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Racial/Ethnic Disparities in Obstetrical Outcomes and Care: Prevalence and Determinants

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Abstract

Wide disparities in obstetrical outcomes exist between women of different race/ethnicities. The prevalence of preterm birth, fetal growth restriction, fetal demise, maternal mortality and inadequate receipt of prenatal care all vary by maternal race/ethnicity. These disparities have their roots in maternal health behaviors, genetics, the physical and social environments, and access to and quality of health care. Elimination of the health inequities due to sociocultural differences or access to or quality of health care will require a multidisciplinary approach. We aim to describe these obstetrical disparities, with an eye towards potential etiologies, thereby improving our ability to target appropriate solutions.

Keywords

disparities; maternal mortality; obstetrical care; preterm birth; race/ethnicity

Racial and Ethnic Disparities in Obstetrical Outcomes and Obstetrical Care

Profound racial and ethnic disparities have been documented in many areas of health and health care¹⁻³. Attempts to rectify these inequities in outcomes and processes of care must begin with an accurate account of their prevalence, and with some attention to potential etiologies. Unfortunately, disparities in obstetrical outcomes and care have persisted over time⁴⁻⁶. Here, we aim to summarize these obstetrical disparities and their possible origins, with the hope of driving an agenda to resolve them.

The manner in which disparities in health and health care should be defined is not always straightforward. In an argument to standardize the definition, Lê Cook and colleagues describe three definitions of disparities in health care.⁷ In the first, proposed by the Agency for Healthcare Research and Quality, disparities are defined by the mathematical difference in means or proportions between groups, without the use of statistical models. In the second, the

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Condensation

Widespread racial/ethnic disparities exist in obstetrics; documenting them and understanding potential etiologies will increase the likelihood of eliminating them.

Residual Direct Effect method, disparities are defined by differences which persist after accounting for all measured potential confounding variables. The last definition, preferred by the authors, is that used by the Institute of Medicine, in which disparities are seen as differences above and beyond those that can be explained by differences in health status between groups. Thus far, in investigations into obstetrical disparities, the methodologies described in the first two definitions have been most common. It should be a goal in the field to design studies that also seek to use the third, as this method is best able to highlight those disparities which might be amenable to interventions to reduce them.

The distinction between disparities in health outcomes and disparities in health care deserve mention. Both exist in obstetrics and both will be explored here. In general, disparities in health care are thought to contribute, though not exclusively, to disparities in health outcomes.

McGinnis and colleagues proposed that population health status, as measured by premature mortality, is contributed to by five domains, either individually or in conjunction with one another. The domains include behavioral patterns, which they estimate account for 40% of early deaths, genetic predispositions (30%), social circumstances (15%), environmental exposures (5%), and shortfalls in medical care (10%)^{8, 9}. We propose that disparities in health status can also be considered using this framework. In this paper, we will outline major disparities in the outcomes most clearly associated with significant morbidity and mortality, and will discuss the relative contributions of each of these domains, as indicated by our review of the relevant literature. We will also examine inequalities in obstetrical care, whether in access to or quality of care. Table 1 presents a summary of our findings regarding racial/ethnic disparities in these outcomes, while Table 2 presents a summary of the strength of the evidence for contribution of each of the above-mentioned domains to these disparities.

For the purposes of this discussion, we will refer mostly to the maternal race/ethnicity categories of Asian/Pacific Islanders, black, Hispanic, American Indian/Alaska Native and white. For most comparisons, White women serve as the referent group, merely to maintain consistency with the majority of the published literature on obstetrical disparities.

