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Cross-State Differences in the Processes Generating Black–White Disparities in Neonatal Mortality

Benjamin Sosnaud

ABSTRACT The U.S. Black neonatal mortality rate is more than twice the White rate. This dramatic disparity can be decomposed into two components: (1) disparities due to differences in the distribution of birth weights, and (2) disparities due to differences in birth weight–specific mortality. I utilize this distinction to explore how the social context into which infants are born contributes to gaps in mortality between Black and White neonates. I analyze variation in Black–White differences in neonatal mortality across 33 states using 1995–2010 data. For each state, I calculate the contribution of differences in birth weight distribution versus differences in birth weight–specific mortality to the total disparity in mortality between White and Black neonates. Disparities are largely a product of different birth weight distributions between Black and White newborns (mirroring the pattern for the United States as a whole). However, in at least nine states, differences in birth weight–specific mortality make a notable contribution. This pattern is observed even among those from advantaged sociodemographic backgrounds and is driven by differences in mortality among very low birth weight neonates. This calls attention to inequality in medical care at birth as an important contributor to racial disparities in neonatal mortality.

KEYWORDS Neonatal mortality • Health disparities • Racial inequality • U.S. states • Decomposition

Introduction

Despite reductions in the U.S. infant mortality rate over the past century, mortality among Black infants is still more than twice that among Whites (Singh and Yu 2019). This disparity is also observed in the neonatal period—the critical first 28 days of an infant's life in which two thirds of infant deaths occur. In 2017, the neonatal mortality rate for Black infants was 7.16 deaths per 1,000 live births, compared with 3.04 per 1,000 for Whites (Ely and Driscoll 2019). This provides a powerful example of the disparate life chances facing White and Black Americans.

Scholars have dedicated considerable effort to understanding differences in mortality between Black and White neonates. Evidence supports several explanations for this phenomenon, including racial differences in socioeconomic resources (Braveman

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et al. 2014), receipt of prenatal and hospital care (Howell et al. 2018; Vintzileos et al. 2002a), exposure to discrimination and other stressors (Hogue and Bremner 2005), and exposure to contextual risk factors (O'Campo et al. 2008; Pearl et al. 2001). These explanations generate two distinct outcomes: (1) differences between White and Black mothers that result in differences in infant health at birth, and (2) differences that result in disparate rates of mortality, conditional on health at birth (Elder et al. 2011). To identify the relative contribution of these two processes, Black–White inequalities in neonatal mortality can be decomposed into two corresponding components: those due to differences in the distribution of birth weights and those due to differences in birth weight–specific mortality (Gortmaker and Wise 1997).

Research using this type of two-component decomposition technique has made important contributions to the study of infant health gaps between Black and White neonates (e.g., Carmichael and Iyasu 1998; Elder et al. 2011; Schempf et al. 2007; see Fan and Luo 2020 for an alternative application); however, this approach has untapped potential. A key benefit of distinguishing between disparities due to differences in birth weight distributions and those due to birth weight–specific mortality is that each component can be linked to distinct explanations (Wise 2003). Specifically, group differences in the distribution of birth weights reflect factors that affect mothers before conception or during pregnancy. In contrast, differences in mortality among very low birth weight (VLBW) neonates are because of differential receipt of appropriate medical care during and after birth. As a result, exploring racial differences in birth weight distribution and birth weight–specific mortality can shed light on how social context contributes to racial gaps in neonatal mortality.

In the United States, states are sites of key variation in infant mortality. Not only do infant mortality rates and racial disparities in infant mortality vary dramatically across states (Brown Speights et al. 2017; Mathews et al. 2015), but health care systems and other factors that affect infant health are organized and vary at the state level (Elder et al. 2014; Montez et al. 2020; Montez, Zajacova et al. 2019; Sosnaud 2019). In this article, I explore variation in Black–White inequality in neonatal mortality across 33 states using 1995–2010 data. For each state, I calculate the contribution of differences in birth weight distribution versus birth weight–specific mortality to disparities in mortality between White and Black neonates. I find that disparities are largely a product of differing birth weight distributions (mirroring the United States as a whole); however, in at least nine states, differences in birth weight–specific mortality make a notable contribution. Further examination reveals that this pattern is observed even among those from advantaged sociodemographic backgrounds and is driven by differences in mortality among VLBW neonates.

Background

Neonatal deaths are typically rooted in factors relating to pregnancy and childbirth (Gortmaker and Wise 1997). The primary causes of neonatal mortality include prematurity and low birth weight (LBW), congenital malformations, and pregnancy complications (Anderson and Smith 2005). These represent most of the leading causes of infant mortality, and more than two thirds of all infant deaths occur during the neonatal period.[1] Neonatal mortality has declined in the United States, from 17.70 deaths per 1,000 live births in 1965 to 3.85 per 1,000 in 2017 (Eisner et al. 1978; Ely and Driscoll 2019). However, this dramatic improvement has not eliminated racial disparities: in 2017, the mortality rates for Black and White neonates were 7.16 and 3.04 per 1,000, respectively (Ely and Driscoll 2019).

Research on racial disparities in neonatal mortality has focused on a range of possible explanations.[2] These include racial differences in socioeconomic resources and receipt of medical care (Braveman et al. 2014; Collins et al. 1997; Howell et al. 2018; Vintzileos et al. 2002a), exposure to discrimination and other stressors (Hogue and Bremner 2005), and exposure to neighborhood-level risk factors (O'Campo et al. 2008; Pearl et al. 2001). These explanations can be organized using two processes that produce racial differences in neonatal mortality: (1) maternal differences that result in differences in infant health at birth, and (2) differences that result in differential rates of mortality, conditional on health at birth.

Racial Differences in Health at Birth

Health at birth is typically measured using birth weight or gestational age. Not only are LBW and preterm birth leading causes of neonatal mortality, but they also increase the risk of such other causes of infant mortality as respiratory distress and congenital malformations (Callaghan et al. 2006; Eberstein et al. 1990; MacDorman 2011). The presence of racial inequalities in birth weight and gestational age has been well established (Alexander et al. 2003; Collins and David 2009; Lu and Halfon 2003). Although research on this issue has been unable to conclusively explain racial differences in health at birth, evidence suggests that several key factors play a role.

First, an infant's health at birth is influenced by maternal receipt of prenatal care (Vintzileos et al. 2002a, 2002b; cf. Fiscella 1995). In addition to screening fetuses for potential health issues, prenatal care provides mothers with information about nutrition and other practices that promote maternal and fetal health. There are notable racial disparities in the quality and use of prenatal care (Alexander et al. 2002; Collins et al. 1997; Kogan et al. 1994; Mayberry et al. 2000). While some of these care disparities can been traced to socioeconomic factors, racial disparities in medical care persist even among patients with similar levels of socioeconomic resources (Barfield et al. 1996; Smedley et al. 2003). These differences have been linked to biases and stereotypes held by medical providers, as well as to perceived discrimination and mistrust by Black patients (Balsa and McGuire 2003; LaVeist et al. 2000).

A rich literature explores the relationship between maternal stress and infant health at birth. When individuals experience stress, their bodies produce stress hormones. Chronic exposure to these hormones can cause various health problems (McEwen 1998), the consequences of which can extend from mother to fetus (Wadhwa et al.

[1] In contrast, common causes of deaths during the postneonatal period (28 days to one year) include sudden infant death syndrome, congenital malformations, accidents and injuries, and infections (Anderson and Smith 2005).

[2] Evidence does not support the proposition that racial disparities in infant mortality are because of genetic differences in maternal or infant health (David and Collins 2007).

2011). Multiple studies have explored the hypothesis that differential exposure to stressors helps to explain racial differences in birth weight and gestational age (Collins and David 2009; Kramer and Hogue 2009; Lu and Halfon 2003). This research highlights racism and racial discrimination as chronic stressors that can increase the risk of prematurity and LBW among Black mothers (Collins et al. 2004; Hogue and Bremner 2005; Mustillo et al. 2004).

