

Interdisciplinary Solutions for Conditions Leading to African American Birth Outcome Disparities

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Abstract

Prenatal care alone has not improved disparities in birth outcomes, and it is clear we cannot depend on the narrow focus of prenatal care as the primary mechanism to reduce the gap. A number of specific medical conditions are known or suspected to contribute to the series of events that culminate in adverse birth outcomes including preterm labor and low birth weight. However, efforts to modify these conditions have been hampered by a lack of knowledge of the basic biological mechanisms, the contribution of social and environmental factors such as discrimination and segregation, and the role of differential access to quality care, including care antedating pregnancy. The authors believe that factors likely have their origin early in the maternal life course and are better prevented and treated outside of pregnancy. This paper highlights major medical conditions (bacterial vaginosis, preeclampsia, fibroid uterus, diabetes mellitus, obesity, ectopic pregnancy, and HIV) associated with poor pregnancy outcomes, identifies gaps in knowledge and practice, and proposes interdisciplinary solutions to reduce racial/ethnic disparities in birth outcomes.

Introduction

Infant mortality in the U.S. has declined to a rate of 6.9 deaths per 1000 live births in 2002, but a disturbing disparity persists for African Americans, who experienced 2.5 times the rate of infant mortality as compared with Whites (MacDorman, Minino,

Strobino & Guyer, 2002; Collins, David, Handler, Wall & Andes, 2004). The public health response has largely been to promote early initiation of prenatal care, which aims to identify health and behavioral risk factors. However, a 24% increase in African American women receiving prenatal care in the first trimester – up from 60.6% in 1990 to 75.2% in 2002 – demonstrated a limited impact on birth outcomes (Arias, MacDorman, Strobino & Guyer, 2003)

Several studies have examined the reasons why prenatal care alone has not improved disparities in birth outcomes, and it is clear we cannot depend on the narrow focus of prenatal care as the primary mechanism to reduce the gap. One important limitation of prenatal care is that it occurs only after a woman determines she is pregnant, seeks care, and actually receives it (Frick & Lantz, 1999; Lu, Tache, Alexander, Kotelchuck & Halfon, 2003). Moreover, a growing body of research has demonstrated the impact of social and contextual determinants on pregnancy outcomes.

Growing evidence suggests that influences on women's health, with implications for birth outcomes, occur long before pregnancy begins. Collins et al. (2000), for example, presented evidence that lifelong accumulated experiences of racial discrimination by African American women constitute an independent risk factor for preterm delivery. Studies have also hinted at the differential services received by African Americans and White Americans in our health care system. Bach, Pham, Schreg, Tate & Hargraves (2004) found that physicians treating Black patients had less training and less access to important clinical resources than those treating White patients. Johnson, Roter, Power & Cooper (2004), van Ryn and Burke (2000), Misra, Guyer & Allston (2003), Diehr et al (1989), and Mills and Combs (2002) found that even after accounting for socioeconomic factors, African Americans received poorer content and quality of care compared with their White counterparts. While there is little research in this area related to prenatal care, this is a potential issue that may influence the outcomes of health care for pregnant women.

While our understanding of the root causes of racial disparities in infant mortality remains inexact, several important measures along the continuum are fairly well established. For example, preterm birth accounts for 63% of the gap (Ananth Misra, Demissie & Smulian, 2001), and a number of specific medical conditions are known or suspected to contribute to the series of events that culminate in preterm labor. However, efforts to modify these conditions have been hampered by a lack of knowledge of the basic biological mechanisms, the contribution of social and environmental factors such as discrimination and segregation, and the role of differential access to quality care, including care antedating pregnancy. While health professionals cannot single-handedly take on the multiple determinants of disparities in pregnancy outcomes for African Americans, they can and should play a role. This paper highlights major medical conditions associated with poor pregnancy outcomes, identifies gaps in knowledge and practice, and proposes interdisciplinary solutions to reduce racial/ethnic disparities in birth outcomes.

Bacterial Vaginosis

The best known contributor to racial disparities in very preterm birth is intrauterine infection, probably resulting from lower genital tract infections prior to or shortly after conception (Fiscella, 2004). Bacterial vaginosis poses various risks for the mother and fetus, including spontaneous abortion, preterm delivery, histologic chorioamnionitis, intra-amniotic infection, and post-partum endometriosis. Many researchers have sought to explain the disparity in bacterial vaginosis among African Americans. One study attributed an observed two-fold prevalence difference between African Americans and Whites to differential personal hygiene practices, such as douching (Fiscella, Franks, Kendrick, Meldrum & Kieke, 2002; Rajamanoharan, Low, Jones & Pozniak, 1999). Women who have multiple sex partners are also described as being at an increased risk, however, women with single partners, who do not douche, continue to be diagnosed with bacterial vaginosis. (Barbone, Austin, Louv & Alexander, 1990).