Disparities in Obstetrical Outcomes

Pregnancy Outcomes

Congenital abnormalities—The most consistent racial/ethnic difference in prevalence of congenital abnormalities appears to be a higher incidence of neural tube defects (NTD), including spina bifida and anencephaly, among Hispanic women.¹⁰⁻¹³ Williams and colleagues calculated a recent birth prevalence of spina bifida of 4.18 per 10,000 births among Hispanic women, as compared with 3.37 and 2.90 per 10,000 for non-Hispanic white and black women, respectively, similar to the findings of other studies¹⁴. In contrast, the Centers for Disease Control and Prevention (CDC) found a similar prevalence of spina bifida for Hispanic and white women. Although Hispanic women are at higher risk of NTD in most studies, adequate intake of folic acid remains low in this group¹⁵⁻¹⁷, despite the 1998 FDA mandate to fortify all cereal grains in the United States. A difference in carrier frequencies of genetic polymorphisms associated with folate metabolism, among others, has been proposed as a mechanism for the increased risk of NTD among Hispanic women, but findings have been inconsistent¹⁸⁻²¹. Ascertainment of the true incidence of congenital abnormalities by race/ethnicity may be difficult, due to known differences in rates of prenatal diagnosis among women of different backgrounds, as well as differential rates of pregnancy termination for diagnosed anomalies²²⁻²⁸.

Fetal Demise—Despite improvements in fetal death rates in the United States over time, significant racial disparities still persist. In 2004, the overall fetal death rate was 6.2 deaths per

1,000 live births and fetal deaths; the rate for blacks (11.3/1,000) was more than twice than for non-Hispanic whites (5.0/1,000)²⁹. Rates for Hispanic women, Asian/Pacific Islanders and American Indian/Alaska Natives (AI/AN) did not differ much from that of whites. A review of fetal death rates for women enrolled in a large, prospective study of singleton pregnancies demonstrated an adjusted odds ratio (AOR) for fetal death < 24 weeks gestation of 3.2 (95% CI [2.2, 4.8]) for black women as compared to white women, and of 3.1 [1.5, 6.2] for fetal death ≥ 24 weeks gestation³⁰. Hispanic women and women of other races did not have fetal death rates significantly different than whites. The investigators adjusted their models for various maternal factors and pregnancy exposures and the cohort was remarkable in that all women had to have had initiation of prenatal care in the first trimester to be eligible for inclusion. These findings raise the possibility of contributions of unmeasured maternal social conditions and behaviors, quality of obstetrical care content and biological constructs to disparities in fetal demise.

Preterm Birth—While congenital malformations and chromosomal disorders are the leading cause of infant mortality in the United States among most racial and ethnic groups, preterm birth/low birth weight is the most common cause of infant death for black and Puerto Rican (but not other Hispanic) women³¹. It has been estimated that disparities in extremely preterm births are attributable for 80% of the black-white disparity in infant mortality³². The overall rate of preterm birth in the U.S. in 2006 was 12.8%; black (18.4%) and American Indian/Alaska Native (14.1%) women have the highest risk of preterm delivery, as compared with white (11.7%), Asian/Pacific Islanders (10.9%) and Hispanic women (12.2%)³³.

A recent investigation sought to explain racial and ethnic disparities in preterm birth using methodology akin to the “Residual Direct Effect” method, in a nationally representative birth sample. The author notes that in logistic regression models which account for biologic, sociodemographic and behavioral factors in a stepwise fashion, the addition of behavioral factors (adequacy of prenatal care, pregnancy weight gain, use of prenatal vitamins, smoking and alcohol use) in the final model completely attenuates any residual increased risk of preterm birth for black women as compared with white women³⁴. This was not the case for American Indian/Alaska Native women, who had twice the odds of preterm birth as compared with white women after adjustment.

There has been increasing interest in explorations of genetic contributions to racial/ethnic disparities in preterm birth. Most have focused on identifying candidate genes involved in inflammatory pathways. A recent review of this topic summarizes the literature to date, including evidence that polymorphisms in maternal and fetal genes for tumor necrosis factor, IL-1 and IL-6 may be associated with an excess risk of preterm premature rupture of the membranes and spontaneous preterm birth among black women³⁵. Such genetic differences may modify the risk of preterm birth associated with genital tract infections among black women^{36, 37}, in an example of possible gene-environment interaction.

Results of studies that examine differences in adverse outcomes between foreign-born and United States-born women of the same race/ethnicity demonstrate the need to look beyond a genetic explanation for disparities in obstetrics. In 2002, the CDC reported that foreign-born women had better birth outcomes than their U.S.-born racial/ethnic counterparts despite later initiation of prenatal care and less education³⁸, similar to findings from other national- and state-level data³⁹⁻⁴⁴: compared with their U.S.-born equivalents foreign-born blacks, Asians, Hispanics and Filipinos have lower infant mortality, low birth weight, and preterm births.