Another line of research traces racial disparities in infant health at birth to neighborhood-level factors. Because of segregation and the legacy of housing discrimination, Black and White individuals experience differential rates of exposure to concentrated poverty and neighborhood disadvantage (Logan 2013; Massey and Denton 1993). Research has repeatedly shown that residence in low-income neighborhoods is associated with LBW and premature birth, even after accounting for individual socioeconomic resources (Collins et al. 2009; O'Campo et al. 2008). Further, the effects of neighborhood context on infant health may be especially pronounced among Black newborns (Pearl et al. 2001). Possible pathways through which disadvantaged neighborhoods affect infant health at birth include the availability of services, exposure to environmental toxins, and the effects of segregation (Williams 1999). Overall, the evidence suggests that neighborhood-level factors contribute to racial disparities in premature and LBW births.

Racial Differences in Neonatal Mortality, Conditional on Health at Birth

Even after accounting for the increased prevalence of high-risk births among Black mothers, Black and White infants experience different rates of neonatal mortality. A leading explanation for racial disparities in mortality among neonates born with similar health is differences in medical care. These can take many forms: for example, Black neonates may be disadvantaged in accessing specific medical interventions. Hamvas and colleagues (1996) examined differences in mortality between VLBW Black and White neonates following the expansion of surfactant therapy to treat respiratory distress syndrome after 1990 and found that racial inequalities increased after this treatment was introduced, because of greater reductions in mortality among White neonates. This suggests inequalities in the receipt of surfactant therapy (see also Frisbie et al. 2004).

There is also evidence that disparities in neonatal mortality reflect differences in the quality of hospitals where Black and White infants are born. Racial segregation persists as a problem for many hospitals (Smith 1998), and Howell and colleagues (2008) found that VLBW White infants in New York were more likely than comparable Black infants to be born in the hospitals with the best record of preventing neonatal mortality. If Black mothers delivered in the same hospitals as White mothers, racial disparities in neonatal mortality among VLBW infants would be reduced by an estimated 34.5% (see also Howell et al. 2018; Morales et al. 2005).

Finally, even when Black and White infants have access to the same medical facilities, there may be disparities in the quality of care received. An analysis of California neonatal intensive care units suggests that racial differences in quality of care provided to infants are relatively small in low-performing units but increase substantially as unit performance improves (Profit et al. 2017). This finding is consistent with the growing recognition that race influences how mothers and infants are treated by medical providers and health systems during and after birth (Declercq et al. 2013; Matoba 2017). More research is needed, but differences in quality of care stand out as another way that medical treatment can contribute to the persistence of disparities in mortality among Black and White neonates born with similar health risks.

Birth Weight Distribution and Birth Weight–Specific Mortality

Together, differences in infant health at birth and differences in mortality conditional on health status at birth combine to produce the observed disparities in mortality between Black and White neonates. To identify the contribution of each of these factors, disparities in neonatal mortality can be decomposed into two corresponding components: disparities due to differences in the distribution of birth weights and disparities due to differences in birth weight–specific mortality (Gortmaker and Wise 1997).[3] For example, vital statistics records from 1995–2010 show that, compared with White infants, Black infants are 1.8 times as likely to be born LBW and 2.7 times as likely to be born VLBW (see Table 1). This *difference in the distribution of birth weights* indicates that Black infants are more likely than Whites to be born at high risk of neonatal mortality. Further, among those born VLBW, Black infants' likelihood of neonatal mortality is 1.1 times that of Whites. This represents a *difference in birth weight–specific mortality*. On the basis of this distinction, it is possible to determine the contribution of each factor toward disparities in neonatal mortality using a two-component decomposition technique (Carmichael and Iyasu 1998; Kitagawa 1955).

Research using this approach has produced several notable findings. For one, reductions in neonatal mortality have largely been driven by improvements in birth weight–specific mortality (Gortmaker and Wise 1997). Buehler and colleagues (1987) analyzed reductions in neonatal mortality observed between 1960 and 1980, and found that 84% of the reduction for White infants was because of lower birth weight–specific mortality and 16% was because of a healthier distribution of birth weights; for Black infants, the reduction in neonatal mortality during the period was entirely because of improved birth weight–specific mortality (the distribution of Black birth weights became slightly less favorable over the period).

While reductions in neonatal mortality over time have been driven by trends in mortality at given birth weight categories, racial disparities in neonatal mortality are primarily because of differences in the distribution of birth weights between Black and White infants. Carmichael and Iyasu (1998) examined data from 1983 and 1991 and found that as much as 90% of Black–White disparities in infant mortality and 100% of disparities in neonatal mortality are because of differences in the distribution of birth weights. This is consistent with estimates from more recent periods (Elder et al. 2011) and with estimates that use gestational age as an alternative measure of

[3] I focus on birth weight as the key indicator of infant health at birth to maximize consistency with previous research (e.g., Carmichael and Iyasu 1998; Gortmaker and Wise 1997; Wise 2003) and because of the difficulty in obtaining accurate measures of gestational age using vital statistics data (David and Collins 2007; Dietz et al. 2007; Kramer and Hogue 2009).

Table 1 Contribution of birth weight distribution and birth weight–specific mortality to racial differences in neonatal mortality, United States, 1995–2010

	White Births (n = 36,929,610)			Black Births (n = 9,506,646)			Decomposition		
BW Category	BW Distribution (%)	BW-Specific Mortality Rate (per 1,000)	Neonatal Deaths (per 1,000)	BW Distribution (%)	BW-Specific Mortality Rate (per 1,000)	Neonatal Deaths (per 1,000)	Black–White Difference	BW Distribution	BW-Specific Mortality
VLBW	1.17	200.875	2.354	3.15	224.317	7.075	4.721	4.214	0.507
LBW	5.73	9.079	0.520	10.37	7.116	0.738	0.218	0.376	–0.158
NBW	93.10	0.829	0.772	86.48	1.048	0.906	0.135	–0.062	0.197
Total	100.00		3.646	100.00		8.719	5.073	4.528	0.546

Notes: BW = birth weight; VLBW = very low birth weight; LBW = low birth weight; NBW = normal birth weight. Percentages may not sum to 100.00 because of rounding. N = 46,436,256 births.

health at birth (Schempf et al. 2007). Compared with White infants, Black infants are approximately three times as likely to be born VLBW and almost twice as likely to be born LBW (Ely and Driscoll 2019).

Because the factors that contribute to health at birth are different from those that explain neonatal mortality conditional on health at birth, a key benefit of this decomposition is that each component can be linked to different types of social processes (Wise 2003). As previously discussed, differences in the distribution of birth weights are caused by factors that affect mothers before conception and during pregnancy, such as use and quality of prenatal care, exposure to stressors like discrimination and racism, and residence in disadvantaged neighborhoods (Collins and David 2009). In contrast, disparities in neonatal mortality—especially among VLBW infants—can be linked to differential receipt of medical treatments, such as obstetric interventions and neonatal intensive care technology (Hamvas et al. 1996; Wise 2003). Thus, in populations where differences in VLBW mortality play a prominent role in explaining racial disparities in neonatal mortality, it suggests that Black individuals are disadvantaged relative to Whites in obtaining obstetric and postnatal care (Howell 2008).

Variation in Inequality Across Contexts

The distinction between birth weight distribution and birth weight–specific mortality can shed light on the social factors contributing to racial inequalities in neonatal mortality; however, despite the potential benefits, there has been minimal exploration of variation in the relative importance of these components across populations. An exception is Buehler and colleagues (1987), who examined differences in the extent to which reductions in infant mortality can be explained by improvements in birth weight–specific mortality across four U.S. regions, and found that patterns are similar for Black and White newborns in the Northeast, but differ in other regions. This provides evidence that the sources of racial disparities in infant mortality are not the same in all contexts.

