups included in this study, reliable estimates of the age-specific population counts for these groups are not available.

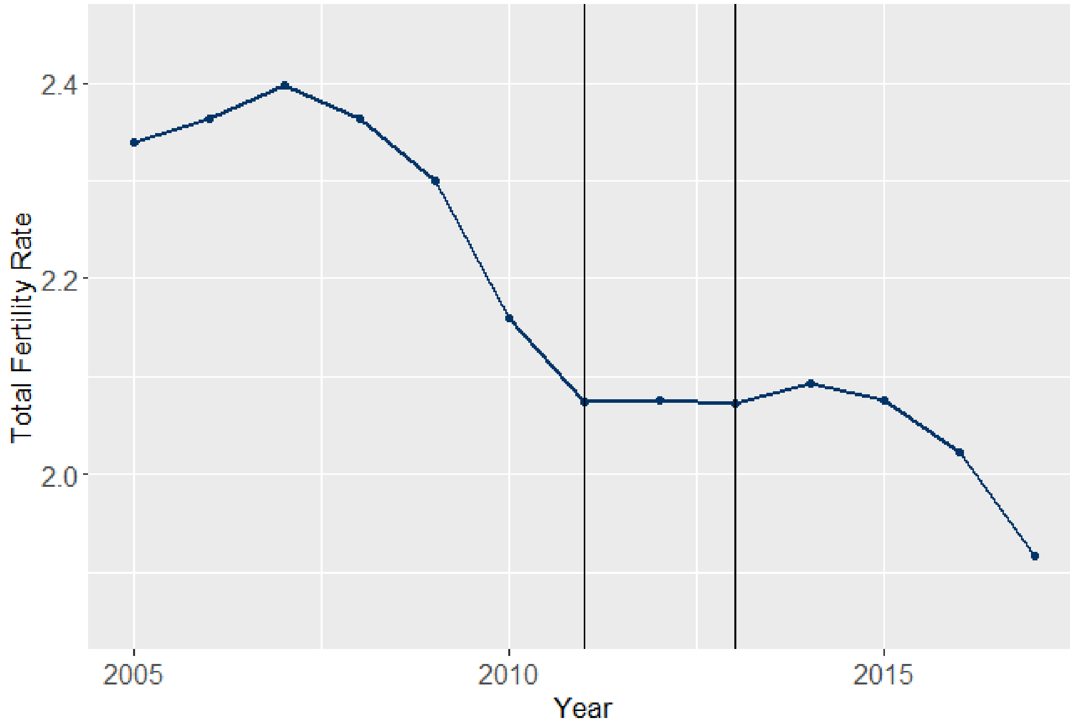

Figure 11: Total Fertility Rates, Texas, 2005-2017

A.2 Factor-Standardized Rates of Preterm Birth and Infant Mortality, 2005-2017

Tables 7 and 8 present the 2005-2017 factor-standardized rates of preterm birth and infant mortality, respectively, for each maternal race and ethnicity group. These values are presented graphically in Figures 5 (preterm birth) and 6 (infant mortality).

Table 7: Factor-Standardized Rates of Preterm Birth, Texas, US, 2005-2017

Population	Year	Age	Education	Prenatal Care	Rate
Hispanic, Foreign-Born	2005	12.05	12.09	12.02	11.54
	2006	12.05	12.08	11.98	11.67
	2007	12.04	12.04	11.94	12.04
	2008	12.05	12.03	11.88	12.04
	2009	12.03	12.02	11.93	12.02
	2010	12.02	12.02	12.00	12.37

	2011	12.01	12.01	12.04	12.29
	2012	12.00	11.99	12.04	11.82
	2013	11.99	11.97	12.03	11.91
	2014	11.99	11.95	12.01	12.15
	2015	11.98	11.93	12.01	11.52
	2016	11.98	11.91	12.00	12.00
	2017	11.98	11.85	11.99	12.53
Hispanic, US-Born	2005	14.38	13.92	13.78	14.45
	2006	14.38	13.90	13.76	14.99
	2007	14.38	13.87	13.73	14.83
	2008	14.36	13.83	13.73	14.45
	2009	14.36	13.81	13.71	14.03
	2010	14.36	13.78	13.75	14.02
	2011	14.38	13.74	13.77	13.72
	2012	14.39	13.70	13.76	13.03
	2013	14.40	13.67	13.77	12.97
	2014	14.42	13.65	13.75	13.17
	2015	14.42	13.64	13.75	12.83
	2016	14.43	13.63	13.75	12.97
	2017	14.45	13.59	13.75	13.35
NH Black, US-Born	2005	18.64	17.51	17.44	18.91
	2006	18.65	17.50	17.40	18.77
	2007	18.63	17.45	17.38	18.44
	2008	18.62	17.42	17.38	17.70
	2009	18.62	17.42	17.36	17.84
	2010	18.65	17.44	17.37	17.82
	2011	18.70	17.41	17.40	17.14
	2012	18.72	17.38	17.39	16.97
	2013	18.74	17.36	17.40	16.45
	2014	18.78	17.32	17.40	16.67
	2015	18.77	17.30	17.40	16.32
	2016	18.79	17.30	17.39	16.24
	2017	18.80	17.30	17.38	16.90
NH White	2005	12.90	11.49	11.46	12.65
	2006	12.90	11.49	11.44	12.43
	2007	12.90	11.47	11.42	12.33
	2008	12.90	11.46	11.41	12.03

	2009	12.89	11.45	11.41	11.73
	2010	12.90	11.44	11.42	11.59
	2011	12.91	11.42	11.43	11.22
	2012	12.92	11.41	11.43	11.02
	2013	12.93	11.40	11.43	10.78
	2014	12.93	11.39	11.43	10.87
	2015	12.93	11.39	11.43	10.76
	2016	12.94	11.38	11.43	10.55
	2017	12.94	11.38	11.43	10.62

Table 8: Factor-Standardized Rates of Infant Mortality, Texas, US, 2005-2017

Population	Year	Age	Education	Prenatal Care	Rate
Hispanic, Foreign-Born	2005	4.63	4.63	4.62	4.72
	2006	4.66	4.65	4.63	4.76
	2007	4.65	4.64	4.63	4.39
	2008	4.64	4.64	4.66	4.89
	2009	4.64	4.63	4.63	4.61
	2010	4.64	4.64	4.63	4.84
	2011	4.64	4.63	4.62	4.70
	2012	4.63	4.63	4.61	4.57
	2013	4.64	4.61	4.62	4.68
	2014	4.63	4.62	4.63	4.77
	2015	4.62	4.62	4.60	4.53
	2016	4.62	4.59	4.63	3.86
	2017	4.63	4.61	4.63	4.83
Hispanic, US-Born	2005	5.73	5.56	5.43	5.72
	2006	5.73	5.52	5.45	5.63
	2007	5.72	5.52	5.48	6.01
	2008	5.72	5.51	5.47	5.73
	2009	5.72	5.48	5.47	5.24
	2010	5.72	5.46	5.45	5.38
	2011	5.72	5.44	5.44	5.09
	2012	5.71	5.42	5.44	5.11
	2013	5.69	5.38	5.44	5.27
	2014	5.72	5.39	5.42	5.28

	2015	5.70	5.38	5.42	5.29
	2016	5.71	5.37	5.43	5.55
	2017	5.66	5.33	5.41	5.49
NH Black, US-Born	2005	11.20	10.52	10.44	11.46
	2006	11.21	10.52	10.47	11.31
	2007	11.20	10.48	10.51	11.48
	2008	11.19	10.46	10.47	10.55
	2009	11.24	10.45	10.49	10.40
	2010	11.23	10.47	10.49	9.88
	2011	11.24	10.46	10.47	9.77
	2012	11.25	10.43	10.48	11.24
	2013	11.29	10.44	10.47	9.87
	2014	11.27	10.44	10.43	10.52
	2015	11.24	10.38	10.35	9.78
	2016	11.32	10.42	10.41	9.96
	2017	11.21	10.40	10.39	9.69
NH White	2005	5.67	4.96	4.84	5.47
	2006	5.64	4.95	4.87	5.17
	2007	5.67	4.93	4.90	4.96
	2008	5.66	4.91	4.90	4.83
	2009	5.65	4.89	4.91	5.14
	2010	5.64	4.88	4.91	5.16
	2011	5.63	4.86	4.89	4.60
	2012	5.62	4.85	4.89	4.69
	2013	5.61	4.83	4.90	4.88
	2014	5.60	4.82	4.83	4.68
	2015	5.58	4.82	4.83	4.51
	2016	5.57	4.82	4.83	4.67
	2017	5.57	4.81	4.82	4.58

A.3 Standardization and Decomposition Results: Very Preterm Birth and Neonatal Mortality

Below, Figures 12 and 13 demonstrate increases in the age-education-prenatal care standardized rates of very preterm birth (Figure 12) and neonatal infant mortality

(Figure 13) among births to US-born NH Black mothers. Very preterm birth identifies those births occurring between 28 and 32 weeks of gestation, and neonatal infant mortality measures deaths occurring within the first 27 days of life.