The role of social circumstances such as poverty and maternal stress has been explored as contributors to disparities in preterm birth. Poor socioeconomic conditions at the individual and neighborhood levels are associated with prematurity, and may modify the effect of race

on preterm birth risk⁴⁵⁻⁵⁰. Hispanic women, who often have socioeconomic statuses similar to that of black women, on average, have notably better birth outcomes^{4, 51, 52}, a phenomenon often referred to as the “Hispanic paradox.” However, evidence exists that with acculturation comes worse birth outcomes for Hispanic women⁵³⁻⁵⁶, a fact which may explain higher rates of preterm birth among Puerto Ricans, who may have had longer exposure to mainland U.S. culture, as compared with recent immigrants from Mexico and Central America⁵⁶.

Maternal stress also contributes to preterm birth risk⁵⁷⁻⁶⁰, and black and American Indian/Alaska Native women are most likely to report exposure to chronic stressors during pregnancy⁵⁷. The search for a biological explanation for the pathways through which stress might affect preterm birth risk has led to an extensive literature on the role of corticotropin-releasing hormone (CRH) as a potential mediator of this relationship. While some studies have shown higher levels of CRH in women destined to have a preterm birth, these findings have not been consistent⁶¹⁻⁶⁶. It remains likely, however, that neuroendocrine pathways underlie the relationship between acute and chronic stressors on preterm birth and low birth weight risk. An interesting line of investigation explores the role of maternal perceived racism on preterm delivery risk; most studies find that life experiences with racism, as well as living in especially segregated residential areas, increase the risk of adverse birth outcomes⁶⁷⁻⁷³, a fact which may help to explain racial and ethnic disparities in these outcomes.

Fetal Growth Restriction—Black women are more likely to experience fetal growth restriction (FGR), a significant contributor to neonatal morbidity and mortality, than are women of other races and ethnicities⁷⁴⁻⁷⁹. Factors such as maternal pre-pregnancy weight and nutrition, substance abuse and exposure to cigarette smoke, and maternal health status prior to pregnancy have been shown to contribute to fetal growth. Black and American Indian/Alaska Native women are more likely to have inadequate weight gain during pregnancy^{4, 79, 80}; some evidence suggests that black women are more likely than others to decrease their risk of FGR by achieving adequate weight gain during pregnancy⁸¹. Black women are more likely than other groups to experience food insecurity during pregnancy⁸²; participation in such public programs such as the Special Supplemental Food Program for Women, Infants and Children may have a beneficial effect on FGR risk among women⁷⁹. Historical factors such as maternal low-birth weight has also been shown to be a risk factor for FGR among black women, but does not fully explain the disparity between groups⁸³.

Use of substances such as tobacco and alcohol during pregnancy is known to increase the risk of FGR. White women are more likely to use tobacco⁴ and white women and American Indian/Alaska Native women more likely to use alcohol during pregnancy than are other groups^{84, 85}. However, it appears that minority (American Indian/Alaska Native, Asian/Pacific Islander, black and Hispanic) women may be less likely to discontinue use during pregnancy than are white women⁸⁵⁻⁸⁷ and for smoking, third trimester exposure may be more predictive of poor fetal growth⁸⁸.

Several investigators have found an association between other environmental pollutants such as polycyclic aromatic hydrocarbons and pesticides, and small for gestational age neonates⁸⁹⁻⁹². Racial and ethnic minorities are more likely to live and work in areas with greater exposure to such agents⁹³⁻⁹⁶. The impact of several of these substances seems to be modified by race/ethnicity, having been found to contribute to growth restriction among black Americans but not Dominican Americans in studies conducted in New York City^{89, 92}. Authors who have found this association suggest that protective factors among Hispanic immigrants may outweigh adverse effects of environmental pollutants, as has been argued in other instances of the “Hispanic paradox.”⁸⁹ As with preterm birth, social isolation and deprivation appear also to play a role in the risk of FGR^{45, 97}.