A recent study hypothesized that there might be a genetic factor associated with spontaneous preterm birth, and identified a polymorphism, specifically the TNF-2 allele, as being associated with spontaneous preterm delivery (Roberts et al., 1999). In an attempt to explain their incongruent findings with another research group (Macones et al, 2004), the authors introduced an additional factor, bacterial vaginosis, to their study. They found that subjects with the TNF genotype were at an increased risk of spontaneous preterm delivery, and that those subjects carrying the TNF promoter and having bacterial vaginosis were at an even higher risk of preterm delivery. Furthermore, the relationship between maternal carriage of TNF-2 allele and preterm birth was shown to be stronger among African Americans than Whites (odds ratio of 2.5 and 1.6, respectively).

The hypothesis of racial difference in host resistance to infections during pregnancy has been proposed, including a possible social and environmental influence (Lu & Halfon, 2003). Yet the few studies examining the role of social and environmental stress in immunity during pregnancy have relied on limited measures of stress or superficial immune measures (Lu & Chen, 2004). Recent findings of the association between perceived racial discrimination and adverse health consequences underline the potential role of interdisciplinary research in exploring such mechanisms and developing future interventions related to preterm births (Williams, Neighbors, & Jackson, 2003; Lu & Halfon, 2003).

In addition, studies have demonstrated an increased risk of preterm delivery among women diagnosed with bacterial vaginosis during the first or second trimester. While treatment during pregnancy is safe and effective, approximately half of all bacterial vaginosis cases are asymptomatic and a large percentage of them are undiagnosed and thus untreated (Paige, Augustyn, Adih, Witter & Chang, 1998). Current standard prenatal care does not generally include early screening for bacterial vaginosis, potentially missing numerous treatable cases. Given the excess risk of bacterial vaginosis among African Americans, a relatively simple intervention such as screening could have a significant impact.

Preeclampsia

African Americans are also at an increased risk of developing preeclampsia during pregnancy. One study found that the percentage of preeclampsia in African American women was twice that of White women (Samadi Mayberry & Reed, 2001). Preeclampsia is defined as an elevated gestational blood pressure accompanied by proteinuria. It is characterized by small placentae, abruptio placentae, and lesions on the placenta caused by decreased uteroplacental perfusion. Proteinuria distinguishes preeclampsia from simply gestational hypertension. Studies have shown an exacerbated effect of proteinuria on the relationship between hypertension and fetal death. However, until the mother and fetus are truly at risk for mortality and morbidity, proteinuria may not be evident.

The mechanisms that lead to birth outcome disparities related to preeclampsia are complex. Preeclampsia is a leading cause of maternal mortality and increases perinatal mortality by five times; however its effect also depends on the gestational age at delivery and the severity of disease (Sibai, 2005; Ransom, Dombrowski, Evans, & Ginsburg, 2002). Although delivery is the most widely used therapy, it contributes to perinatal morbidity, as iatrogenic prematurity is inevitable in many of these cases. The frequent association of preeclampsia with premature birth likely contributes to the disparity in preterm birth among Black women over white women, 17.5% and 11.1% respectively (Cunningham, MacDonald, Leveno, Gant & Gilstrap, 1993; MacKay, 2001). In 2002, 7.8% of infants were born with low birth weight; the infant mortality rate among Black infants was more than twice as high as White infants in 2001 (Zhang, Meikle & Trumble, 2003). Disorders related to low birth weight and short gestation were the second leading cause of infant deaths in 2001, and they accounted for 16% of all infant deaths (Anderson & Smith, 2003).

Studies have shown that vasospasm is accountable for decreased uteroplacental perfusion, the major cause of fetal mortality (Ransom et al, 2002; Cunningham et al, 1993). Recently it also has been hypothesized that microvascular dysfunction contributes to low uteroplacental perfusion and subsequent preeclampsia and fetal growth retardation (Fiscella, 2004). Evidence exists for racial differences in uteroplacental blood flow, possibly in response to changes in systemic blood pressure. Importantly, there is growing evidence for racial disparities in early onset endothelial dysfunction, with likely causes including childhood lead exposure, psychosocial stress and diet, among other factors. This too provides a valuable opportunity for interdisciplinary research and intervention development that can integrate the views from social, public health, nursing, and medical perspectives.