Recent scholarship highlights U.S. states as important units of analysis in population health research.[4] Health outcomes, including infant mortality, vary substantially across states (Mathews et al. 2015; U.S. Burden of Disease Collaborators 2018). Moreover, emerging evidence identifies cross-state differences in the magnitude of health disparities between socioeconomic and racial groups (Brown Speights et al. 2017; Montez, Zajacova et al. 2019; Sosnaud 2019). Efforts to explain these differences emphasize that residents of each state inhabit distinct institutional contexts that influence health both directly and by shaping the importance of socioeconomic position and race as fundamental causes of health outcomes (Kemp and Montez 2000; Montez, Hayward et al. 2019). For example, Montez and colleagues (2020) identified a set of state-level policy domains that have the potential to influence health outcomes, including abortion, civil rights, welfare, housing, education, and the environment. They found that states that implement more liberal policies in these

[4] States stand out as especially relevant units of analysis because of the rise of state preemption laws that prevent local governments from enacting legislation that deviates from existing state standards (Montez 2017; Montez et al. 2020).

domains experience improvements in life expectancy. In addition, there are differences in health care infrastructure and the availability of medical resources across states (Shaffer 2001; Shi et al. 2005).

Despite the influence of this growing body of research and notable differences in neonatal mortality across states, scholars have yet to explore whether the contributions of birth weight distribution and birth weight–specific mortality vary at the state level. In research relevant to this issue, Elder and colleagues (2011) mentioned employment, social services, pollution, and health care as key state-level factors that might contribute to racial inequalities in infant mortality (see also Elder et al. 2014). They captured the effect of such state-level factors with indicator variables for each state, but did not study the extent to which the contributions of differences in birth weight distribution and birth weight–specific mortality to disparities in infant mortality vary across states.

Differences in health and health disparities across populations can reflect the influence of both demographic composition and contextual factors, such as medical infrastructure and other institutions (Ross and Mirowsky 2008). If disparate birth weight–specific mortality makes an especially important contribution to the Black–White gap in neonatal mortality in some states, one possible explanation is that Black mothers are overrepresented among those facing socioeconomic disadvantage and this lack of resources impedes access to high-quality neonatal care. Alternatively, state-level variation in the importance of birth weight–specific mortality could indicate that something about the medical infrastructure in certain states puts *all* Black neonates at a systematic disadvantage in receiving care during and after birth. This highlights the need to account for compositional factors when assessing variation in the processes that produce Black–White disparities in neonatal mortality across states.

In this article, I explore variation in racial inequality in neonatal mortality across 33 states. For each state, I calculate the contribution of differences in birth weight distribution versus birth weight–specific mortality to disparities in mortality between White and Black neonates. I then use both state- and individual-level information to explore the processes that manifest in different contributions of these components across states.

Data and Methods

Data

This project uses infant birth and death records compiled by the National Vital Statistics System (NVSS). The NVSS links birth and death certificates for all infants born in the United States (National Center for Health Statistics (NCHS) 1995–2010).[5] The linked data files include information on an infant's birth and age at death, as well as key maternal characteristics. I measure neonatal mortality with a dichotomous

[5] The NVSS is able to successfully link almost 99% of all infant deaths to corresponding birth certificates. For example, in 2002, only 292 out of 27,527 infant deaths were unlinked.

variable indicating whether the infant died in the first 28 days of life (0–27 days). The NCHS specifies that, to reliably calculate the infant mortality rate in a population, numerators should not contain fewer than 20 deaths. In this project, it is necessary to calculate state-specific neonatal mortality rates for infants in three birth weight categories (VLBW, LBW, and normal birth weight (NBW)) for both non-Hispanic White and non-Hispanic Black infants. However, in many states, the annual counts for these subpopulations do not meet the 20-death threshold necessary to reliably calculate the risk of mortality. To maximize the number of states for which neonatal mortality rates can be calculated, I combine data from 1995 through 2010. Pooling data over this period results in 33 states with at least 20 neonatal deaths for each of these race-specific birth weight categories. In total, this encompasses 42,165,102 individual birth records for White and Black infants, including 203,352 neonatal deaths.

I use information included in the linked birth–death records to control for sociodemographic composition when analyzing cross-state variation in birth outcomes. Specifically, I use data on mother's marital status (measured with an indicator variable identifying currently married mothers) and mother's education. As shown in the online Appendix B, highly educated mothers who are married have a substantially lower risk of neonatal mortality. I use these characteristics to identify mothers in advantaged sociodemographic positions (Chen et al. 2016; Fan and Luo 2020). If the distribution of these characteristics across racial groups varies across states, then geographic patterns of racial inequalities in neonatal mortality could reflect compositional differences. Controlling for sociodemographic characteristics shows the extent to which disparities persist when comparing mothers and infants in similarly advantaged positions.

One challenge with combining vital statistics data from the 1995–2010[6] period is that the birth certificate form was revised in 2003 and the measure of maternal education changed as part of this transition. The original measure captures years of educational attainment at different levels of schooling (e.g., years of elementary school, years of high school, years of college). The revised measure is based on degree attainment (e.g., high school graduate, bachelor's degree, master's degree, doctorate or professional degree). Thus, the two measures are not directly comparable. A further complication is that states implemented this revision at different times between 2003 and 2014. Of the 33 states analyzed, 19 adopted the revised birth certificate during the study period. To minimize the possibility that mothers with equivalent education are categorized differently owing to the change in measurement across states and over time, I focus specifically on identifying mothers with the highest levels of educational attainment. In the original birth certificate, this includes all mothers who reported completing four or more years of college. In the revised certificate, this includes all mothers who reported a bachelor's degree or higher. With this approach, the only potential for measurement error when combining data pre- and postrevision comes

[6] Cohort-linked birth–infant death microdata are available through 2015, but there is an issue with the measure of maternal education in years 2011–2013 for nine of the 33 states included in the analysis. In these states, large proportions of the infant observations are missing data on maternal education. Given the importance of education as the primary measure of socioeconomic position used in the analysis, excluding years after 2010 maintains the same sample of 33 states over an uninterrupted period.

from mothers who completed four or more years of college but did not earn a degree or those who completed fewer than four years of college but did earn a degree.[7]

Analysis Stage One: Variation in Decomposition Results Across States

The analysis proceeds in two stages. In the first stage, I decompose the disparity in mortality between Black and White neonates into two components using a decomposition technique pioneered by Kitagawa (1955) and further developed by Oaxaca (1973) and Blinder (1973). Following Jann (2005), I use a linear probability model[8] to regress neonatal mortality (Y) on birth weight (X) for Black ($\dot{J}1$) and White ($\dot{J}2$) neonates:

$$Y_j = X_j B_j + \varepsilon_j.$$

The mean difference in the probability of neonatal mortality (R) between Black and White infants can be expressed as

$$R = \overline{Y}_1 - \overline{Y}_2 = \overline{X}_1'\hat{\beta}_1 - \overline{X}_2'\hat{\beta}_2. \quad (1)$$

Further, R can be decomposed as

$$R = (\overline{X}_1 - \overline{X}_2)'\beta^* + [\overline{X}_1'(\hat{\beta}_1 - \beta^*) + \overline{X}_2'(B^* - \hat{\beta}_2)], \quad (2)$$

where $\beta^* = .5\hat{\beta}_1 + .5\hat{\beta}_2$. (This is consistent with the Kitagawa decomposition. See also Reimers (1983).) In this formulation (a twofold decomposition), the first term refers to the component of the gap in neonatal mortality due to racial differences in birth weight distribution (often referred to as the "explained" part of the gap), and the second term refers to the component of the gap due to differences in birth weight–specific mortality (the "unexplained part") (Jann 2005). Although this produces equivalent results to the decomposition technique developed by Kitagawa (1955), the use of a regression-based approach allows for the estimation of standard errors for the results of Kitagawa–Blinder–Oaxaca decompositions (Jann 2008). When estimating the linear regression models used in the decompositions, I adjust the standard errors to account for the clustering of observations within birth years. The standard errors produced by this approach can be used to calculate 95% confidence intervals for the estimates of each component of the Black–White disparity in neonatal mortality. To express the decomposition results in relative terms, each component can then

[7] Although there is no way to directly measure the prevalence of these errors, the online Appendix A shows how the percentage of births to mothers categorized as having the highest levels of educational attainment changed before and after revision. For each state, column 1 displays the percentage of births to mothers reporting four or more years of college in the year before the revised birth certificate was adopted. Column 2 displays the percentage of births to mothers reporting a college degree or more. Column 3 displays the difference in these percentages and shows that the percentage of births to highly educated mothers declines slightly in 16 of the 18 states. This pattern suggests that some mothers in prerevision years who were grouped with college graduates when combining data across revisions may have instead been nongraduates who attended four or more years of college. However, the difference is small enough (1.35% of births per state on average) that this inconsistency is unlikely to influence the results.