Maternal Outcomes

Maternal Mortality—Pregnancy-related mortality, though rare, is on the rise in the United States. In 2005, the death rates for white women was 11.7 per 100,000 live births, 9.6 for Hispanic women and 39.2 for non-Hispanic black women⁹⁸. To compare, the Healthy People 2010 goal for maternal deaths is 3.3/100,000 live births⁹⁹. Tucker and colleagues attempt to understand whether higher rates of pregnancy-related mortality among black women is due to a higher prevalence of certain high-risk conditions, versus a higher risk of death from these conditions (or both). They found that black women in a national sample did not have a higher prevalence of preeclampsia/eclampsia, postpartum hemorrhage, placenta previa or placental abruption, but for all five conditions, black women had a case-fatality rate 2.4–3.3 times higher than that of white women¹⁰⁰. This case-fatality ratio accounted for the majority of the disparity in mortality. The authors were not able to comment upon differences in severity of conditions, presence of co-morbidities or timing or quality of care received, but postulate that any of these might contribute to this black-white disparity. Harper and colleagues examined some of these variables in their investigation of black and white women with pregnancy-related morbidity in North Carolina. Black women had higher degrees of hypertension, lower hemoglobin levels on admission, and had presented for prenatal care later, on average, than white women. Black women were no more likely to have a chronic medical condition, were more likely to be obese and to use cocaine and were less likely to smoke. In the cohort with obstetrical hemorrhage, black women were less likely to undergo a surgical intervention, though there were no differences in medical management or the likelihood of transfusion, suggesting similar severity of disease.

Maternal morbidity—Black women are more likely to experience morbidity during pregnancy. In California, black women had an adjusted odds ratio for one or more maternal morbidities of 1.25 [1.23–1.27] as compared with white women¹⁰¹. Asian and Hispanic women had lower risks of maternal morbidities as compared with white women. Asian women are at particular risk of third and fourth degree lacerations (AOR 1.36 [1.32–1.40]), considered a metric of obstetric care quality¹⁰¹.

Black women are more likely to experience hypertensive disorders of pregnancy, some of which may be attributable to excess cases of pre-pregnancy hypertension^{30, 102-104}. While black women have the highest risks of pregnancy-related hypertension, among Asian women, Filipina and Samoan women have risks higher than women from other subgroups¹⁰⁵⁻¹⁰⁷, arguing for the careful and thorough collection of race/ethnicity data for the purposes of assessing maternal risk. Thus far, little data exist regarding racial differences in biological mediators of preeclampsia, such as endothelial dysfunction or responsiveness to angiotensin, to explain disparities in hypertensive disorders, but more investigation in this area is warranted. There is also evidence that paternal race/ethnicity may be associated with preeclampsia with Asian paternity associated with a reduction in the risk and racial/ethnic discordance between parents associated with a small increased risk¹⁰⁸.

Wide variations in risk of diabetes in pregnancy exist by race/ethnicity. As compared with white women, racial/ethnic minorities are at higher risk of entering pregnancy with pre-existing diabetes, and Hispanic and Asian/Pacific Islander women are at particularly high risk for the development of gestational diabetes¹⁰⁹. Among Asians, women of Filipina and Native Hawaiian descent appear to be at highest risk^{105-107, 110}, and data suggest that these women are more likely than white women or women of other Asian groups to have macrosomic infants in the setting of gestational diabetes¹¹¹. There is also evidence that pregnancies of white women fathered by Asian men are at increased risk of gestational diabetes as well, suggesting potential biologic or nutritional explanations¹¹².

