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Birth outcome racial disparities: A result of intersecting social and environmental factors

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ABSTRACT

Adverse birth outcomes such as preterm birth, low-birth weight, and infant mortality continue to disproportionately affect black and poor infants in the United States. Improvements in healthcare quality and access have not eliminated these disparities. The objective of this review was to consider societal factors, including suboptimal education, income inequality, and residential segregation, that together lead to toxic environmental exposures and psychosocial stress. Many toxic chemicals, as well as psychosocial stress, contribute to the risk of adverse birth outcomes and black women often are more highly exposed than white women. The extent to which environmental exposures combine with stress and culminate in racial disparities in birth outcomes has not been quantified but is likely substantial. Primary prevention of adverse birth outcomes and elimination of disparities will require a societal approach to improve education quality, income equity, and neighborhoods.

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Introduction

Twenty years ago, David and Collins published groundbreaking findings demonstrating that black women in Illinois who were born in the United States gave birth to substantially smaller infants than black women who immigrated from Africa to the United States.¹ Immigrant black women's birth outcomes were much more similar to white mothers than they were to their African American counterparts. This key observation largely debunked the hypothesis that racial disparities in birth outcomes result from genetic differences

between races and ethnic groups.² There is something about being black in America over time, perhaps generations, that leads to worse birth outcomes for black infants. Over the following 2 decades, the search for modifiable factors that result in these disparities has been relentless, but disparities persist (Table). Black infants have a 50% higher risk of being born preterm (before 37 weeks of gestation), are almost twice as likely to be born low-birth weight (LBW, less than 2500 g), and are more than twice as likely to die in the first year of life.³⁻⁵ Fetal deaths are also more than twice as common among black women compared with white women.⁶ Despite

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Table – Black-White disparities in birth outcomes in the United States⁴⁻⁶.

Outcome	Black (%)	White (%)	Black/White disparity (RR)
Preterm birth (<37 weeks)	13.0	8.9	1.46
Very preterm (<34 weeks)	4.6	2.4	1.92
Low-birth weight (<2500 g)	12.8	7.0	1.83
Very low-birth weight (<1500 g)	2.8	1.1	2.55
	n/1000	n/1000	
Infant mortality (<1 year)	11.05	4.93	2.24
Neonatal mortality (<28 days)	7.32	3.37	2.17
Fetal death (>20 weeks)	10.3	4.88	2.11

all of the effort and resources that have been expended to discover the reasons for birth outcome disparities, the mechanisms remain poorly understood.

While improvements in healthcare and healthcare access can improve health overall, tackling disparities has proven difficult. Massachusetts instituted universal health insurance in 2006, but disparities persist. In 2005, black infants were 40% more likely than white infants to be born preterm (12.4% versus 8.8%) and 64% more likely to be LBW (12.0% versus 7.3%).⁷ In 2014, 8 years after healthcare reform, black infants were still 18% more likely to be born preterm (10.0% versus 8.5%) and 48% more likely to be LBW (10.2% versus 6.9%).⁸ The prevention of preterm birth relies on identifying high-risk pregnancies and targeting therapies such as progesterone or cerclage placement.⁹ However, screening for women at high risk for preterm birth is not always universal, even when women receive prenatal care.¹⁰ Further, even if optimal screening and use of medical interventions to prevent preterm birth were uniformly distributed, only a fraction of preterm deliveries would be averted. Data demonstrate that progesterone can reduce the risk of preterm birth in high-risk women, as defined by a prior preterm delivery or short cervical length, by 43%.¹¹ Assuming 20% of pregnancies were high risk, the overall reduction in preterm birth for the population would be just under 10%. A more comprehensive societal approach that extends beyond healthcare will be required to improve birth outcomes and eliminate their disparities.

In this review, we focus on social factors such as suboptimal education and poverty, in addition to environmental exposures to air pollution, metals such as lead, and recently identified toxins such as phthalates, that differ by race and ethnicity in the United States. Lastly, we discuss the impact of psychosocial stressors, including discrimination on birth outcomes. Each of these factors may increase the risk of adverse health outcomes for all adults and children in the United States, but also likely combine to lead to unequal beginnings for the youngest members of our society (Fig.).

Education

In almost all epidemiologic studies, investigators adjust for socioeconomic position, so as to isolate the potentially causal

relationship between other factors, such as smoking or diabetes, and the risk of an outcome, such a preterm birth. However, socioeconomic position itself is reproducibly associated with an increased risk of adverse birth outcomes. One of the primary contributors to socioeconomic position is education. The United States has a long history of racial segregation and inequality in schools that did not end with the 1954 *Brown v. Board of Education of Topeka* Supreme Court ruling outlawing segregation. In 2015, the National Assessment of Educational Progress produced a report to describe school racial composition in the United States and its association with academic achievement gaps.¹² The report stated that segregation persists: white students attend schools that average 9% black students, while black students most often attend schools that are 48% black. Both black and white students underperformed at schools with a higher density of black students compared to students at schools with a lower density of black students, but the achievement gap between black and white students was similar between schools. This finding suggests that where students attend school matters for achievement overall, but that, regardless of racial composition, schools are equally poor at eliminating achievement gaps. Further, 4-year high school graduation rates are substantially lower for black students (73%) than white students (87%).¹³ Fewer years of education are associated with increased risks of preterm birth, suboptimal fetal growth, still birth, and infant mortality.¹⁴ How lower levels of education may cause poor birth outcomes is not completely

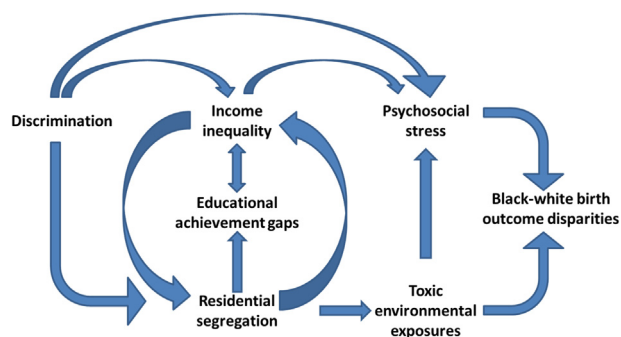


Fig. – Conceptual model of societal factors in the United States that lead to psychosocial stress, toxic environmental exposures, and ultimately contribute to racial disparities in birth outcomes.

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