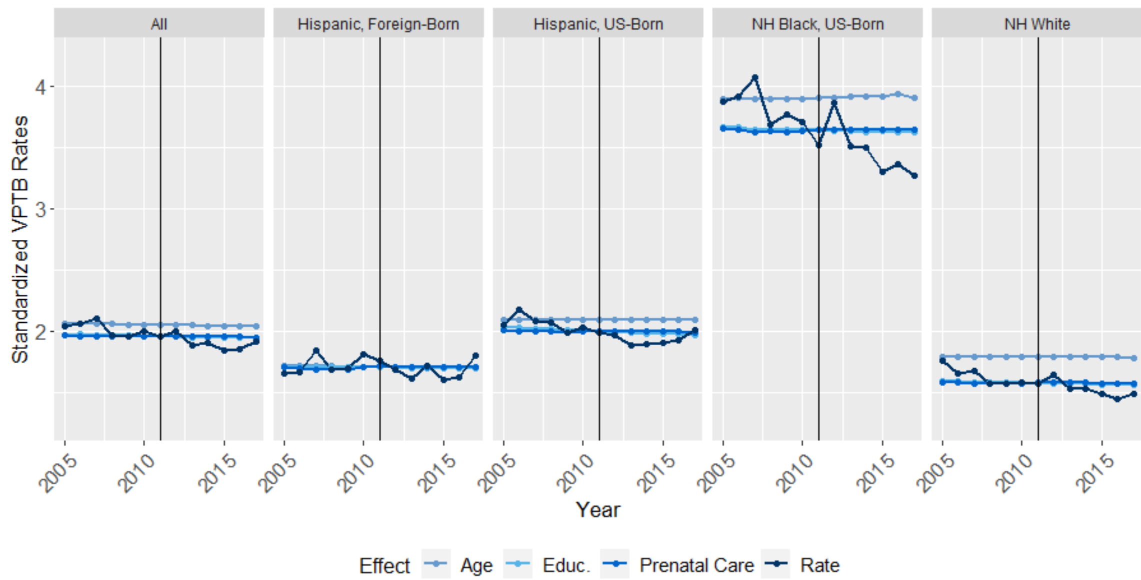

Figure 12: Factor-Standardized Rates of Very Preterm Birth, Texas, US, 2005-2017

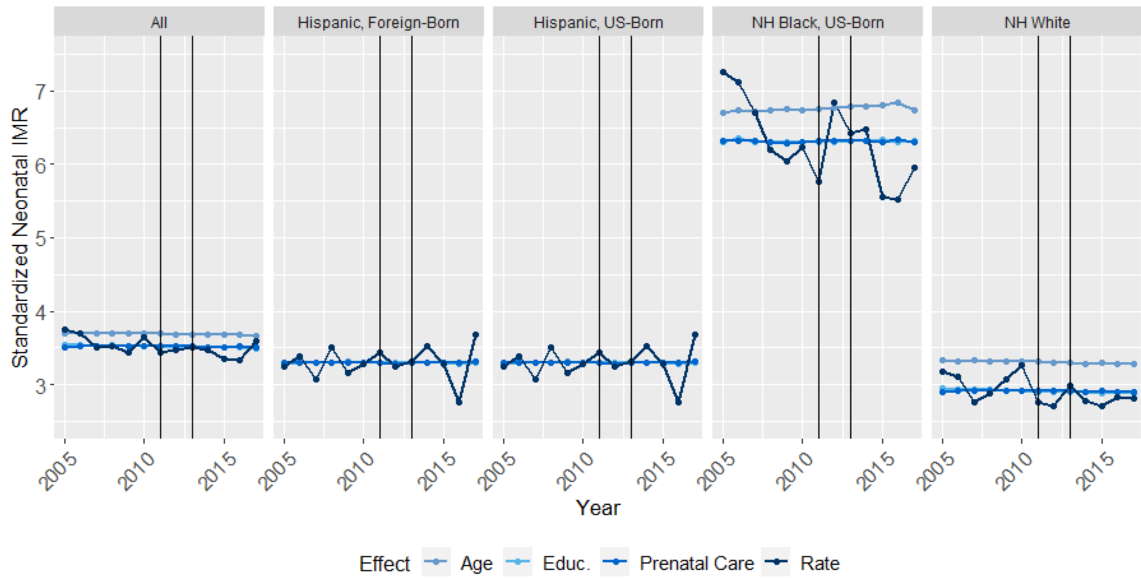

Figure 13: Factor-Standardized Rates of Neonatal Infant Mortality, Texas, US, 2005-2017

A.4 Numbers of births in the US, 2005-2017

Figure 14 presents the number of births between 2005 to 2017 for all births occurring in the US and for births to Louisiana and Oklahoma residents. Results demonstrate that the increases in births after 2011 presented in the main analyses are unique to Texas and are not reflected in the broader US or more local Louisiana and Oklahoma contexts.

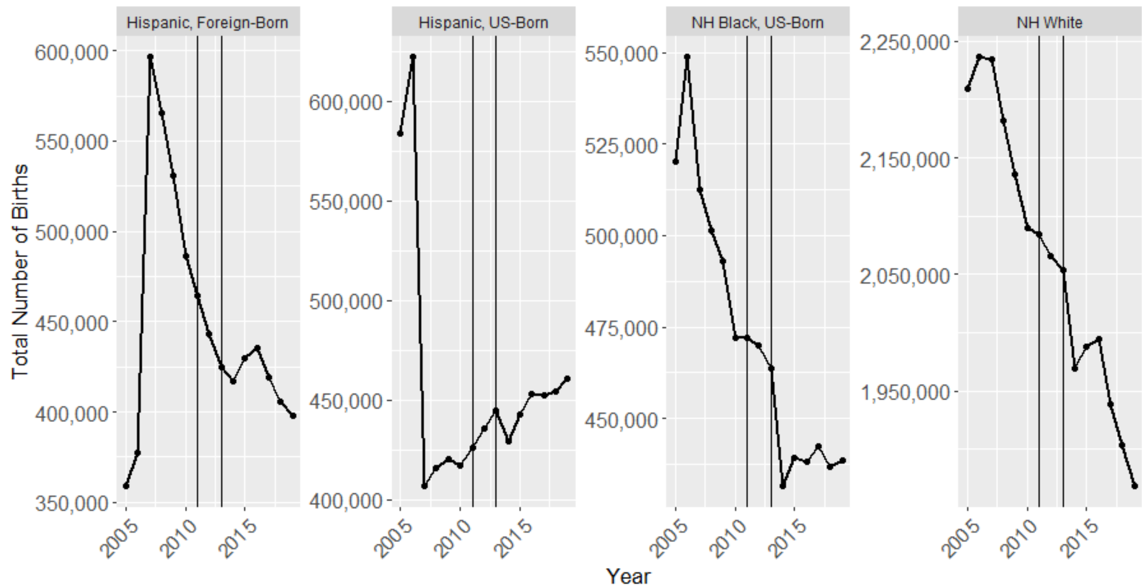

Figure 14: Total Number of Births in the US, 2005-2017

A.5 Standardization and Decomposition Results: US, Louisiana, Oklahoma

Figures 15 and 16 display the age-education-prenatal care standardized rates (i.e., the rate effects) for preterm birth and infant mortality, respectively, for all births occurring in the US, Louisiana, and Oklahoma. Results demonstrate that the rising standardized IMR after 2011 among NH Black births and the single-year increases in standardized rates of PTB after 2013 are not reflected in the broader US or more local Louisiana and Oklahoma contexts. Standardized rates are not calculated for foreign-born Hispanic births in Louisiana and Oklahoma due to low numbers of births.

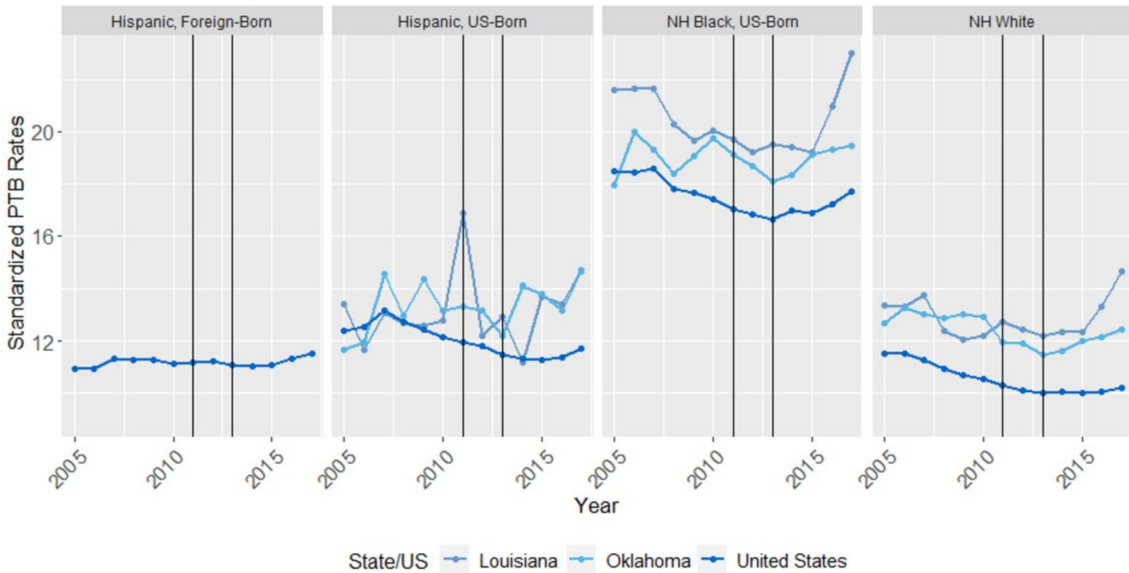

Figure 15: Standardized Rate Effects for Preterm Birth, US, Louisiana, and Oklahoma, 2005-2017

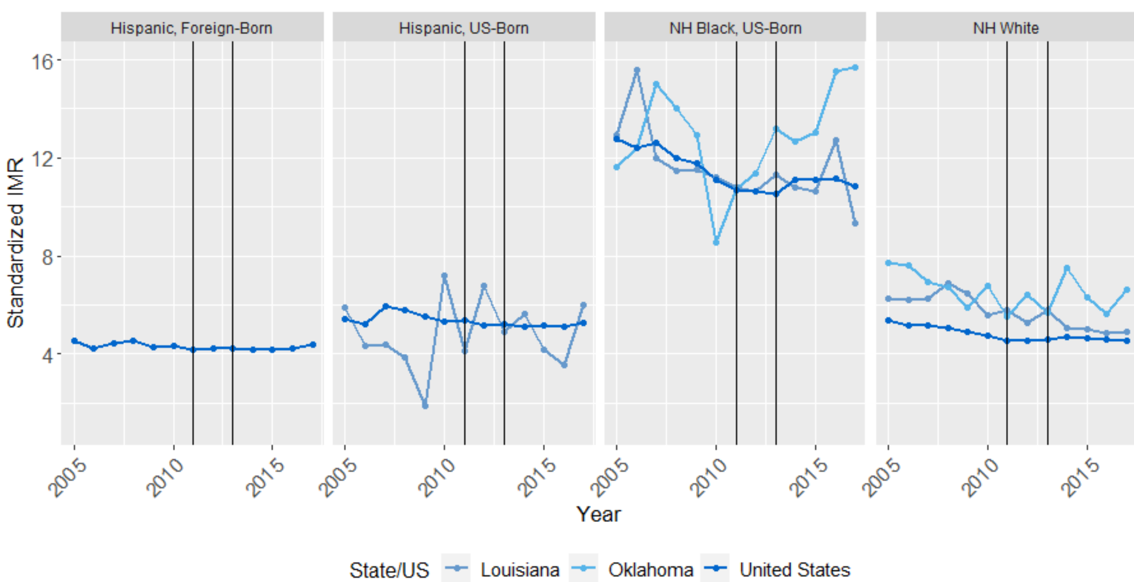

Figure 16: Standardized Rate Effects for Infant Mortality, US, Louisiana, and Oklahoma, 2005-2017

Appendix B. Additional Information for Chapter 3

Table 9: Fit Indices for Latent Profile Models

Number of Est. Profiles	BIC	AIC	Likelihood Ratio Test (p-value)	Entropy
Two	-508.181	-544.51	0.000	0.883
Three	-515.757	-565.47	0.000	0.932
Four	-501.862	-570.695	0.005	0.895

Note: The Likelihood Ratio Test considers if the added complexity of a model with n profiles is a significantly better fit than a model with n-1 number of profiles. Models estimating five and six profiles are not included in this table because the models were not identified.