[8] Results are substantively identical when using a logit model for this portion of the decomposition.

be divided by the total Black–White difference in neonatal mortality to determine the proportion of the disparity due to birth weight distribution and to birth weight–specific mortality. Using the linked infant birth–death data, I perform this decomposition for the United States as a whole and separately for 33 states.

Analysis Stage Two: Exploring Cross-State Variation

In the second stage of the analysis, I draw on both state- and individual-level information to explore the processes that manifest in differences in the contributions of birth weight distribution and birth weight–specific mortality across states. I begin by exploring the association between the decomposition results and a set of state-level explanatory variables. Because of the disproportionately high rates of infant mortality observed in Southern states (Hirai et al. 2014; see also Montez and Berkman 2014), I first assess whether racial differences in birth weight–specific mortality represent a larger proportion of the Black–White gap in neonatal mortality in states classified by the U.S. Census Bureau as being part of the Southern region.

I then focus on the role of institutional context as a key predictor of variation in health disparities across states (Montez, Hayward et al. 2019). Because racial differences in birth weight–specific mortality are largely a product of processes that operate during and soon after birth (Wise 2003), I focus on a set of state-level variables that are intended to capture aspects of state health and medical systems relevant to racial disparities in neonatal mortality. I use data from the 2008–2010 American Community Survey (ACS) to calculate the Black–White difference in the percentage of women who recently gave birth who do not have health insurance (Ruggles et al. 2020) as a measure of disparities in access to medical care. I also account for the fact that Black patients may face barriers to care despite having health insurance with a measure of the Black–White difference in the percentage of residents *with* health insurance coverage who do not have a doctor or personal health care provider (CDC 2004–2010). Research shows that Black infants experience better birth outcomes when they receive care from Black physicians (Greenwood et al. 2020). As a result, I use data from the 2006–2010 ACS on the percentage of a state's physicians who are Black as a measure of the racial diversity of the medical workforce (Ruggles et al. 2020). Finally, I include measures of the per capita number of obstetrician-gynecologists and hospital bassinets from the Area Resource File (HRSA 2010). In states where these resources are in short supply, Black mothers may be especially disadvantaged in accessing medical care when giving birth. For each of these state-level variables, I analyze the bivariate association with the proportion of the Black–White gap in neonatal mortality attributable to birth weight–specific mortality. Although a sample size of 33 states precludes a multivariate analysis, this approach provides a useful baseline evaluation of the role of state institutional context.

I further investigate differences in the decomposition results across states by assessing the extent to which the observed variation can be traced to differences in state sociodemographic composition. For this analysis, I use individual-level birth and death certificate data to replicate the calculations from stage one controlling for the sociodemographic variables discussed above. I implement this adjustment by restricting the analyses to married mothers with the highest level of educational attainment and then repeating the national and state-specific decompositions. This analysis examines whether the observed state-level differences persist when comparing those in similarly advantaged positions.

Finally, I draw on scholarship on explanations for differences in birth weight–specific mortality between groups to help isolate the aspects of state medical systems in which Black neonates are most disadvantaged relative to Whites. Prior research on this topic emphasizes that disparities in neonatal mortality among VLBW infants can be linked to differential receipt of hospital services such as obstetric interventions and neonatal intensive care technology (Hamvas et al. 1996; Wise 2003). Drawing on this insight, I calculate the proportion of each state's *total* Black–White gap in neonatal mortality due to disparate mortality between Black and White VLBW neonates.[9] In states where differences in VLBW mortality play a prominent role in explaining racial disparities in neonatal mortality, it suggests that Black neonates are especially unlikely to benefit from this lifesaving care and technology (Howell 2008).

Results

Table 1 presents the decomposition of Black–White disparities in neonatal mortality for the United States overall. As shown in the first column of data, 1.17% of White infants are born VLBW and 5.73% are born LBW. In contrast, Black infants are 2.7 times as likely to be born VLBW (3.15% of infants) and 1.8 times as likely to be born LBW (10.37%) (column 4). This supports the established finding that the distribution of birth weight among Black infants puts them at higher risk of mortality (Mathews and MacDorman 2012). Comparison of White and Black neonates (columns 2 and 5) shows that mortality rates among VLBW and NBW White neonates are lower than for Black neonates at comparable birth weights. Black neonates in the LBW category are *less* likely to die than White LBW neonates (7.1 vs 9.1 deaths per 1,000 live births). This is consistent with research showing a survival advantage for Black infants in this category (Alexander et al. 2003; Mathews and MacDorman 2012). This breakdown highlights the two processes that lead to disparate mortality between Black and White neonates.

To identify the contribution of these processes to inequalities in mortality between Black and White neonates, the last two columns decompose the Black–White gap in

[9] This quantity can be calculated using the decomposition approach introduced by Kitagawa (1955; see also Carmichael and Iyasu 1998). Below, R_{bi} and R_{wi} are the neonatal mortality rates for Black and White infants in each of i birth weight categories (VLBW, LBW, and NBW). P_{bi} and P_{wi} are the proportions of Black and White infants in each birth weight category i. Adding across all three birth weight categories gives the total disparity in mortality between White and Black neonates. The number of deaths due to differences in VLBW mortality can then be divided by this total disparity to identify the proportion of the disparity attributed to this component.

Component 1: Disparities due to differences in birth weight distribution:

$$\left[(R_{bi} + R_{wi})/2\right] \times (P_{bi} - P_{wi}).$$

Component 2: Disparities due to differences in birth weight–specific mortality:

