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EDITORIAL COMMENT

Money Is Not Enough

Diminishing Health Returns in Black Women Hospitalized for Preeclampsia*

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Preeclampsia is a leading cause of maternal and fetal morbidity and mortality worldwide.[1] Our recent population-based study indicated that approximately 15% of women will experience at least 1 hypertensive pregnancy during their reproductive years.[2] The risk of preeclampsia varies by clinical characteristics and social determinants of health, including age, comorbid conditions, race, and income. Black women have a significantly increased risk of preeclampsia compared with White women overall.[3] Data on whether preeclampsia has the same impact on short- and long-term health outcomes across racial and socioeconomic factors, however, are limited. The impact of race and income on in-hospital mortality and cardiovascular outcomes related to preeclampsia is the subject of the article by Zahid et al[4] in this issue of *JACC: Advances*.

Zahid et al used the National Inpatient Sample, an administrative claims database that compiles data from across the United States, to identify all hospitalizations for preeclampsia from 2004 to 2019 using the International Classification of Diseases 9th and 10th edition codes. Demographic data, including age and self-identified race (White, Black, Hispanic, and Asian-Pacific Islander), as well as median household income by zip code, are available from National Inpatient Sample. The women were categorized into low-, medium-, and high-income percentiles, and the interaction between race and income was evaluated in multivariate models to predict outcomes, including mortality and in-hospital cardiovascular complications. They analyzed over 2 million deliveries for preeclampsia over a 15-year period and found that Black, Hispanic, and Asian/Pacific Islander women had higher in-hospital mortality compared with White women, with a significant interaction between race and household income ($P = 0.01$). Propensity matching was then used to compare Black vs White and high- vs low-income women, as well as to compare high-income Black women to low-income White women. They found that high-income White women had lower odds of in-hospital mortality and multiple other complications compared with low-income White women; however, the same was not true for Black women, where the higher income group did not have lower mortality or in-hospital complications. Indeed, the odds of acute coronary syndrome and acute kidney injury risk were elevated in the higher income group compared with the low income group. When comparing high-income Black women to low-income White women, Black women had higher odds of postpartum cardiomyopathy, acute coronary syndrome, stroke, heart failure, cardiac arrhythmias, and venous thromboembolism compared with low-income White women, and there was no difference in in-hospital mortality between the 2 groups.

This study raises the critical question as to why Black women hospitalized for preeclampsia do not see the same protective effects of higher income as White women. "Diminishing returns" is a phenomenon whereby Black women do not experience the same health benefits related to having a higher

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socioeconomic status as White women and has been demonstrated in multiple cardiometabolic conditions.[5] In a state-wide study in California, having a higher socioeconomic status attenuated the risk of preeclampsia only in White women. Black women had a shorter gestational age length compared with White women independent of preeclampsia or socioeconomic status indicators (education and insurance status).[5] There are several possible theories that have been proposed to explain these diminishing health returns. Black women with higher socioeconomic status may experience more racism and unfair treatment than Black women with lower socioeconomic status.[6] In a study using the 1979 National Longitudinal Study of Youth, which was initially developed to investigate the labor practices of young adults, Colen et al[6] found that upward social mobility over time in Blacks was associated with more reported episodes of acute discrimination compared with Black subjects with stable socioeconomic status over time. Furthermore, although both White and Hispanic subjects experienced less chronic discrimination with upward mobility, Blacks had stable levels of chronic discrimination across socioeconomic categories.

The increased exposure to racism and discrimination that Black women experience can impact multiple physiologic pathways, such as the sympathetic nervous system and adrenal axis, leading to an adverse metabolic milieu and health outcomes.[6,7] The consistent triggering of the stress response has been associated with higher rates of morbidity and mortality.[7] In the CARDIA study, Black women had a significantly higher odds of preterm delivery and low birth weight infants than White women; however, after adjusting for at least 3 experiences of racial discrimination, as well as other social determinants of health (income, education, alcohol/tobacco use), the relationship between race, preterm delivery, and low birth weight was significantly attenuated,[8] demonstrating the critical impact of these factors on maternal health. Members of socially disadvantaged groups may also need to develop complex coping strategies that can help them succeed in a difficult environment, which may cause mental and physical distress, so-called "skin-deep resilience."[9] Black women with upward mobility and increased socioeconomic status may therefore have the combined effects of increased experiences of racism and increased need for coping strategies, leading to a chronic stress response and poor health outcomes.

There is evidence that lower socioeconomic status among Hispanics does not translate into an increase in adverse health outcomes compared with average population rates, despite more metabolic risk factors and conditions, such as diabetes and hypertension.[6] This could be due to several factors, including increased social support and dietary factors, as well as time spent living in the United States.[10] In the present study, Hispanics had a lower risk of postpartum cardiomyopathy compared with White women. The fact that socioeconomic status does not impact health in a consistent manner across racial groups indicates that there may be other factors overriding the benefits of increased income and education. One key factor may be structural racism, which includes the multitude of ways that society fosters racial discrimination across all aspects of life, from housing to health care. Higher socioeconomic status or income may not give all women the same access to health benefits, and providers may not provide the same care to all patients. Implicit bias in health care providers has been associated with poor patient-provider relationships, although data on the impact on health outcomes in real-world scenarios are lacking.[11]

This study adds to our understanding of how race can impact maternal health in the United States, where increasing maternal mortality is a cause for significant alarm.[12] There are several limitations, however. As noted by the authors, the sample size for Asian and Pacific Islander women was small, and the few available categories for race likely mask significant heterogeneity. The use of diagnostic codes to identify preeclampsia episodes is fraught with inaccuracies, given the varying sensitivities and specificities of diagnostic codes over time, as well as the changing definitions of preeclampsia.[13,14] Whether providers consistently diagnose women with preeclampsia or other hypertensive disorders of pregnancy across racial categories is also not known, but it would be an interesting point of future study that would inform future claims-based research. Finally, the impact of preeclampsia on long-term cardiovascular health is increasingly recognized.[2] Understanding how the discrepancy in short-term complications translates into differences in future cardiovascular risk by race and income status would be extremely valuable in developing interventions to

target these health disparities, particularly given the increasing incidence of preeclampsia over time.[15] In-hospital mortality and complications from preeclampsia are devastating, though rare, while cardiovascular disease impacts millions of women each year. There is still much work to be done to make sure that women of all races and differing socioeconomic status have access to the care they need in pregnancy and beyond.

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