Table 10: State-level Measures of Socioeconomic and Policy Indicators, Posterior Probabilities of Latent Profile Membership, and Predicted State Profiles (2018)

State	Socioeconomic and Policy Indicators						Posterior Probability of Profile Membership			Predicted Policy Context Profile
	Voter Turnout	*GDP / capita (1000s $)*	*TANF Cases (/ 1,000)*	*Cig. Tax*	*Gini Coeff.*	*Repro. Rights Index*	*LI*	*HI*	*HCE*	
Alabama	0.47	40.60	3.77	0.68	0.48	0.24	1.00	0.00	0.00	Low Intervention
Arizona	0.47	43.55	2.08	2.00	0.47	0.48	0.88	0.00	0.12	Low Intervention
Arkansas	0.41	38.97	2.06	1.15	0.48	0.04	1.00	0.00	0.00	Low Intervention
Florida	0.54	43.54	3.12	1.34	0.49	0.47	0.93	0.00	0.07	Low Intervention
Georgia	0.54	50.33	1.96	0.37	0.48	0.18	1.00	0.00	0.00	Low Intervention
Idaho	0.49	40.27	1.70	0.57	0.45	0.22	1.00	0.00	0.00	Low Intervention
Indiana	0.47	49.18	1.81	1.00	0.45	0.23	1.00	0.00	0.00	Low Intervention
Kansas	0.51	53.10	1.44	1.29	0.46	0.21	1.00	0.00	0.00	Low Intervention
Kentucky	0.49	41.97	8.48	0.60	0.48	0.07	1.00	0.00	0.00	Low Intervention
Louisiana	0.45	50.94	2.97	1.08	0.49	0.15	1.00	0.00	0.00	Low Intervention
Michigan	0.58	47.13	3.05	2.00	0.47	0.11	0.98	0.00	0.02	Low Intervention
Mississippi	0.44	34.50	2.78	0.68	0.48	0.02	1.00	0.00	0.00	Low Intervention
Missouri	0.53	46.54	3.50	0.17	0.46	0.16	1.00	0.00	0.00	Low Intervention
Nebraska	0.52	59.29	5.18	0.64	0.44	0.10	1.00	0.00	0.00	Low Intervention
North Carolina	0.49	47.91	2.46	0.45	0.48	0.25	1.00	0.00	0.00	Low Intervention
North Dakota	0.59	69.75	3.31	0.44	0.46	0.05	1.00	0.00	0.00	Low Intervention
Ohio	0.51	51.85	7.76	1.60	0.47	0.08	0.99	0.00	0.01	Low Intervention
Oklahoma	0.42	49.88	3.53	1.03	0.47	0.24	1.00	0.00	0.00	Low Intervention
South Carolina	0.45	40.76	3.46	0.57	0.47	0.26	1.00	0.00	0.00	Low Intervention
South Dakota	0.53	52.91	6.81	1.53	0.45	0.04	0.99	0.00	0.01	Low Intervention
Tennessee	0.45	47.80	6.98	0.62	0.48	0.07	1.00	0.00	0.00	Low Intervention

Texas	0.46	59.83	1.93	1.41	0.48	0.20	1.00	0.00	0.00	Low Intervention
Utah	0.51	50.36	2.64	1.70	0.43	0.28	0.94	0.00	0.06	Low Intervention
Virginia	0.54	56.11	3.98	0.30	0.47	0.29	1.00	0.00	0.00	Low Intervention
West Virginia	0.43	39.62	7.15	1.20	0.46	0.39	0.99	0.00	0.01	Low Intervention
Wyoming	0.48	65.86	2.16	0.60	0.44	0.37	0.99	0.00	0.01	Low Intervention
California	0.49	68.97	19.39	2.87	0.49	0.83	0.00	1.00	0.00	High Intervention
Connecticut	0.55	68.58	6.43	4.35	0.50	0.99	0.00	1.00	0.00	High Intervention
Hawaii	0.40	58.18	8.57	3.20	0.44	1.00	0.00	0.94	0.07	High Intervention
Massachusetts	0.55	73.53	7.57	3.51	0.48	0.62	0.00	0.96	0.04	High Intervention
New York	0.46	73.51	10.39	4.35	0.51	0.93	0.00	1.00	0.00	High Intervention
Rhode Island	0.48	50.67	9.44	4.25	0.48	0.52	0.00	0.99	0.01	High Intervention
Alaska	0.55	72.22	9.81	2.00	0.42	0.64	0.00	0.00	1.00	High Constituent Eng.
Colorado	0.61	59.93	6.35	0.84	0.46	0.62	0.01	0.00	0.99	High Constituent Eng.
Delaware	0.51	65.01	10.70	2.10	0.46	0.39	0.01	0.00	0.99	High Constituent Eng.
Illinois	0.52	60.50	1.74	1.98	0.48	0.71	0.02	0.00	0.98	High Constituent Eng.
Iowa	0.58	54.65	6.33	1.36	0.44	0.47	0.06	0.00	0.94	High Constituent Eng.
Maine	0.60	42.90	5.62	2.00	0.45	0.67	0.00	0.00	1.00	High Constituent Eng.
Maryland	0.54	61.11	7.14	2.00	0.45	0.77	0.00	0.00	1.00	High Constituent Eng.
Minnesota	0.64	59.56	7.28	3.61	0.45	0.51	0.00	0.01	0.99	High Constituent Eng.
Montana	0.61	43.58	9.13	1.70	0.46	0.51	0.01	0.00	0.99	High Constituent Eng.
Nevada	0.47	49.48	7.77	1.80	0.46	0.57	0.08	0.00	0.92	High Constituent Eng.
New Hampshire	0.54	56.03	5.01	1.78	0.44	0.59	0.01	0.00	0.99	High Constituent Eng.
New Jersey	0.54	62.54	2.78	2.70	0.48	0.76	0.00	0.04	0.96	High Constituent Eng.
New Mexico	0.47	44.73	12.37	1.66	0.48	0.67	0.01	0.00	0.99	High Constituent Eng.
Oregon	0.61	51.79	7.94	1.33	0.46	0.96	0.00	0.00	1.00	High Constituent Eng.
Pennsylvania	0.52	55.61	8.82	2.60	0.47	0.34	0.03	0.00	0.97	High Constituent Eng.
Vermont	0.56	47.65	7.83	3.08	0.45	0.94	0.00	0.02	0.98	High Constituent Eng.
Washington	0.58	68.01	7.31	3.03	0.46	0.95	0.00	0.23	0.77	High Constituent Eng.

Wisconsin	0.61	51.94	5.50	2.52	0.45	0.23	0.05	0.00	0.95	High Constituent Eng.

Notes: The state-level socioeconomic and political measures are indicators of the socioeconomic and political conditions that compose the structural determinants of health inequities, as proposed by the World Health Organization. Voter turnout is a measure of governance and is calculated as the percentage of all eligible voters (Election Project). GDP per capita in thousands of dollars (US BEA) and is a measure of macroeconomic policy. TANF caseloads per 1,000 residents (Urban Institute) is a measure of social policy. Tax on a pack of cigarettes (CDC) is a measure of public health policy. Gini coefficient is a measure of social capital and cohesion (US Census Bureau). The reproductive rights index is a composite score of select measures related to abortion and adoption care (Institute for Women's Policy Research). State policy profiles and each state's posterior probability of membership and predicted profile were estimated using LPA.

References

Aaronson, Becca. 2013. "Legislature Restores Some Family Planning Cuts." *The New York Times*, August 9.

Abrevaya, Jason. 2001. "The Effects of Demographics and Maternal Behavior on the Distribution of Birth Outcomes." *Empirical Economics* 26:247–57.

ACLU of Texas. 2021. "A Recent History of Restrictive Abortion Laws in Texas." Retrieved February 14, 2023 (https://www.aclutx.org/en/recent-history-restrictive-abortion-laws-texas).

Adams, Elizabeth A., Beth E. Kurtz-Costes, and Adam J. Hoffman. 2016. "Skin Tone Bias among African Americans: Antecedents and Consequences across the Life Span." *Developmental Review* 40:93–116. doi: 10.1016/j.dr.2016.03.002.

Aizer, A., and J. Currie. 2014. "The Intergenerational Transmission of Inequality: Maternal Disadvantage and Health at Birth." *Science* 344(6186):856–61. doi: 10.1126/science.1251872.

Akseer, Nadia, Emily Catherine Keats, Pravheen Thurairajah, Simon Cousens, Ana Pilar Bétran, Brietta M. Oaks, David Osrin, Ellen Piwoz, Exnevia Gomo, Faruk Ahmed, Henrik Friis, José Belizán, Kathryn Dewey, Keith West, Lieven Huybregts, Lingxia Zeng, Michael J. Dibley, Noel Zagre, Parul Christian, Patrick Wilfried Kolsteren, Pernille Kaestel, Robert E. Black, Shams El Arifeen, Ulla Ashorn, Wafaie Fawzi, and Zulfiqar Ahmed Bhutta. 2022. "Characteristics and Birth Outcomes of Pregnant Adolescents Compared to Older Women: An Analysis of Individual Level Data from 140,000 Mothers from 20 RCTs." *EClinicalMedicine* 45:101309. doi: 10.1016/j.eclinm.2022.101309.