$$\left[(P_{bi} + P_{wi})/2\right] \times (R_{bi} - R_{wi}).$$

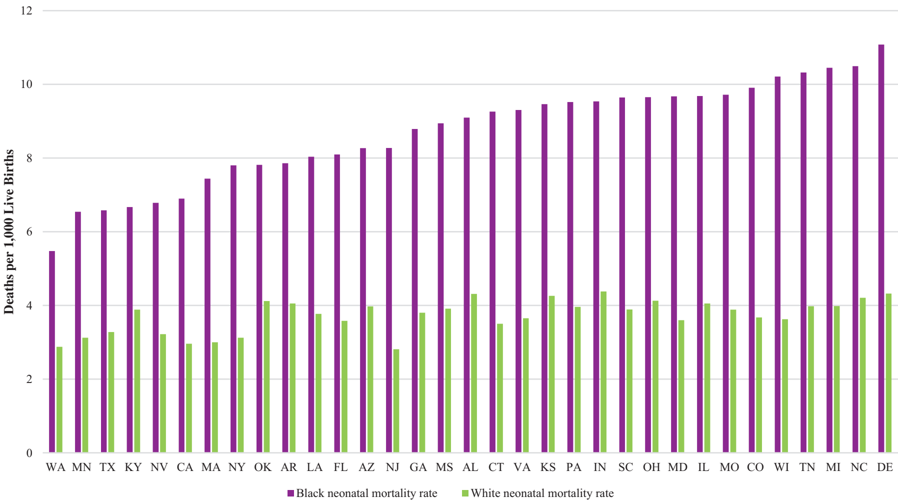

Fig. 1 Black and White neonatal mortality rates in 33 states, 1995–2010

neonatal mortality into two components. Overall, the mortality rate is 3.65 deaths per 1,000 live births for White neonates and 8.72 per 1,000 for Black neonates. This means that the total gap in neonatal mortality between Black and White infants is 5.07 per 1,000. Of these additional Black neonatal deaths, the decomposition analysis shows that 4.53 are because of differences in the distribution of birth weights between White and Black newborns and 0.55 are because of differences in birth weight–specific mortality. Thus, roughly 89% of the disparity in mortality is attributable to birth weight distribution (4.53/5.07) and the remaining 11% to birth weight–specific mortality (0.55/5.07). These estimates are comparable in magnitude to those of previous research (Elder et al. 2011; Schempf et al. 2007). This confirms that at the national level, Black–White disparities in neonatal mortality are driven predominantly by differences in the distribution of birth weights (and thus factors that operate before and during pregnancy).

Cross-State Differences in Decomposition Results

Figure 1 displays the number of deaths per 1,000 live births for White and Black neonates in each of the 33 states where sufficient data are available. The difference between the purple and green bars shows the magnitude of the Black–White difference in mortality rates. An important takeaway is that although inequalities in neonatal mortality are present in all states, the size of the gap varies across states (from a low of 2.1 per 1,000 in Washington to a high of 6.8 per 1,000 in Delaware). Moreover, the graph reveals that this variation is driven by differences in the Black neonatal mortality rate: racial disparities are highest in the states where Black infant neonatal mortality is high (and there is less variability in the White neonatal mortality rate across states). This is also supported by the very high .96 Pearson correlation between the Black–White gap and the Black neonatal mortality rate, compared with a correlation of .41 between the Black–White gap and the White rate. Thus, efforts to reduce

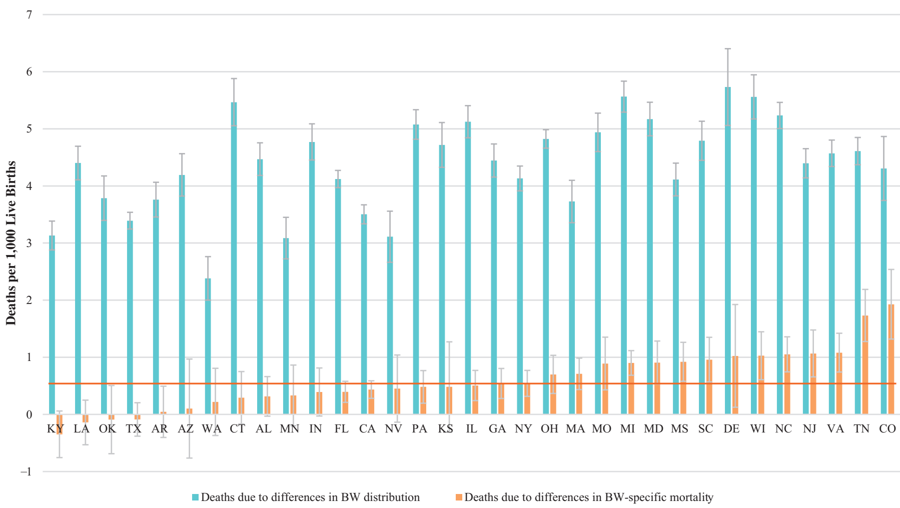

Fig. 2 Decomposition of Black–White disparities in neonatal mortality in 33 states, 1995–2010. The gray bars represent 95% confidence intervals. The horizontal orange line shows the number of deaths per 1,000 live births due to Black–White differences in birth weight–specific mortality for the United States (0.55). BW = birth weight.

racial disparities in neonatal mortality must address the fact that the social context in some states is particularly harmful to Black neonates.

To assess whether these processes that produce higher rates of mortality among Black neonates operate differently across states, I conduct separate decompositions of Black–White disparities in neonatal mortality for each of the 33 states. In Figure 2, the combined height of the teal and orange bars represents the total difference in mortality rates between White and Black neonates.

A notable result is that the contribution of birth weight–specific mortality to Black–White disparities in neonatal mortality varies substantially by state. In Kentucky, Louisiana, Oklahoma, and Texas, the negative contribution means that Black neonates are *advantaged* relative to Whites in birth weight–specific mortality. This can also be seen in the online Appendix C, which presents the full results of the decomposition analysis for Kentucky. In contrast with the nation overall, rates of VLBW mortality in Kentucky are similar for White and Black neonates (with the Black rate slightly lower than the White rate). In addition, the survival advantage among LBW Black neonates is even more pronounced than at the national level. However, Black neonates still experience a disparity of 2.78 additional deaths per 1,000 live births. This is because, in Kentucky, the incidence of VLBW births among Black infants is 2.2 times that among Whites, and the incidence of LBW births among Black infants is nearly 1.6 times that among Whites.

The error bars in Figure 2 show that the level of precision varies across states. Even after accounting for this uncertainty, error bars for five states are entirely below the orange line representing the 0.55 deaths that can be traced to birth weight–specific mortality in the national-level decomposition. This supports the idea that the substantively small contribution of birth weight–specific mortality in these states is not observed because of chance. In contrast to states for which the contribution of birth weight–specific mortality is small or even negative, there are also states that stand

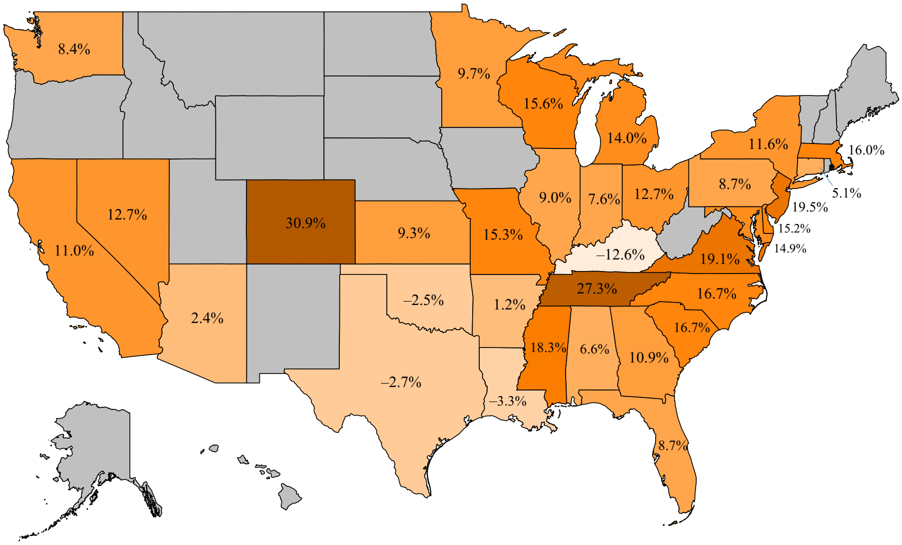

Fig. 3 Percentage of the Black–White disparity in neonatal mortality explained by differences in birth weight–specific mortality in 33 states, 1995–2010. Darker shades of orange represent higher percentages.

out for a large contribution of birth weight–specific mortality. In nine states for which the estimates are greater than the national-level contribution and the error bars do not overlap (including Colorado, Tennessee, and Virginia), birth weight–specific mortality explains upward of 0.90 neonatal deaths (14%–31% of the total disparity in mortality between Black and White neonates in these states). To show how birth weight–specific mortality can be such an important factor, the online Appendix C presents the full decomposition for Colorado. As shown in data columns 2 and 5, the mortality rate among VLBW Black neonates is 1.4 times that among White neonates (289.13 vs. 204.00 per 1,000). Black neonates also face a 50% greater risk of NBW mortality (1.24 vs. 0.82 per 1,000). These differences in mortality among infants of similar birth weights account for 1.93 of the 6.23 excess deaths among Black neonates (30.9%). Thus, in Colorado and other states where birth weight–specific mortality explains a high proportion of the Black–White gap in neonatal mortality, something about the experience of Black neonates during and after birth puts them at heightened risk of mortality relative to their White counterparts.