Disparities similarly exist in the prevalence and severity of other maternal morbidities in pregnancy, such as asthma, connective tissue diseases, HIV, genitourinary infections and periodontal disease, with evidence that minorities, in particular black women, with these conditions fare worse in pregnancy than do their white counterparts¹¹³⁻¹¹⁹. Disparities in maternal obesity in pregnancy deserve special mention. Racial/ethnic minorities are at increased risk of prepregnancy overweight and obesity, and these conditions are associated with an ever-growing list of pregnancy complications, including preterm birth, fetal death, macrosomia, gestational diabetes and cesarean delivery¹²⁰⁻¹²³. Furthermore, the effects of obesity on the pregnancy and the severity of outcomes at higher BMIs may differ by racial/ethnic group¹²⁴⁻¹²⁶. Contributors to maternal overweight and obesity are many, including poor nutrition and physical and built environments which are not conducive to exercise, and are often more prevalent among minority populations. The contribution of genetics and *in utero* exposures to later childhood and adult obesity are also an area of active investigation¹²⁷⁻¹²⁹.

Disparities in Obstetrical Care

Few agreed-upon measures of quality of obstetrical care currently exist for evaluation of disparities in care quality¹³⁰. The Agency for Healthcare Research and Quality's National Healthcare Disparities Report uses a set of measures to describe quality of care across a variety of settings. While other areas in medicine have numerous available measures, the single measure that reflects quality of obstetrical care in this report is the proportion of women who receive prenatal care in the first trimester¹. White women and Asian/Pacific Islanders are most likely to receive early prenatal care¹. In 2006, 69.0% of women received prenatal care in the first trimester; these proportions were 76.2%, 58.4% and 57.7% for whites, blacks and Hispanics, respectively⁴. Contributors to late entry into prenatal care are myriad, and include concerns such as lack of education and insurance coverage, ambivalence about pregnancy and negative perceptions of health care providers and staff¹³¹⁻¹³⁵. Black women are more likely than women from other groups to have unintended pregnancies; women with unintended pregnancies are more likely to present late to care^{134, 135}. Black and Hispanic women in the United States are also more likely to be poor and reliant upon public insurance sources. Many of these women are not eligible for Medicaid before pregnancy but become so by virtue of different income eligibility standards set in pregnancy; however, the application process for pregnancy-related coverage may present a barrier to early initiation of care¹³¹.

Women who fail to present for prenatal care entirely are at high risk for adverse pregnancy outcomes and are more likely to be non-White¹³⁶⁻¹³⁹. Whether maternal behaviors such as late or lack of entry into prenatal care explain a significant portion of racial/ethnic disparities in outcomes is not clear. In one study, stepwise adjustment for maternal behavioral constructs (prenatal care initiation, tobacco use, alcohol use, among others) did not mitigate the effect of Black race on preterm birth risk¹⁴⁰, in another study, however, the effects of race on preterm birth were nearly eliminated after adjustment for prenatal care adequacy¹³⁸, while in a third, an interaction between race and prenatal care's effects on birth outcomes is suggested¹⁴¹.

Other potential quality measures to consider include the primary cesarean delivery rate, prevalence of major obstetrical lacerations, postpartum hemorrhage and puerperal infection, the latter three of which are considered intrapartum care-sensitive conditions. Several studies have documented higher risks of cesarean delivery among non-white women as compared with white women, even after adjusting for features known to be risk factors, such as maternal age, socioeconomic status, pre-existing chronic disease and obstetric complications such as preeclampsia and macrosomia¹⁴²⁻¹⁴⁶. These studies raise a question of unmeasured confounding bias; that is, that factors may exist which are associated with both race/ethnicity and cesarean delivery risk that have been thus far unable to be captured by available data. Potential examples of these might include patient preference, or biological factors which

increase the risk of “nonreassuring fetal testing” in some populations. Consideration should also be given to the contribution of provider bias in the cesarean delivery rate.

As mentioned previously, Asian women are at increased risk of severe perineal laceration¹⁰¹. In one study, after adjustment for maternal age, operative vaginal delivery, birth weight and episiotomy, race remained an independent predictor of third or fourth degree laceration, with Asian women having twice the odds of such a laceration as compared with white women¹⁴⁷.

Disparities in the prevalence of postpartum hemorrhage, a potential quality measure, have been described. Women of Asian race^{101, 148} and Hispanic ethnicity^{148, 149} have been noted to have higher rates of postpartum hemorrhage. Lastly, rates of puerperal infection have been shown to be higher in Asian, black and Hispanic as compared with white women, after adjustment for other factors, ranging from AORs of 1.16 [1.08-1.25] for Asians to 2.35 [2.21-2.49] for black women¹⁰¹.