Allen, Amani M., Yijie Wang, David H. Chae, Melisa M. Price, Wizdom Powell, Teneka C. Steed, Angela Rose Black, Firdaus S. Dhabhar, Leticia Marquez-Magaña, and Cheryl L. Woods-Giscombe. 2019. "Racial Discrimination, the Superwoman Schema, and Allostatic Load: Exploring an Integrative Stress-coping Model among African American Women." *Annals of the New York Academy of Sciences* 1457(1):104–27. doi: 10.1111/nyas.14188.

American Sociological Association. 2003. *The Importance of Collecting Data and Doing Social Scientific Research on Race*. Washington, DC: American Sociological Association.

Avison, William R. 2010. "Incorporating Children's Lives into a Life Course Perspective on Stress and Mental Health." *Journal of Health and Social Behavior* 51(4):361–75. doi: 10.1177/0022146510386797.

Baeva, Sonia, Natalie Archer, Karen Ruggiero, Manda Hall, Julie Stagg, Evelyn Interis, Rachelle Vega, Evelyn Delgado, John Hellerstedt, Gary Hankins, Lisa Hollier, and Texas Maternal Mortality and Morbidity Task Force. 2016. "Maternal Mortality in Texas." *American Journal of Perinatology* 34(06):614–20. doi: 10.1055/s-0036-1595809.

Baldwin, L. M., E. H. Larson, F. A. Connell, D. Nordlund, K. C. Cain, M. L. Cawthon, P. Byrns, and R. A. Rosenblatt. 1998. "The Effect of Expanding Medicaid Prenatal Services on Birth Outcomes." *American Journal of Public Health* 88(11):1623–29. doi: 10.2105/AJPH.88.11.1623.

Barfield, Wanda D. 2018. "Public Health Implications of Very Preterm Birth." *Clinics in Perinatology* 45(3):565–77. doi: 10.1016/j.clp.2018.05.007.

Barker, D. J. 1995. "Fetal Origins of Coronary Heart Disease." *BMJ (Clinical Research Ed.)* 311(6998):171–74. doi: 10.1136/bmj.311.6998.171.

Baum, Sarah E., Kari White, Kristine Hopkins, Joseph E. Potter, and Daniel Grossman. 2016. "Women's Experience Obtaining Abortion Care in Texas after Implementation of Restrictive Abortion Laws: A Qualitative Study." *PLOS ONE* 11(10):e0165048. doi: 10.1371/journal.pone.0165048.

Beckfield, Jason, and Clare Bambra. 2016. "Shorter Lives in Stingier States: Social Policy Shortcomings Help Explain the US Mortality Disadvantage." *Social Science & Medicine* 171:30–38. doi: 10.1016/j.socscimed.2016.10.017.

Bergqvist, Kersti, Monica Åberg Yngwe, and Olle Lundberg. 2013. "Understanding the Role of Welfare State Characteristics for Health and Inequalities – an Analytical Review." *BMC Public Health* 13(1):1234. doi: 10.1186/1471-2458-13-1234.

Berlin, Kristoffer S., Natalie A. Williams, and Gilbert R. Parra. 2014. "An Introduction to Latent Variable Mixture Modeling (Part 1): Overview and Cross-Sectional Latent Class and Latent Profile Analyses." *Journal of Pediatric Psychology* 39(2):174–87. doi: 10.1093/jpepsy/jst084.

Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. 2007. "From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes." *The Quarterly Journal of Economics* 122(1):409–39.

Blumenshine, Philip, Susan Egerter, Colleen J. Barclay, Catherine Cubbin, and Paula A. Braveman. 2010. "Socioeconomic Disparities in Adverse Birth Outcomes: A Systematic Review." *American Journal of Preventive Medicine* 39(3):263–72. doi: 10.1016/j.amepre.2010.05.012.

Bonilla-Silva, Eduardo. 2017. *Racism without Racists: Color-Blind Racism and the Persistence of Racial Inequality in America, Fifth Edition*. Rowman & Littlefield Publishers.

Brisendine, Anne E., Whitney S. Rice, Samantha S. Goldfarb, and Martha S. Wingate. 2020. "The Weathering Hypothesis and Stillbirth: Racial Disparities across the Life Span." *Ethnicity & Health* 25(3):354–66. doi: 10.1080/13557858.2017.1420145.

Brown, Clare C., Jennifer E. Moore, Holly C. Felix, M. Kathryn Stewart, T. Mac Bird, Curtis L. Lowery, and J. Mick Tilford. 2019. "Association of State Medicaid Expansion Status With Low Birth Weight and Preterm Birth." *JAMA* 321(16):1598–1609. doi: 10.1001/jama.2019.3678.

CDC. 2020a. "Infant Mortality Rates by State." *Stats of the States*. Retrieved February 3, 2021 (https://www.cdc.gov/nchs/pressroom/sosmap/infant_mortality_rates/infant_mortality.htm).

CDC. 2020b. "Percentage of Babies Born Low Birthweight By State." *Stats of the States - Low Birthweight Births*. Retrieved March 9, 2020 (https://www.cdc.gov/nchs/pressroom/sosmap/lbw_births/lbw.htm).

CDC. 2020c. "State Tobacco Activities Tracking and Evaluation (STATE) System." Retrieved March 16, 2020 (https://www.cdc.gov/statesystem/index.html).

Center for Reproductive Rights. 2018. *The Undue Burden Standard After Whole Woman's Health v. Hellerstedt*.

Chen, Alice, Emily Oster, and Heidi Williams. 2016. "Why Is Infant Mortality Higher in the United States Than in Europe?" *American Economic Journal. Economic Policy* 8(2):89–124. doi: 10.1257/pol.20140224.

Cobb, Ryon J., Courtney S. Thomas, Whitney N. Laster Pirtle, and William A. Darity. 2016. "Self-Identified Race, Socially Assigned Skin Tone, and Adult Physiological Dysregulation: Assessing Multiple Dimensions of 'Race' in Health Disparities Research." *SSM - Population Health* 2:595–602. doi: 10.1016/j.ssmph.2016.06.007.

Cohen, Philip. 2016. "Maternal Age and Infant Mortality for White, Black, and Mexican Mothers in the United States." *Sociological Science* 3:32–38. doi: 10.15195/v3.a2.

Colen, Cynthia G., Arline T. Geronimus, John Bound, and Sherman A. James. 2006. "Maternal Upward Socioeconomic Mobility and Black-White Disparities in Infant Birthweight." 96(11).

Colen, Cynthia G., David M. Ramey, Elizabeth C. Cooksey, and David R. Williams. 2018. "Racial Disparities in Health among Nonpoor African Americans and Hispanics: The Role of Acute and Chronic Discrimination." *Social Science & Medicine* 199:167–80. doi: 10.1016/j.socscimed.2017.04.051.

Collins, Linda M., and Stephanie T. Lanza. 2009. *Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences*. Hoboken, UNITED STATES: John Wiley & Sons, Incorporated.

Dahl, Espen, and Kjetil A. van der Wel. 2013. "Educational Inequalities in Health in European Welfare States: A Social Expenditure Approach." *Social Science & Medicine* 81:60–69. doi: 10.1016/j.socscimed.2012.12.010.

Das Gupta, Prithwis. 1993. *Standardization and Decomposition of Rates: A User's Manual*. Washington, D.C.: US Bureau of the Census.

DeAngelis, Reed T., Taylor W. Hargrove, and Robert A. Hummer. 2022. "Skin Tone and the Health Returns to Higher Status." *Demography* 10191675. doi: 10.1215/00703370-10191675.

Dehlendorf, Christine, Maria Isabel Rodriguez, Kira Levy, Sonya Borrero, and Jody Steinauer. 2010. "Disparities in Family Planning." *American Journal of Obstetrics and Gynecology* 202(3):214–20. doi: 10.1016/j.ajog.2009.08.022.

DeLeone, Felicia Yang, Daniel T. Lichter, and Robert L. Strawderman. 2009. "Decomposing Trends in Nonmarital Fertility Among Latinas." *Perspectives on Sexual & Reproductive Health* 41(3):166–72. doi: 10.1363/4116609.

Dietz, Patricia M., Lucinda J. England, Carrie K. Shapiro-Mendoza, Van T. Tong, Sherry L. Farr, and William M. Callaghan. 2010. "Infant Morbidity and Mortality Attributable to Prenatal Smoking in the U.S." *American Journal of Preventive Medicine* 39(1):45–52. doi: 10.1016/j.amepre.2010.03.009.

Dixon, Angela R., and Edward E. Telles. 2017. "Skin Color and Colorism: Global Research, Concepts, and Measurement." *Annual Review of Sociology* 43(1):405–24. doi: 10.1146/annurev-soc-060116-053315.

Farmer, Melissa M., and Kenneth F. Ferraro. 2005. "Are Racial Disparities in Health Conditional on Socioeconomic Status?" *Social Science & Medicine* 60(1):191–204. doi: 10.1016/j.socscimed.2004.04.026.

Feagin, Joe, and Zinobia Bennefield. 2014. "Systemic Racism and U.S. Health Care." *Social Science & Medicine* 103:7–14. doi: 10.1016/j.socscimed.2013.09.006.

Fenelon, Andrew. 2013. "Geographic Divergence in Mortality in the United States." *Population and Development Review* 39(4):611–34. doi: 10.1111/j.1728-4457.2013.00630.x.

Fenelon, Andrew, and Christopher Witko. 2021. "Emerging Political and Demographic Divides: State Politics, Welfare Generosity, and Adult Mortality in U.S. States 1977–2017." *Health & Place* 71:102644. doi: 10.1016/j.healthplace.2021.102644.

Fischer, Stefanie, Heather Royer, and Corey White. 2017. "The Impacts of Reduced Access to Abortion and Family Planning Services: Evidence from Texas." *SSRN Electronic Journal*. doi: 10.2139/ssrn.3010397.

Flores, Marie E. S., Sara E. Simonsen, Tracy A. Manuck, Jane M. Dyer, and David K. Turok. 2012. "The 'Latina Epidemiologic Paradox': Contrasting Patterns of Adverse Birth Outcomes in U.S.-Born and Foreign-Born Latinas." *Women's Health Issues* 22(5):e501–7. doi: 10.1016/j.whi.2012.07.005.