Exploring Cross-State Differences in Decomposition Results

The results from the first stage of the analysis provide evidence of notable cross-state variation in the role that birth weight–specific mortality plays in the Black–White disparity in neonatal mortality, underscoring the value of exploring this variation further. As a first step in this direction, Figure 3 maps the *percentage* of each state's Black–White disparity in neonatal mortality that can be traced to differences in birth weight–specific mortality. At the national level, this percentage is 10.8%, but the contribution ranges from −12.6% in Kentucky to 30.9% in Colorado. The map displays

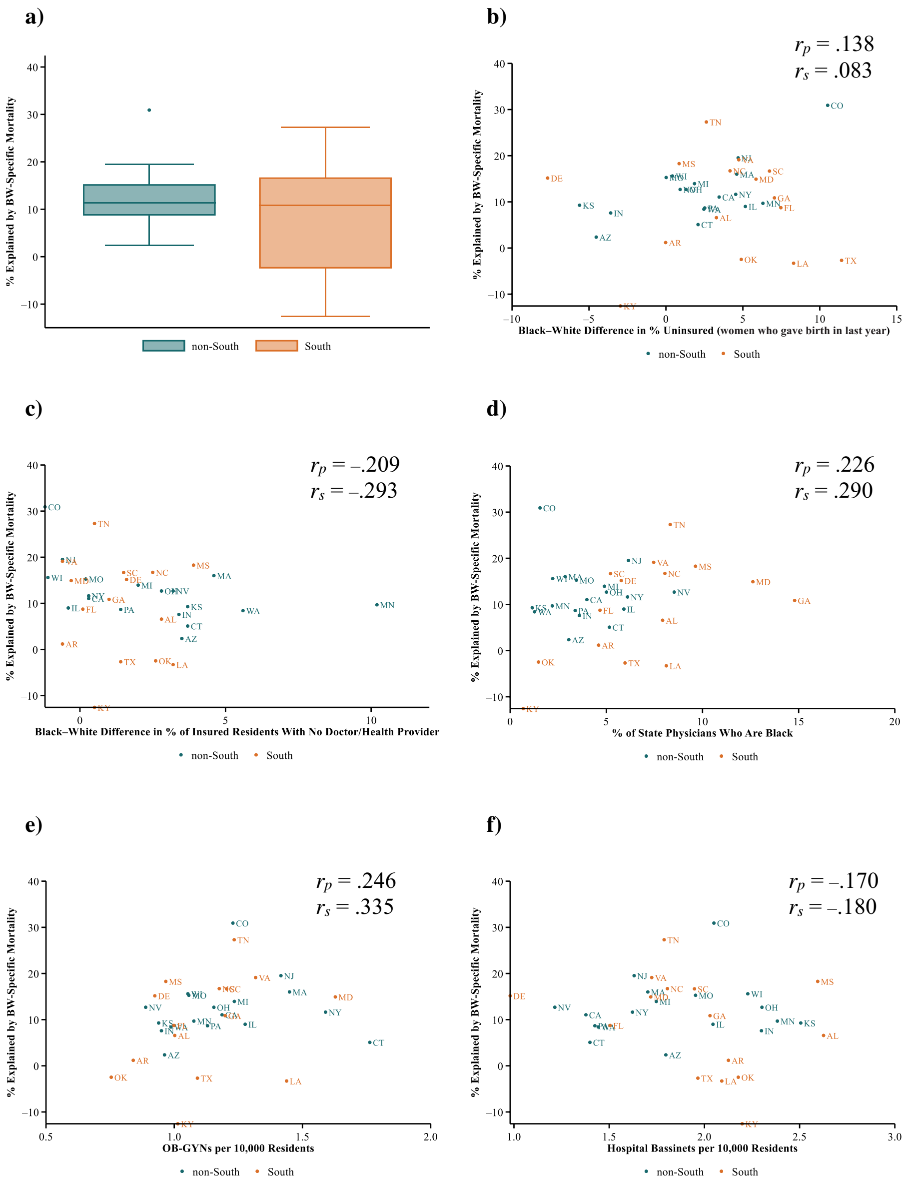

Fig. 4 Bivariate associations between the percentage of the Black–White gap in neonatal mortality explained by birth weight–specific mortality and state-level variables ($n = 33$ states). Orange markers indicate Southern states. r_p = Pearson correlation coefficient; r_s = Spearman correlation coefficient. BW = birth weight.

some similar patterns for clusters of neighboring states. Birth weight–specific mortality contributes a comparatively small percentage to disparities in neonatal mortality in Texas, Oklahoma, Louisiana, and Arkansas, while this percentage is high in Tennessee, Virginia, North Carolina, and South Carolina. Interestingly, many of the states with both the lowest *and* highest contribution of birth weight–specific mortality are located in the South. This can also be seen in panel a of Figure 4, which displays box plots for the distribution of this outcome for the 15 Southern states and 18 non-Southern states included in the analysis. Although the median percentage is slightly lower in Southern states, there is also considerably more variability across the states in this region.

The complexity of the cross-state patterns is further emphasized by the analysis of state-level explanatory variables displayed in Figure 4. Panels b–f show the bivariate plots and Pearson correlation coefficients (r_p) between the relative contribution of birth weight–specific mortality to the Black–White gap in neonatal mortality and five measures of state health and medical systems. I also present Spearman rank order correlation coefficients (r_s) as a nonparametric measure of the association. Although these measures capture state-level factors predicted to relate to birth weight–specific mortality, none are highly correlated with this outcome (r_p ranges from –.209 to .246, and r_s ranges from –.293 to .335). Despite the absence of strong correlations, a few notable patterns stand out. Panel b shows the association between the Black–White difference in the percentage of women in a state who gave birth in the past year but do not have any health insurance coverage and the contribution of birth weight–specific mortality. Although the overall association is weak and positive, distinguishing Southern and non-Southern states reveals that there is a moderate positive correlation between these two variables in non-Southern states ($r_p = .621$, $r_s = .338$), but not in Southern states ($r_p = –.065$, $r_s = –.239$). This provides further evidence that there are regional differences in the processes through which racial differences in birth weight–specific mortality contribute to disparities in neonatal mortality. Differences between Southern and non-Southern states are also apparent in panel d, which shows the association between the contribution of birth weight–specific mortality and the percentage of a state's physicians who are Black. Separating the results by region shows that there is no association outside the South ($r_p = –.08$, $r_s = .065$), but a moderate positive association in the South ($r_p = .536$, $r_s = .468$).

While a bivariate analysis of state-level data is unable to provide a straightforward explanation for cross-state differences in the contribution of birth weight–specific mortality, it is still possible to identify important takeaways about the differing roles played by this component of the Black–White gap in neonatal mortality across states. One potential source of this variation is the demographic composition of state populations. To account for the role of compositional factors, I replicate the decompositions displayed in Figure 2 after restricting the analysis to infants born to highly educated, married mothers. Table 2 presents the results of this analysis for the nation overall. As would be expected, the total difference in neonatal mortality is smaller for mothers in more advantaged positions (4.15 deaths per 1,000 live births vs. 5.07 per 1,000 without controls). Although the size of the gap is smaller, differences in birth weight–specific mortality explain a slightly larger *proportion* of the total disparity in neonatal mortality. As shown in the last column, 0.55 deaths out of the 4.15 death gap stem from differences in birth weight–specific mortality (13.34%).