Conclusions

As in other fields of medicine, obstetrical outcomes differ by maternal race/ethnicity. These disparities ultimately contribute to disparate rates of infant and maternal mortality, and thereby reflect the overall health status of the communities in which women and their families live. While some disparities may have their origins in biology and therefore may not be modifiable in the short term, a great many more may be rooted in maternal health behaviors and the physical and social environments, all of which should be viewed as targets for change. Health care itself plays a clear role in health disparities², and health care policy and quality improvement efforts should aim to broaden access and elevate the quality of obstetrical care available to all women. As yet, clear quality standards for the provision of preconception, prenatal, intrapartum and postpartum care are lacking; creation of such guidelines will provide better benchmarks for quality and equality of obstetrical care.

Future obstetrical disparities work should move beyond descriptions of mathematical differences in prevalences of conditions between populations, to a more sophisticated approach to explaining disparities and identifying targets for improvement. Recent work has demonstrated that selection bias may result in findings biased toward the null hypothesis of no effect in observational cohort studies of socioeconomic disparities in outcomes¹⁵⁰. Examinations of obstetrical disparities should take this into account and should consider population-based approaches or including sensitivity analyses to explore possible selection biases. Quantitative research should seek to accurately measure and take into consideration potential variables which might confound the relationship between race/ethnicity and outcomes of interest. In addition, patient preference and need must also be taken into account in order to identify true disparities above and beyond these constructs. Some of this exploration would also benefit from the collection of qualitative data, particularly in regards to patient preference and potential provider biases. In time, and with targeted clinical, research and health policy efforts (in addition to broader social policy efforts in areas such as education, environmental justice and poverty), we can strive towards a decrement in these obstetrical disparities specifically, and in inequities in health and health care more generally.

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Table 1

Disparities in pregnancy outcome, maternal outcome and obstetrical care, by race/ethnicity.

	American Indian/ Alaska Native	Asian/ Pacific Islander	Black	Hispanic
Pregnancy Outcomes				
Congenital Abnormalities	↔	↔	↔	↑ (neural tube defects)
Fetal Demise	↔	↔	↑	↔
Preterm Birth	↑	↔	↑	↑ (Puerto Ricans)
Fetal Growth Restriction	↔	↔	↑	↔
Maternal Outcomes				
Mortality	↔	↔	↑	↔
Hypertensive Disorders	↔	↔	↑	↔
Diabetes	↑	↑	↑	↑
Obesity	↑	↑	↑	↑
Obstetrical Care				
Prenatal care entry after 1 st trimester	↑	↔	↑	↑
1° Cesarean Delivery	↓	↓	↑	↔
Major Perineal Laceration	↔	↑	↓	↔

White women are the reference group. ↑ = higher risk, ↓ = lower risk; ↔ = available data do not support higher or lower risk.

Table 2

Strength of the evidence for contributions of health domains to racial/ethnic disparities in pregnancy outcome

	Biology	Social Circumstances	Environmental Exposures	Behavioral Patterns	Medical Care
Pregnancy Outcomes					
Congenital Abnormalities	B	B	C	A	B
Fetal Demise	C	B	C	B	C
Premature Birth	B	A	B	B	C
Fetal Growth Restriction	C	B	B	A	C
Maternal Outcomes					
Mortality	B	A	C	B	A
Hypertensive Disorders	B	C	C	C	C
Diabetes	B	B	C	B	B
Obesity	C	A	C	A	B
Obstetrical Care					
Early Prenatal Care	C	B	C	A	A
1° Cesarean Delivery	C	B	C	C	A
Major Perineal Laceration	B	C	C	C	B

Adapted from the U.S. Preventive Task Force Ratings¹³⁷;

A = There is good evidence to support the association between the domain and racial/ethnic disparities in the outcome

B = There is fair evidence to support the association between the domain and racial/ethnic disparities in the outcome

C = There is insufficient evidence to support the association between the domain and racial/ethnic disparities in the outcome