Forde, Allana T., Danielle M. Crookes, Shakira F. Suglia, and Ryan T. Demmer. 2019. "The Weathering Hypothesis as an Explanation for Racial Disparities in Health: A Systematic Review." *Annals of Epidemiology* 33:1-18.e3. doi: 10.1016/j.annepidem.2019.02.011.

Freese, Jeremy, and Karen Lutfey. 2011. "Fundamental Causality: Challenges of an Animating Concept for Medical Sociology." Pp. 67–81 in *Handbook of the Sociology of Health, Illness, and Healing*, edited by B. A. Pescosolido, J. K. Martin, J. D. McLeod, and A. Rogers. New York, NY: Springer New York.

Frost, Jennifer J., Rachel Benson Gold, and Amelia Bucek. 2012. "Specialized Family Planning Clinics in the United States: Why Women Choose Them and Their Role in Meeting Women's Health Care Needs." *Women's Health Issues* 22(6):e519–25. doi: 10.1016/j.whi.2012.09.002.

Fuentes, Liza. 2023. "Inequity in US Abortion Rights and Access: The End of Roe Is Deepening Existing Divides." *Guttmacher Institute*. Retrieved February 8, 2023 (https://www.guttmacher.org/2023/01/inequity-us-abortion-rights-and-access-end-roe-deepening-existing-divides).

Fuentes, Liza, Sharon Lebenkoff, Kari White, Caitlin Gerdts, Kristine Hopkins, Joseph E. Potter, and Daniel Grossman. 2016. "Women's Experiences Seeking Abortion Care Shortly after the Closure of Clinics Due to a Restrictive Law in Texas." *Contraception* 93(4):292–97. doi: 10.1016/j.contraception.2015.12.017.

Gee, Gilbert C., Katrina M. Walsemann, and Elizabeth Brondolo. 2012. "A Life Course Perspective on How Racism May Be Related to Health Inequities." *American Journal of Public Health* 102(5):967–74. doi: 10.2105/AJPH.2012.300666.

Gemmill, Alison, Ralph Catalano, Joan A. Casey, Deborah Karasek, Héctor E. Alcalá, Holly Elser, and Jacqueline M. Torres. 2019. “Association of Preterm Births Among US Latina Women With the 2016 Presidential Election.” *JAMA Network Open* 2(7):e197084. doi: 10.1001/jamanetworkopen.2019.7084.

Gerdts, Caitlin, Liza Fuentes, Daniel Grossman, Kari White, Brianna Keefe-Oates, Sarah E. Baum, Kristine Hopkins, Chandler W. Stolp, and Joseph E. Potter. 2016. “Impact of Clinic Closures on Women Obtaining Abortion Services After Implementation of a Restrictive Law in Texas.” *American Journal of Public Health* 106(5):857–64. doi: 10.2105/AJPH.2016.303134.

Geronimus, Arline T. 1992. “The Weathering Hypothesis and the Health of African-American Women and Infants: Evidence and Speculations.” *Ethnicity & Disease* 2:207–21.

Geronimus, Arline T. 1996. “Black/White Differences in the Relationship of Maternal Age to Birthweight: A Population-Based Test of the Weathering Hypothesis.” *Social Science & Medicine* 42(4):589–97. doi: 10.1016/0277-9536(95)00159-X.

Geronimus, Arline T., Margaret T. Hicken, Danya Kenne, and John Bound. 2006. “‘Weathering’ and Age Patterns of Allostatic Load Scores Among Blacks and Whites in the United States.” *American Journal of Public Health* 96(5).

Geronimus, Arline T., Jay A. Pearson, Erin Linnenbringer, Amy J. Schulz, Angela G. Reyes, Elissa S. Epel, Jue Lin, and Elizabeth H. Blackburn. 2015. “Race-Ethnicity, Poverty, Urban Stressors, and Telomere Length in a Detroit Community-Based Sample.” *Journal of Health & Social Behavior* 56(2):199–224. doi: 10.1177/0022146515582100.

Golden, Shelley D., Kurt M. Ribisl, and Krista M. Perreira. 2014. “Economic and Political Influence on Tobacco Tax Rates: A Nationwide Analysis of 31 Years of State Data.” *American Journal of Public Health* 104(2):350–57. doi: 10.2105/AJPH.2013.301537.

Goldenberg, Robert L., and Jennifer F. Culhane. 2007. “Low Birth Weight in the United States.” *The American Journal of Clinical Nutrition* 85(2):584S-590S. doi: 10.1093/ajcn/85.2.584S.

Goodchild, Mark, Anne-Marie Perucic, and Nigar Nargis. 2016. “Modelling the Impact of Raising Tobacco Taxes on Public Health and Finance.” *Bulletin of the World Health Organization* 94(4):250–57. doi: 10.2471/BLT.15.164707.

Goosby, Bridget J., Jacob E. Cheadle, and Colter Mitchell. 2018. “Stress-Related Biosocial Mechanisms of Discrimination and African American Health

Inequities.” *Annual Review of Sociology* 44(1):319–40. doi: 10.1146/annurev-soc-060116-053403.

Goosby, Bridget J., and Chelsea Heidbrink. 2013. “The Transgenerational Consequences of Discrimination on African-American Health Outcomes: Discrimination and Health.” *Sociology Compass* 7(8):630–43. doi: 10.1111/soc4.12054.

Goyal, Vinita, Isabel H. McLoughlin Brooks, and Daniel A. Powers. 2020. “Differences in Abortion Rates by Race–Ethnicity after Implementation of a Restrictive Texas Law.” *Contraception* 102(2):109–14. doi: 10.1016/j.contraception.2020.04.008.

Grossman, Daniel, Sarah Baum, Liza Fuentes, Kari White, Kristine Hopkins, Amanda Stevenson, and Joseph E. Potter. 2014a. “Change in Abortion Services after Implementation of a Restrictive Law in Texas.” *Contraception* 90(5):496–501. doi: 10.1016/j.contraception.2014.07.006.

Grossman, Daniel, Sarah Baum, Liza Fuentes, Kari White, Kristine Hopkins, Amanda Stevenson, and Joseph E. Potter. 2014b. “Change in Abortion Services after Implementation of a Restrictive Law in Texas.” *Contraception* 90(5):496–501. doi: 10.1016/j.contraception.2014.07.006.

Grossman, Daniel, Kari White, Kristine Hopkins, and Joseph E. Potter. 2017. “Change in Distance to Nearest Facility and Abortion in Texas, 2012 to 2014.” *JAMA* 317(4):437. doi: 10.1001/jama.2016.17026.

Grossman, Michael, and Steven Jacobowitz. 1981. “Variations in Infant Mortality Rates Among Counties of the United States: The Roles of Public Policies and Programs.” *Demography* 18(4):695–713. doi: 10.2307/2060956.

Guttmacher Institute. 2022. “US States Have Enacted 1,381 Abortion Restrictions since Roe v. Wade Was Decided in 1973.” *Guttmacher Institute*. Retrieved February 8, 2023 (https://www.guttmacher.org/infographic/2022/us-states-have-enacted-1381-abortion-restrictions-roe-v-wade-was-decided-1973).

Hamilton, Brady E., Joyce A. Martin, Michelle J. K. Osterman, Sally C. Curtin, and T. J. Mathews. 2015. “National Vital Statistics Reports, Volume 64, Number 12, December 23, 2015.” *National Vital Statistics Reports* 64(12):64.

Hamilton, Brady, Joyce Martin, Michelle Osterman, and Lauren Rossen. 2019. *Births: Provisional Data for 2018*. National Center for Health Statistics. doi: 10.15620/cdc:104993.

Hamilton, Erin R., Paola D. Langer, and Caitlin Patler. 2021. *DACA Associated with Improved Birth Outcomes Among Mexican-Immigrant Mothers*. *Policy Brief*. 10; 3. Center for Poverty and Inequality Research.

Hamilton, Tod G. 2015. “The Healthy Immigrant (Migrant) Effect: In Search of a Better Native-Born Comparison Group.” *Social Science Research* 54:353–65. doi: 10.1016/j.ssresearch.2015.08.008.

Hargrove, Taylor W. 2018a. “BMI Trajectories in Adulthood: The Intersection of Skin Color, Gender, and Age among African Americans.” *Journal of Health and Social Behavior* 19.

Hargrove, Taylor W. 2018b. “Light Privilege? Skin Tone Stratification in Health among African Americans.” *Sociology of Race and Ethnicity*.

Harris, Kathleen Mullan, Carolyn T. Halpern, E. Whitsel, J. Hussey, J. Tabor, P. Entzel, and J. R. Udry. 2009. “The National Longitudinal Study of Adolescent to Adult Health - Research Design.” Retrieved (http://www.cpc.unc.edu/projects/addhealth/design).

Hasstedt, Kinsey. 2014. “The State of Sexual and Reproductive Health and Rights In the State of Texas: A Cautionary Tale.” *Guttmacher Policy Review* 17(2).

Hatzenbuehler, Mark L., Seth J. Prins, Morgan Flake, Morgan Philbin, M. Somjen Frazer, Daniel Hagen, and Jennifer Hirsch. 2017. “Immigration Policies and Mental Health Morbidity among Latinos: A State-Level Analysis.” *Social Science & Medicine* 174:169–78. doi: 10.1016/j.socscimed.2016.11.040.

Healthy People. 2020. “Maternal, Infant, and Child Health.” *Healthy People 2020*. Retrieved March 23, 2020 (https://www.healthypeople.gov/2020/data-search/Search-the-Data#objid=4903;).

Hellmann, Melissa. 2017. “What Reproductive Rights Advocates Can Learn From Texas (Yes, Texas).” *YES! Magazine*. Retrieved March 7, 2023 (https://www.yesmagazine.org/social-justice/2017/03/23/what-reproductive-rights-advocates-can-learn-from-texas-yes-texas).

Hill, Mark E. 2002. “Race of the Interviewer and Perception of Skin Color: Evidence from the Multi-City Study of Urban Inequality.” *American Sociological Review* 67(1):99–108.

Homan, Patricia. 2017. “Political Gender Inequality and Infant Mortality in the United States, 1990–2012.” *Social Science & Medicine (1982)* 182:127–35. doi: 10.1016/j.socscimed.2017.04.024.