One thing that stands out is the wide confidence intervals for many states. Even after aggregating 1995–2010 data, many states report small numbers of neonatal deaths among LBW and NBW infants born to Black married mothers with a college degree. This data limitation increases the standard errors and reduces the precision of the adjusted decomposition estimates (even though the estimates are based on nearly the full population of births and deaths in these states). Despite the imprecision, the findings support the idea that the contribution of birth weight–specific mortality varies across states, even when comparing outcomes for neonates with similar sociodemographic characteristics.

Table 2 Contribution of birth weight distribution and birth weight–specific mortality to racial differences in neonatal mortality among infants born to highly educated married mothers, United States, 1995–2010

	White Births ($n = 11,690,268$)			Black Births ($n = 804,563$)			Decomposition		
BW Category	BW Distribution (%)	BW-Specific Mortality Rate (per 1,000)	Neonatal Deaths (per 1,000)	BW Distribution (%)	BW-Specific Mortality Rate (per 1,000)	Neonatal Deaths (per 1,000)	Black–White Difference	BW Distribution	BW-Specific Mortality
VLBW	0.98	175.506	1.718	2.76	206.655	5.712	3.994	3.411	0.583
LBW	4.92	8.318	0.409	7.89	6.305	0.497	0.088	0.217	–0.129
NBW	94.10	0.606	0.571	89.35	0.715	0.639	0.068	–0.031	0.100
Total	100.00		2.698	100.00		6.848	4.151	3.597	0.554

Notes: BW = birth weight; VLBW = very low birth weight; LBW = low birth weight; NBW = normal birth weight. Percentages may not sum to 100.00 because of rounding. $N = 12,494,831$ births.

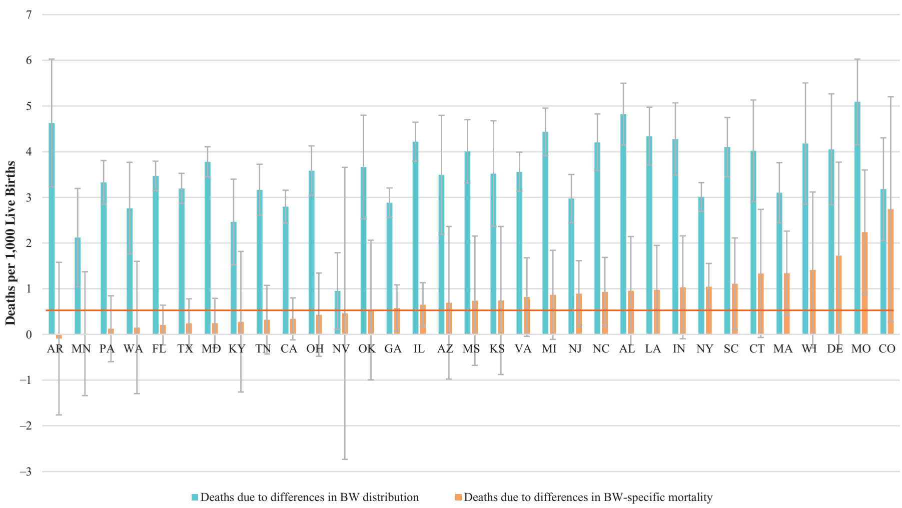

Fig. 5 Decomposition of Black–White disparities in neonatal mortality in 33 states among highly educated, married mothers, 1995–2010. The gray bars represent 95% confidence intervals. The horizontal orange line shows the number of deaths per 1,000 live births due to Black–White differences in birth weight–specific mortality for the United States (0.55). BW = birth weight.

In comparing the results in Figures 2 and 5, several patterns stand out. First, there are a few states where differences in birth weight–specific mortality make a large contribution to the Black–White gap in neonatal mortality both before and after accounting for maternal characteristics. In Colorado, New Jersey, Massachusetts, and Wisconsin, this component accounts for 15.6%–30.9% of the disparity in the unadjusted data and 23.1%–46.3% in the adjusted data. This indicates that the factors that lead to differences in mortality among Black and White neonates of similar birth weight cannot be ascribed simply to sociodemographic advantages among White mothers. Instead, it suggests that race independently influences access to or quality of the medical care received during and after pregnancy in these states. In contrast, in Tennessee and Mississippi, the large relative contribution of birth weight–specific mortality is notably reduced when the analysis is restricted to highly educated, married mothers. This is consistent with the idea that Black mothers' socioeconomic disadvantage in these states is the primary source of disparities in birth weight–specific mortality.

Finally, Table 3 compares the percentage of each state's total Black–White gap in neonatal mortality due to differences in birth weight–specific mortality (column 3, the same quantity mapped in Figure 3) with the percentage of the total gap due to disparate mortality between Black and White VLBW neonates (column 4). This focus on the VLBW category is useful because mortality differences between neonates in this group can be traced specifically to differential receipt of neonatal intensive care and other medical technology (Wise 2003). Consistent with patterns for the nation overall (shown in the bottom row), for most states, the percentages in column 4 are nearly as large as those in column 3. This means that disparities due to birth weight–specific mortality are driven primarily by deaths to VLBW neonates. Exceptions to this pattern include Nevada, Minnesota, and New Jersey, where disparities in mortality

Table 3 Percentage of the total Black–White gap in neonatal mortality that is explained by BW-specific mortality and VLBW-specific mortality in 33 states, 1995–2010

State	Black–White Gap in Neonatal Mortality (deaths per 1,000 live births)	% of Total Black–White Gap Due to BW-Specific Mortality	% of Total Black–White Gap Due to VLBW-Specific Mortality	Percentage-Point Difference
KY	2.78	–12.56	–3.78	–8.78
OK	3.69	–2.48	–0.71	–1.77
TX	3.30	–2.67	1.01	–3.68
NV	3.56	12.68	1.17	11.51
AR	3.80	1.18	1.43	–0.24
MN	3.42	9.69	1.46	8.22
LA	4.26	–3.29	4.01	–7.30
IL	5.63	8.99	4.40	4.59
CT	5.76	5.07	4.65	0.43
AZ	4.30	2.36	5.86	–3.50
PA	5.56	8.67	6.63	2.04
NY	4.67	11.63	6.68	4.95
WA	2.60	8.41	7.52	0.89
FL	4.52	8.74	8.01	0.73
GA	4.99	10.86	10.13	0.74
AL	4.78	6.58	10.33	–3.75
WI	6.59	15.60	10.79	4.81
MA	4.44	16.00	11.03	4.97
CA	3.94	11.04	11.07	–0.03
IN	5.16	7.59	11.69	–4.10
NJ	5.46	19.53	11.78	7.74
MD	6.08	14.92	12.40	2.52
OH	5.52	12.68	12.60	0.08
MI	6.47	13.95	13.14	0.80
KS	5.20	9.27	13.25	–3.98
MO	5.83	15.27	13.44	1.83
DE	6.76	15.16	14.99	0.18
VA	5.65	19.12	15.96	3.16
SC	5.75	16.67	16.05	0.62
MS	5.03	18.28	16.91	1.37
NC	6.29	16.72	17.05	–0.33
TN	6.34	27.31	23.57	3.73
CO	6.23	30.92	27.52	3.40
USA	5.07	10.76	9.99	0.77

between NBW and LBW neonates make up a comparatively large portion of the deaths due to birth weight–specific mortality.

Table 3 highlights cross-state variation in contribution of differences in VLBW-specific mortality between Black and White neonates to the total gap. At the national level, VLBW-specific mortality represents 10% of the total Black–White difference in neonatal mortality (0.51/5.07, see Table 1), but in five states (South Carolina, Mississippi, North Carolina, Tennessee, and Colorado), this percentage ranges from 16% to 27%. These states all stand out as places where birth weight–specific mortality contributes an especially high percentage to the total Black–White gap. The contribution of VLBW-specific mortality apparent in Table 3 indicates that Black neonates are especially disadvantaged in the use of advanced obstetric interventions and neonatal intensive care technology in these states.