Homan, Patricia. 2019. “Structural Sexism and Health in the United States: A New Perspective on Health Inequality and the Gender System.” *American Sociological Review* 84(3):486–516. doi: 10.1177/0003122419848723.

Hopkins, Kristine, Kari White, Fran Linkin, Celia Hubert, Daniel Grossman, and Joseph E. Potter. 2015. “Women’s Experiences Seeking Publicly Funded Family Planning Services in Texas.” *Perspectives on Sexual and Reproductive Health* 47(2):63–70. doi: 10.1363/47e2815.

Horn, Brady P., Johanna Catherine Maclean, and Michael R. Strain. 2017. “Do Minimum Wage Increases Influence Worker Health?” *Economic Inquiry* 55(4):1986–2007. doi: 10.1111/ecin.12453.

Hummer, Robert A. 1993. “Racial Differentials in Infant Mortality in the U.S.: An Examination of Social and Health Determinants*.” *Social Forces* 72(2):529–54. doi: 10.1093/sf/72.2.529.

Hunter, Margaret L. 2002. “‘If You’re Light You’re Alright’: Light Skin Color as Social Capital for Women of Color.” *Gender & Society* 16(2):175–93. doi: 10.1177/08912430222104895.

Institute of Medicine (US) Committee to Study Outreach for Prenatal Care. 1988. “Barriers to the Use of Prenatal Care.” in *Prenatal Care: Reaching Mothers, Reaching Infants*, edited by S. S. Brown. National Academies Press (US).

Jones, Christopher W., Cecilia Gambala, Kyle C. Esteves, Maeve Wallace, Reid Schlesinger, Marguerite O’Quinn, Laura Kidd, Katherine P. Theall, and Stacy S. Drury. 2017. “Differences in Placental Telomere Length Suggest a Link between Racial Disparities in Birth Outcomes and Cellular Aging.” *American Journal of Obstetrics and Gynecology* 216(3):294.e1-294.e8. doi: 10.1016/j.ajog.2016.11.1027.

Kane, Jennifer B. 2015. “An Integrative Model of Inter- and Intragenerational Preconception Processes Influencing Birthweight in the United States.” *Journal of Health and Social Behavior* 56(2):246–61. doi: 10.1177/0022146515582043.

Kane, Jennifer B., Kathleen Mullan Harris, and Anna Maria Siega-Riz. 2018. “Intergenerational Pathways Linking Maternal Early Life Adversity to Offspring Birthweight.” *Social Science & Medicine* 207:89–96. doi: 10.1016/j.socscimed.2018.04.049.

Komro, Kelli A., Sara Markowitz, Melvin D. Livingston, and Alexander C. Wagenaar. 2019. “Effects of State-Level Earned Income Tax Credit Laws on Birth Outcomes by Race and Ethnicity.” *Health Equity* 3(1):61–67. doi: 10.1089/heq.2018.0061.

Kost, Kathryn, and Laura Lindberg. 2015. “Pregnancy Intentions, Maternal Behaviors, and Infant Health: Investigating Relationships With New Measures and Propensity Score Analysis.” *Demography* 52(1):83–111. doi: 10.1007/s13524-014-0359-9.

Krieger, N. 2001. "A Glossary for Social Epidemiology." *J Epidemiol Community Health* (55):693–700.

Krieger, Nancy, Jarvis T. Chen, Brent Coull, Pamela D. Waterman, and Jason Beckfield. 2013. "The Unique Impact of Abolition of Jim Crow Laws on Reducing Inequities in Infant Death Rates and Implications for Choice of Comparison Groups in Analyzing Societal Determinants of Health." *American Journal of Public Health* 103(12):2234–44. doi: 10.2105/AJPH.2013.301350.

Krieger, Nancy, Sofia Gruskin, Nakul Singh, Mathew V. Kiang, Jarvis T. Chen, Pamela D. Waterman, Jillian Gottlieb, Jason Beckfield, and Brent A. Coull. 2015. "Reproductive Justice and the Pace of Change: Socioeconomic Trends in US Infant Death Rates by Legal Status of Abortion, 1960–1980." *American Journal of Public Health* 105(4):680–82. doi: 10.2105/AJPH.2014.302401.

Lazzarini, Zita. 2022. "The End of Roe v. Wade — States' Power over Health and Well-Being." *New England Journal of Medicine* 387(5):390–93. doi: 10.1056/NEJMp2206055.

Leonard, Jonathan, and Alexandre Mas. 2008. "Welfare Reform, Time Limits, and Infant Health." *Journal of Health Economics* 27(6):1551–66. doi: 10.1016/j.jhealeco.2008.05.013.

Levine, M. E., and EM Crimmins. 2014. "Evidence of Accelerated Aging among African Americans and Its Implications for Mortality." *Social Science & Medicine (1982)* 118:27–32. doi: 10.1016/j.socscimed.2014.07.022.

Liu, G. G. 1998. "Birth Outcomes and the Effectiveness of Prenatal Care." *Health Services Research* 32(6):805–23.

Livingston, Gretchen, and D'Vera Cohn. 2010. *U.S. Birth Rate Decline Linked to Recession*. Pew Research Center.

Lobel, Marci, Dolores Lacey Cannella, Jennifer E. Graham, Carla DeVincent, Jayne Schneider, and Bruce A. Meyer. 2008. "Pregnancy-Specific Stress, Prenatal Health Behaviors, and Birth Outcomes." *Health Psychology* 27(5):604–15. doi: 10.1037/a0013242.

Love, Catherine, Richard J. David, Kristin M. Rankin, and James W. Collins. 2010. "Exploring Weathering: Effects of Lifelong Economic Environment and Maternal Age on Low Birth Weight, Small for Gestational Age, and Preterm Birth in African-American and White Women." *American Journal of Epidemiology* 172(2):127–34. doi: 10.1093/aje/kwq109.

Lu, Michael C., and Neal Halfon. 2003. “Racial and Ethnic Disparities in Birth Outcomes: A Life-Course Perspective.” *Maternal and Child Health Journal* 18.

Lukachko, Alicia, Mark L. Hatzenbuehler, and Katherine M. Keyes. 2014. “Structural Racism and Myocardial Infarction in the United States.” *Social Science & Medicine* 103:42–50. doi: 10.1016/j.socscimed.2013.07.021.

Lynch, Scott M., and Miles G. Taylor. 2016. “Chapter 2 - Trajectory Models for Aging Research.” Pp. 23–51 in *Handbook of Aging and the Social Sciences (Eighth Edition)*, edited by L. K. George and K. F. Ferraro. San Diego: Academic Press.

MacDorman, Marian F. 2011. “Race and Ethnic Disparities in Fetal Mortality, Preterm Birth, and Infant Mortality in the United States: An Overview.” *Seminars in Perinatology* 35(4):200–208. doi: 10.1053/j.semperi.2011.02.017.

MacDorman, Marian F., Eugene Declercq, Howard Cabral, and Christine Morton. 2016. “Recent Increases in the U.S. Maternal Mortality Rate: Disentangling Trends From Measurement Issues.” *Obstetrics & Gynecology* 128(3):447–55. doi: 10.1097/AOG.0000000000001556.

MacDorman, Marian F., Eugene Declercq, and Marie E. Thoma. 2018. “Trends in Texas Maternal Mortality by Maternal Age, Race/Ethnicity, and Cause of Death, 2006-2015.” *Birth* 45(2):169–77. doi: 10.1111/birt.12330.

MacLaggan, Corrie. 2014. “In Texas, Less Progress on Curbing Teen Pregnancy.” *The Texas Tribune*. Retrieved March 5, 2023 (https://www.texastribune.org/2014/07/06/teen-births-texas/).

Mark, Nicholas D. E., and Lawrence L. Wu. 2022. “More Comprehensive Sex Education Reduced Teen Births: Quasi-Experimental Evidence.” *Proceedings of the National Academy of Sciences* 119(8):e2113144119. doi: 10.1073/pnas.2113144119.

Martin, Joyce A. 2018. “Describing the Increase in Preterm Births in the United States, 2014–2016.” *National Center for Health Statistics Data Brief* (312):8.

Martin, Joyce A., Brady E. Hamilton, Michelle J. K. Osterman, and Anne K. Driscoll. 2019. “National Vital Statistics Reports Volume 68, Number 13, November 30, 2019, Births: Final Data for 2018.” *National Vital Statistics Reports* 68(13):47.

Martinez, Rae Anne M., Nafeesa Andrabi, Andrea N. Goodwin, Rachel E. Wilbur, and Paul N. Zivich. 2021. “Thoughtfully Measuring and Interpreting Race In Population Health Research.” *IAPHS Blog*. Retrieved (https://doi.org/10.17615/bs67-jj32).

Mathews, T. J., and Brady E. Hamilton. 2005. *Trend Analysis of the Sex Ratio at Birth in the United States*. *National Vital Statistics Reports*. 53:20.

McEwen, Bruce S., and Teresa Seeman. 1999. “Protective and Damaging Effects of Mediators of Stress: Elaborating and Testing the Concepts of Allostasis and Allostatic Load.” *Annals New York Academy of Science* 896(1):30–47.

Mehra, Renee, Lisa M. Boyd, and Jeannette R. Ickovics. 2017. “Racial Residential Segregation and Adverse Birth Outcomes: A Systematic Review and Meta-Analysis.” *Social Science & Medicine* 191:237–50. doi: 10.1016/j.socscimed.2017.09.018.

Monk, Ellis P. 2014. “Skin Tone Stratification among Black Americans, 2001–2003.” *Social Forces* 92(4):1313–37. doi: 10.1093/sf/sou007.

Monk, Ellis P. 2015. “The Cost of Color: Skin Color, Discrimination, and Health among African-Americans.” *American Journal of Sociology* 121(2):396–444. doi: 10.1086/682162.

Monk, Ellis P. 2018. “The Color of Punishment: African Americans, Skin Tone, and the Criminal Justice System.” *Ethnic and Racial Studies* 1–20. doi: 10.1080/01419870.2018.1508736.

Montez, Jennifer Karas. 2017. “Deregulation, Devolution, and State Preemption Laws’ Impact on US Mortality Trends.” *American Journal of Public Health; Washington* 107(11):1749–50. doi: http://dx.doi.org/10.2105/AJPH.2017.304080.

Montez, Jennifer Karas. 2020. “US State Polarization, Policymaking Power, and Population Health.” *The Milbank Quarterly* 00(0):1–20. doi: https://doi.org/10.1111/1468-0009.12482.

Montez, Jennifer Karas, Jason Beckfield, Julene Kemp Cooney, Jacob M. Grumbach, Mark D. Hayward, Huseyin Zeyd Koytak, Steven H. Woolf, and Anna Zajacova. 2020. “US State Policies, Politics, and Life Expectancy.” *The Milbank Quarterly* 98(3):668–99. doi: https://doi.org/10.1111/1468-0009.12469.

Montez, Jennifer Karas, Mark D. Hayward, and Douglas A. Wolf. 2017. “Do U.S. States’ Socioeconomic and Policy Contexts Shape Adult Disability?” *Social Science & Medicine* 178:115–26. doi: 10.1016/j.socscimed.2017.02.012.

Montez, Jennifer Karas, Nader Mehri, Shannon M. Monnat, Jason Beckfield, Derek Chapman, Jacob M. Grumbach, Mark D. Hayward, Steven H. Woolf, and Anna Zajacova. 2022. “U.S. State Policy Contexts and Mortality of Working-Age Adults” edited by M. A. Andrade-Navarro. *PLOS ONE* 17(10):e0275466. doi: 10.1371/journal.pone.0275466.

Montez, Jennifer Karas, Anna Zajacova, and Mark D. Hayward. 2016. “Explaining Inequalities in Women’s Mortality between U.S. States.” *SSM - Population Health* 2:561–71. doi: 10.1016/j.ssmph.2016.07.004.

Montez, Jennifer Karas, Anna Zajacova, Mark D. Hayward, Steven H. Woolf, Derek Chapman, and Jason Beckfield. 2019. “Educational Disparities in Adult Mortality Across U.S. States: How Do They Differ, and Have They Changed Since the Mid-1980s?” *Demography* 56(2):621–44. doi: 10.1007/s13524-018-0750-z.

Moore, Michael J. 1996. “Death and Tobacco Taxes.” *The Rand Journal of Economics; Santa Monica* 27(2):415.

Mukhopadhyay, Sankar, and Jeanne Wendel. 2008. “Are Prenatal Care Resources Distributed Efficiently across High-Risk and Low-Risk Mothers?” *International Journal of Health Care Finance and Economics* 8(3):163–79. doi: 10.1007/s10754-008-9035-1.

Nash, Elizabeth. 2021. “State Policy Trends 2021: The Worst Year for Abortion Rights in Almost Half a Century.” *Guttmacher Institute*. Retrieved February 8, 2023 (https://www.supremecourt.gov/opinions/URLs_Cited/OT2021/19-1392/19-1392-24.pdf).

Nash, Elizabeth, Rachel Benson Gold, Zohra Ansari-Thomas, Olivia Cappello, Sophia Naide, and Lizamarie Mohammed. 2018. “State Policy Trends 2018: With Roe v. Wade in Jeopardy, States Continued to Add New Abortion Restrictions.” *Guttmacher Institute*. Retrieved February 6, 2023 (https://www.guttmacher.org/article/2018/12/state-policy-trends-2018-roe-v-wade-jeopardy-states-continued-add-new-abortion).

Nash, Elizabeth, and Peter Ephross. 2022. “State Policy Trends 2022: In a Devastating Year, US Supreme Court’s Decision to Overturn Roe Leads to Bans, Confusion and Chaos.” *Guttmacher Institute*. Retrieved February 8, 2023 (https://www.guttmacher.org/2022/12/state-policy-trends-2022-devastating-year-us-supreme-courts-decision-overturn-roe-leads).

Nash, Elizabeth, and Isabel Guarnieri. 2023. “Six Months Post-Roe, 24 US States Have Banned Abortion or Are Likely to Do So: A Roundup.” *Guttmacher Institute*. Retrieved February 8, 2023 (https://www.guttmacher.org/2023/01/six-months-post-roe-24-us-states-have-banned-abortion-or-are-likely-do-so-roundup).

Nash, Elizabeth, Lizamarie Mohammed, Olivia Cappello, and Sophia Naide. 2019. “State Policy Trends 2019: A Wave of Abortion Bans, But Some States Are Fighting Back.” *Guttmacher Institute*, December 6.

Nash, Elizabeth, Lizamarie Mohammed, Olivia Cappello, and Sophia Naide. 2020. "State Policy Trends 2020: Reproductive Health and Rights in a Year Like No Other." *Guttmacher Institute*. Retrieved February 6, 2023 (https://www.guttmacher.org/article/2020/12/state-policy-trends-2020-reproductive-health-and-rights-year-no-other).

Navarro, Vicente, and Leiyu Shi. 2001. "The Political Context of Social Inequalities and Health." *Social Science & Medicine* 52(3):481–91. doi: 10.1016/S0277-9536(00)00197-0.

Nelson, Heidi D., Blair G. Darney, Katherine Ahrens, Amanda Burgess, Rebecca M. Jungbauer, Amy Cantor, Chandler Atchison, Karen B. Eden, Rose Goueth, and Rongwei Fu. 2022. "Associations of Unintended Pregnancy With Maternal and Infant Health Outcomes: A Systematic Review and Meta-Analysis." *JAMA* 328(17):1714. doi: 10.1001/jama.2022.19097.

Ollove, Michael. 2022. "Some States Already Are Targeting Birth Control." *The Pew Charitable Trusts*, May 19.

Orr, S. T., C. A. Miller, S. A. James, and S. Babones. 2000. "Unintended Pregnancy and Preterm Birth." *Paediatric and Perinatal Epidemiology* 14(4):309–13. doi: 10.1046/j.1365-3016.2000.00289.x.

Ortiz, Erik. 2021. "How Activists Say Texas Abortion Law Is Undermining Native American Women's Reproductive Justice." *NBC News*, September 6.

Osterman, Michelle J. K., Brady E. Hamilton, Joyce A. Martin, Anne K. Driscoll, and Cristian P. Valenzuela. 2023. *Births: Final Data for 2021*. 72: 1. National Center for Health Statistics.

Pabayo, Roman, Daniel M. Cook, Guy Harling, Anastasia Gunawan, Natalie A. Rosenquist, and Peter Muennig. 2019. "State-Level Income Inequality and Mortality among Infants Born in the United States 2007–2010: A Cohort Study." *BMC Public Health* 19(1):1333. doi: 10.1186/s12889-019-7651-y.

Phelan, Jo C., and Bruce G. Link. 2015. "Is Racism a Fundamental Cause of Inequalities in Health?" *Annual Review of Sociology* 41(1):311–30. doi: 10.1146/annurev-soc-073014-112305.

Pogue, Stacey. 2017. *Excluding Planned Parenthood Has Been Terrible for Texas Women*. Center for Public Policy Priorities.

Raley, R. Kelly. 2001. "Increasing Fertility in Cohabiting Unions: Evidence for the Second Demographic Transition in the United States?" *Demography* 38(1):59–66. doi: 10.1353/dem.2001.0008.

Ramshaw, Emily, and Thanh Tan. 2012. “The Storm Over Women’s Health Care Had Been Brewing.” *The New York Times*, March 22.

Rauh, Virginia A., Howard F. Andrews, and Robin S. Garfinkel. 2001. “The Contribution of Maternal Age to Racial Disparities in Birthweight: A Multilevel Perspective.” *American Journal of Public Health* 91(11).

Reidpath, D., and P. Allotey. 2003. “Infant Mortality Rate as an Indicator of Population Health.” *Journal of Epidemiology and Community Health* 57(5):344–46. doi: 10.1136/jech.57.5.344.

Riley, Alicia R., Daniel Collin, Jacob M. Grumbach, Jacqueline M. Torres, and Rita Hamad. 2021. “Association of US State Policy Orientation with Adverse Birth Outcomes: A Longitudinal Analysis.” *Journal of Epidemiology and Community Health* 75(7):689–94. doi: 10.1136/jech-2020-214858.

Rodriguez, Javier M., John Bound, and Arline T. Geronimus. 2014. “US Infant Mortality and the President’s Party.” *International Journal of Epidemiology* 43(3):818–26. doi: 10.1093/ije/dyt252.

Ross, Loretta J., and Rickie Solinger. 2017. *Reproductive Justice: An Introduction*. Vol. 1. First. University of California Press.

Roth, Wendy D. 2016. “The Multiple Dimensions of Race.” *Ethnic and Racial Studies* 39(8):1310–38. doi: 10.1080/01419870.2016.1140793.

Schmeer, Kammi K., and Jacob Tarrence. 2018. “Racial-Ethnic Disparities in Inflammation: Evidence of Weathering in Childhood?” *Journal of Health and Social Behavior* 59(3):411–28. doi: 10.1177/0022146518784592.

Schut, Rebecca Anna, and Courtney Boen. 2022. “State Immigration Policy Contexts and Racialized Legal Status Disparities in Health Care Utilization Among U.S. Agricultural Workers.” *Demography* 10342687. doi: 10.1215/00703370-10342687.

Siddiqi, Arjumand, Marcella K. Jones, Donald J. Bruce, and Paul C. Erwin. 2016. “Do Racial Inequities in Infant Mortality Correspond to Variations in Societal Conditions? A Study of State-Level Income Inequality in the U.S., 1992–2007.” *Social Science & Medicine* 164:49–58. doi: 10.1016/j.socscimed.2016.07.013.

Simons, Ronald L., Man-Kit Lei, Steven R. H. Beach, Leslie Gordon Simons, Ashley B. Barr, Frederick X. Gibbons, and Robert A. Philibert. 2019. “Testing Life Course Models Whereby Juvenile and Adult Adversity Combine to Influence Speed of Biological Aging.” *Journal of Health and Social Behavior* 002214651985989. doi: 10.1177/0022146519859896.

Singh, Gopal K., and Stella M. Yu. 2019. "Infant Mortality in the United States, 1915-2017: Large Social Inequalities Have Persisted for Over a Century." *International Journal of Maternal and Child Health and AIDS (IJMA)* 8(1):19–31. doi: 10.21106/ijma.271.

Slaughter-Acey, Jaime C., Tony N. Brown, Verna M. Keith, Rhonda Dailey, and Dawn P. Misra. 2020. "A Tale of Two Generations: Maternal Skin Color and Adverse Birth Outcomes in Black/African American Women." *Social Science & Medicine* 265:113552. doi: 10.1016/j.socscimed.2020.113552.