Discussion

This paper explores differences in neonatal mortality between Black and White infants in 33 U.S. states. Black neonates face a higher risk of mortality in all these states, but the magnitude of the gap varies considerably. To help disentangle the processes producing these disparities, I decompose the gap into two components: (1) disparities due to racial differences in birth weight distribution, and (2) disparities due to racial differences in birth weight–specific mortality. At the national level, birth weight distribution explains 89% of the Black–White gap in neonatal mortality. This supports previous research in emphasizing that a critical component of the disparity in neonatal mortality is that Black infants are more likely to be born at low and very low birth weights (Carmichael and Iyasu 1998; Elder et al. 2011). Differences in birth weight distribution reflect the fact that even before they give birth, Black mothers are more likely to experience socioeconomic deprivation, chronic stress, discrimination, and exposure to environments that put their infants at risk (Braveman et al. 2014; Hogue and Bremner 2005; O'Campo et al. 2008).

However, I go beyond previous applications of this decomposition technique by calculating state-specific decompositions for 33 states. This analysis reveals that in some states, differences in mortality among infants born at similar weight make a meaningful contribution to disparities in mortality between Black and White neonates. In at least nine states, the contribution of birth weight–specific mortality to the disparity in neonatal deaths is greater than the national-level contribution. Disparate mortality among neonates born at similar weights is the product of risk factors that operate during and soon after birth. Because differences in mortality between VLBW neonates can be traced to unequal receipt of obstetric interventions and neonatal intensive care technology (Wise 2003), the high proportion of the disparity due to this component in states like Colorado and Tennessee indicates that, in these states, high-risk Black neonates do not receive the same medical care as Whites during this critical period.

The results of this state-specific analysis are underscored by the fact that similar patterns are observed even when restricting the analysis to infants of highly educated, married mothers, which indicates that inequalities in medical care during and after birth are not simply a product of sociodemographic differences between White and Black mothers (Schoendorf et al. 1992). Thus, a key issue for future research is to study the factors that contribute to racial disparities in newborn care in many states (Bryant et al. 2010). One possibility is that Black mothers in these states do not receive the same quality of hospital care as Whites because of racial bias by providers (Council of Ethical and Judicial Affairs 1990; Matoba 2017; Williams 1999) or the continued racial segregation of hospitals (Howell et al. 2018; Smith 1998). However, cross-state variation in the importance of VLBW-specific mortality emphasizes the complexity of this issue.

These results have important implications for efforts to improve birth outcomes and reduce racial disparities in neonatal mortality. In a majority of states, upward of 90% of the gap in neonatal mortality can be traced to Black infants' greater likelihood than Whites of being born in the high-risk VLBW and LBW categories. These differences in health at birth reflect racial differences in life experiences that play a role even before pregnancy (Lu and Halfon 2003). Thus, efforts to improve birth outcomes for Black infants require interventions that span a mother's full life course. Policies focused on this objective might include housing policies designed to reduce racial disparities in exposure to disadvantaged neighborhoods, more generous income support for women living in poverty, and health care policies that expand access to primary and prenatal care. The broad scope of these interventions emphasizes that the challenge of reducing disparities in health at birth is one that transcends the boundaries of health policy (Rodriguez 2019; Woolf 2019).

However, there are also states where racial differences in birth weight–specific mortality make a substantial contribution to gaps in neonatal mortality. In these states, the results presented here highlight a meaningful role for interventions designed to improve adverse outcomes among VLBW Black neonates. For example, Colorado infants in this group have a neonatal mortality rate of 289 deaths per 1,000 live births. If this rate could be reduced to 206 to match the U.S. rate, Colorado's Black neonatal mortality rate would drop by nearly 2.4 deaths per 1,000 live births and the Black–White difference in mortality would shrink to 3.9 per 1,000. Although an improvement of this magnitude is by no means easy to achieve, the findings for Colorado and similar states provide a clear target for policy reform. Unlike efforts to shift the distribution of Black birth weights, interventions designed to reduce differences in mortality between neonates born at similar risk can be focused more narrowly on reducing disparities in access to quality hospital care among high-risk infants. Useful policy directions include increasing the number of Black infants who are born in hospitals with advanced neonatal intensive care technology and reducing racial bias in physician–patient interactions so that Black mothers and their newborns receive the full benefit of available obstetric interventions.

The need to implement this type of intervention at the state-level calls attention to the value of further research on this topic. In using data from only 33 states, the preliminary analysis of state-level predictors is limited to a comparison of bivariate associations. I analyze five measures of state health care and hospital systems, but none prove to be a strong predictor of variation in the contribution of birth weight–specific mortality to the Black–White neonatal mortality gap. This supports the idea that the processes that produce differentials in mortality among infants of similar birth weight operate at the hospital and individual levels. For example, recent research indicates that racial disparities in infant mortality are smaller in magnitude when Black newborns are cared for by Black physicians (Greenwood et al. 2020). This may be a sign that racism, implicit bias, mistrust, or other factors lower the quality of the care Black newborns receive from White physicians and highlights the importance of research that examines physician–patient interactions as a source of racial disparities in birth weight–specific neonatal mortality. However, the results presented here suggest that research in this area should compare data on race and physician–patient interactions *across states* to help identify aspects of the medical systems in Colorado and Tennessee that lead VLBW Black infants to experience worse outcomes than their White counterparts.

This analysis is subject to additional limitations. For one, birth weight is an imperfect measure of an infant's health at birth (Wilcox 2001). While being born LBW or VLBW is highly correlated with neonatal mortality, gestational age is a more proximate predictor of health at birth (Kramer and Hogue 2009). However, the measurement of gestational age in vital statistics data is considered unreliable, with biases especially likely to be observed when analyzing sociodemographic differences (Dietz et al. 2007). As a result, I follow previous research seeking to decompose racial disparities in neonatal mortality and rely on birth weight as a measure of infant health at birth (e.g., Carmichael and Iyasu 1998; Elder et al. 2011).

Further, even though the data include essentially all of the population of births and deaths during the study period, the analytic sample has some limitations. For one, there were sufficient data on neonatal deaths to apply the birth weight decomposition methodology in only 33 states. Thus, disparities in neonatal mortality in 17 states remain unexamined. In addition, many of the estimates from the state-specific decomposition analyses are imprecise, especially when holding constant maternal education and marital status. This is a product of the low overall incidence of neonatal mortality combined with the small number of deaths among neonates born to highly educated, married mothers in many states. For example, when decomposing the Black–White gap in mortality among neonates from this group in Arkansas, the estimates are based on data on just 46 deaths of Black infants. Although this exceeds the 20-death threshold recommended by the NCHS, the resulting confidence interval for the estimated deaths due to birth weight–specific mortality ranges widely from −1.76 to 1.67. Because the sample already aggregates observations over a 16-year period, this type of sample size limitation is difficult to overcome, and emphasizes that conclusions based on the results that adjust for sociodemographic controls should take the uncertainty of the estimates into account.

The persistence of racial disparities in the likelihood of neonatal mortality serves as a powerful example of disparities in life chances between White and Black Americans. Research has established that the enduring Black–White gap in infant mortality is likely to be the product of interacting processes that are reinforced within and across generations (Fan and Luo 2020; Lu and Halfon 2003). The results presented here emphasize that these processes do not play out in the same way in all populations and highlight the need to identify the state-level institutions that increase or reduce racial disparities. ■

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Benjamin Sosnaud
bsosnaud@trinity.edu

Department of Sociology and Anthropology, Trinity University, San Antonio, TX, USA; https://orcid.org/0000-0001-7794-9458