Slaughter-Acey, Jaime C., Devon Sneed, Lauren Parker, Verna M. Keith, Nora L. Lee, and Dawn P. Misra. 2019. "Skin Tone Matters: Racial Microaggressions and Delayed Prenatal Care." *American Journal of Preventive Medicine* S0749379719302089. doi: 10.1016/j.amepre.2019.04.014.

Smith, Herbert L., S. Philip Morgan, and Tanya Koropeckyj-Cox. 1996. "A Decomposition of Trends in the Nonmarital Fertility Ratios of Blacks and Whites in the United States, 1960-1992." *Demography* 33(2):141. doi: 10.2307/2061868.

Solar, O., and A. Irwin. 2010. *A Conceptual Framework for Action on the Social Determinants of Health*. World Health Organization.

Sosnaud, Benjamin. 2019. "Inequality in Infant Mortality: Cross-State Variation and Medical System Institutions." *Social Problems* (66):20.

Soss, Joe, Sanford F. Schram, Thomas P. Vartanian, and Erin O'Brien. 2004. "Welfare Policy Choices in the States: Does the Hard Line Follow the Color Line?" *Focus* 23(1):8.

Stevenson, Amanda J., Imelda M. Flores-Vazquez, Richard L. Allgeyer, Pete Schenkkan, and Joseph E. Potter. 2016. "Effect of Removal of Planned Parenthood from the Texas Women's Health Program." *New England Journal of Medicine* 374(9):853–60. doi: 10.1056/NEJMsa1511902.

Stevenson, Amanda Jean, and Joseph E. Potter. 2015. "Abortion Access and State Variation in Observed Unintended Pregnancy." *Contraception* 92(3):227–33. doi: 10.1016/j.contraception.2015.04.003.

Sudhinaraset, May, Dovile Vilda, Jessica D. Gipson, Marta Bornstein, and Maeve E. Wallace. 2020. "Women's Reproductive Rights Policies and Adverse Birth Outcomes: A State-Level Analysis to Assess the Role of Race and Nativity Status." *American Journal of Preventive Medicine* 59(6):787–95. doi: 10.1016/j.amepre.2020.07.025.

Swamy, Geeta K., Sharon Edwards, Alan Gelfand, Sherman A. James, and Marie Lynn Miranda. 2012. "Maternal Age, Birth Order, and Race: Differential Effects on Birthweight." *Journal of Epidemiology and Community Health* 66(2):136–42. doi: 10.1136/jech.2009.088567.

Tan, Thanh. 2011. "31 Days, 31 Ways: Family Planning Funding Slashed." *The Texas Tribune*. Retrieved February 12, 2020 (https://www.texastribune.org/2011/08/15/day-15/).

Thoits, Peggy A. 2010. "Stress and Health: Major Findings and Policy Implications." *Journal of Health and Social Behavior* 51(1_suppl):S41–53. doi: 10.1177/0022146510383499.

Tong, Yunping. 2022. "Sidebar: Sex Ratios around the World." *Pew Research Center's Religion & Public Life Project*. Retrieved March 16, 2023 (https://www.pewresearch.org/religion/2022/08/23/sidebar-sex-ratios-around-the-world/).

Torche, Florencia. 2018. "Prenatal Exposure to an Acute Stressor and Children's Cognitive Outcomes." *Demography* 55(5):1611–39. doi: 10.1007/s13524-018-0700-9.

Torche, Florencia, and Tamkinat Rauf. 2021. "The Political Context and Infant Health in the United States." *American Sociological Review* 00031224211000710. doi: 10.1177/00031224211000710.

Totenberg, Nina. 2016. "Supreme Court Tests Texas' New Restrictions On Abortion." *NPR*, March 2.

Turra, Cassio M., and Noreen Goldman. 2007. "Socioeconomic Differences in Mortality Among U.S. Adults: Insights Into the Hispanic Paradox." *The Journals of Gerontology: Series B* 62(3):S184–92. doi: 10.1093/geronb/62.3.S184.

Urban Institute. 2019. "Temporary Assistance for Needy Families (TANF) Data." *Urban Data Catalog*. Retrieved March 16, 2020 (https://datacatalog.urban.org/dataset/safety-net-almanac-data/resource/a77378a2-f26b-4802-be45-d558ea47b65b).

U.S. Congress, Joint Economic Committee, Social Capital Project. 2018. *Social Capital Project - United States Joint Economic Committee*. Vice Chairman's staff, 115th Cong., 2nd Sess.

USBEA. 2019. "Regional Data: GDP & Personal Income." Retrieved March 16, 2020 (https://apps.bea.gov/iTable/index_regional.cfm).

Uzogara, Ekeoma E., and James S. Jackson. 2016. "Perceived Skin Tone Discrimination Across Contexts: African American Women's Reports." *Race and Social Problems* 8(2):147–59. doi: 10.1007/s12552-016-9172-y.

Venator, Joanna, and Jason Fletcher. 2021. "Undue Burden Beyond Texas: An Analysis of Abortion Clinic Closures, Births, and Abortions in Wisconsin." *Journal of Policy Analysis and Management* 40(3):774–813. doi: 10.1002/pam.22263.

Vilda, Dovile, Maeve E. Wallace, Clare Daniel, Melissa Goldin Evans, Charles Stoecker, and Katherine P. Theall. 2021. "State Abortion Policies and Maternal Death in the United States, 2015–2018." *American Journal of Public Health* 111(9):1696–1704. doi: 10.2105/AJPH.2021.306396.

Wang, Amy B., and Caroline Kitchener. 2022. "States Pursue Extremerestrictions in Crafting Post-Roe Abortion Law." *The Washington Post*, May 16.

Warner, David F., and Tyson H. Brown. 2011. "Understanding How Race/Ethnicity and Gender Define Age-Trajectories of Disability: An Intersectionality Approach." *Social Science & Medicine* 72(8):1236–48. doi: 10.1016/j.socscimed.2011.02.034.

Wehby, George L., Jason M. Fletcher, Steven F. Lehrer, Lina M. Moreno, Jeffrey C. Murray, Allen Wilcox, and Rolv T. Lie. 2011. "A Genetic Instrumental Variables Analysis of the Effects of Prenatal Smoking on Birth Weight: Evidence from Two Samples." *Biodemography and Social Biology* 57(1):3–32. doi: 10.1080/19485565.2011.564468.

Weller, Bridget E., Natasha K. Bowen, and Sarah J. Faubert. 2020. "Latent Class Analysis: A Guide to Best Practice." *Journal of Black Psychology* 46(4):287–311. doi: 10.1177/0095798420930932.

White, Kari, Daniel Grossman, Kristine Hopkins, and Joseph E. Potter. 2012. "Cutting Family Planning in Texas." *The New England Journal of Medicine* 367(13):1179–81. doi: 10.1056/NEJMp1207920.

White, Kari, Kristine Hopkins, Abigail R. A. Aiken, Amanda Stevenson, Celia Hubert, Daniel Grossman, and Joseph E. Potter. 2015. "The Impact of Reproductive Health Legislation on Family Planning Clinic Services in Texas." *American Journal of Public Health* 105(5):851–58. doi: 10.2105/AJPH.2014.302515.

White, Karletta M. 2015. "The Salience of Skin Tone: Effects on the Exercise of Police Enforcement Authority." *Ethnic and Racial Studies* 38(6):993–1010. doi: 10.1080/01419870.2014.952752.

Wiley, David. 2011. "Starting A Statewide Campaign To Address Teen Pregnancy Prevention: The Texas Story." *Journal of Applied Research on Children: Informing Policy for Children at Risk* 2(2).

Williams, David R., and Chiquita Collins. 1995. "US Socioeconomic and Racial Differences in Health: Patterns and Explanations." *Annual Review of Sociology* 21(1):349–86. doi: 10.1146/annurev.so.21.080195.002025.

Williams, David R., and Chiquita Collins. 2001. "Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health." *Public Health Reports* 116:13.

Williams, David R., and Selina A. Mohammed. 2009. "Discrimination and Racial Disparities in Health: Evidence and Needed Research." *Journal of Behavioral Medicine* 32(1):20–47. doi: 10.1007/s10865-008-9185-0.

Wolfe, Sidney M. 2007. "Unsettling Scores: A Ranking of State Medicaid Programs." *Public Citizen Health Research Group Health Letter* 23(4):1–8.

Woolf, Steven H., and Laudan Aron. 2013. *U. S. Health in International Perspective: Shorter Lives, Poorer Health*. Washington, D.C., UNITED STATES: National Academies Press.

Zolna, Mia R., and Jennifer J Frost. 2016. *Publicly Funded Family Planning Clinics in 2015: Patterns and Trends in Service Delivery Practices and Protocols*. New York: Guttmacher Institute.

.

Biography

Allison Stolte received a B.A. in Economics from Elon University in 2011, an M.P.P. from Duke University's Sanford School of Public Policy in 2017, and an M.A. in Sociology from Duke University in 2020. At Duke, she received the Duke Graduate School Phillip Jackson Baugh Fellowship. Allison has first-authored two publications: "Using Electronic Health Records to Understand the Population of Local Children Captured in a Large Health System in Durham County, NC, USA, and Implications for Population Health Research" in *Social Science & Medicine* (2022) and "The Impact of Two Types of COVID-19-Related Discrimination and Contemporaneous Stressors on Chinese Immigrants in the US South" in *SSM–Mental Health* (2022). She has co-authored three publications: "Overcrowding and COVID-19 Mortality Across U.S. Counties: Are Disparities Growing over Time?" in *SSM–Population Health* (2021), "Parental Death and Mid-Adulthood Depressive Symptoms: The Importance of Life Course Stage and Parent's Gender" in *Journal of Health and Social Behavior* (2021), and "Link-tracing Designs for the Study of International Migration" in *Demography* in 2022. Prior to her time at Duke, Allison co-authored one additional publication: "Public Housing Transformation and Crime: Are Relocatees More Likely to Be Offenders or Victims?" in *Cityscape: A Journal of Policy Development and Research* (2013). After completing her Ph.D., Allison will be a Postdoctoral Scholar within the Department of Health, Society, & Behavior at the University of California-Irvine under the mentorship of Dr. Tim Bruckner.