Fibroid Uterus

Uterine leiomyomas, or fibroids, are the most commonly found pelvic tumors in women; their prevalence is significantly higher in African Americans (Ransom, Dombrowski, Evans, & Ginsburg, 2000). One study showed that the incidence rate of uterine leiomyomas was 8.9 per 1,000 women in Whites versus 30.6 per 1,000 women

in African Americans. Even after adjusting for factors that may affect incidence, it still suggests that when using ultrasound or hysterectomy for diagnosis, African American women were 3.25 times more likely to have these uterine leiomyomas (Marshall et al., 1997). Another study compared cases of uterine leiomyomas in subjects undergoing hysterectomies, and found that 89% of Black women experienced leiomyomas, versus 59% of White women. Black women were both diagnosed and underwent hysterectomies at younger ages than White women. Also, a higher percentage of Black women reported severe pelvic pain, at least seven leiomyomas, and were anemic, compared with White women (Kjerulff, Langenberg, Seidman, Stolley & Guzinski, 1996). The racial disparity in prevalence of fibroids has yet to be explained and may have contributed to the higher rate of infant deaths among African Americans.

Several studies have attempted to define the risk of adverse pregnancy outcomes associated with the size and location of leiomyomas in pregnant women. Leiomyomas greater than three centimeters have been shown to cause increased rates of preterm labor and placental abruption, and leiomyomas greater than six centimeters are more severe and may obstruct labor (Koike et al, 1999). Due to uncertainty about the exact role of estrogen down-regulation in uterine leiomyomas, their growth cannot be predicted; however, there are suspicions that the hormonal and growth factors that cause a uterus to grow may also be responsible for the growth of leiomyomas during pregnancy. Other risks associated with leiomyomas include an increased probability of retained or abrupt placentas, fetal malpresentation, increased bleeding, abortion, postpartum hemorrhage, and cesarean delivery (Cunningham, Macdonald, Leveno, Gant & Gilstrap, 1993). This racial disparity has yet to be explained and may have contributed to the increased number of deaths among African Americans.

Unfortunately, traditional medical and surgical treatment options for fibroids are not appropriate during pregnancy, presenting substantial challenges to a successful pregnancy outcome. An important research question is: To what extent does lack of access to quality preconceptional care for uterine leiomyomas influence racial disparities in pregnancy outcomes? In addition, could social and environmental conditions, operating through the neuroendocrine system, as well as diet and obesity influence hormonal and uterine growth factors? There is a clear need for interdisciplinary research in these areas.

Diabetes Mellitus

Of the many racial health disparities still present today in the United States, diabetes is perhaps one of the most significant conditions, with a 70 percent greater occurrence rate in African Americans than white Americans (CDC, 2005). Diabetes mellitus increases the risk of several maternal conditions, including preeclampsia, bacterial infections, macrosomic fetus, cesarean delivery, hydramnios, and maternal mortality, each of which poses additional threats to the newborn. Maternal complications have been shown to be one of the leading causes of infant death (Anderson, Hogan & Ansbacher, 2003).

The fetus of a diabetic mother is subject to major anomalies, hypertension- caused preterm delivery, neonatal morbidity, predisposition to diabetes, hypocalcemia, neonatal cardiomyopathy, idiopathic respiratory distress, and macrosomia. Fetal overgrowth is also a common finding among infants of diabetic mothers, and the impact on African American infants versus White infants is significantly different. A study comparing the average birth weight of infants of mothers with diabetes versus mothers without diabetes showed an increase of 212 grams for African American infants and 116 grams for White American infants (Kieffer et al, 1998). The disproportionate number of African Americans with diabetes, along with the differential impact of diabetes on African Americans, may contribute to racial disparities in birth outcomes. It may be possible to lessen the fetal effects of maternal diabetes by tightly controlling the mother's condition, not only during the early weeks of pregnancy but, importantly, preconceptionally. Education to promote a healthy diet, improvement in access to and affordability of appropriate food, and support in adhering to medication, weight control, and exercise programs, are interdisciplinary interventions that can potentially reduce the influence of diabetes on poor pregnancy outcomes among African Americans. The fundamental causes of morbidity among African Americans may supersede traditional behavioral approaches and should be investigated further.

Obesity

Fifty percent of African American women are obese compared to thirty percent of White women (CDC, 2002). One national study showed that over half of non-Hispanic black women aged 40 years or older were obese and more than 80% were overweight (Ehrenberg, Dierker, Milluzzi & Mercer, 2002). Compared to women of other ethnic and racial groups, unmarried African American women who were adolescents at the time of their first pregnancy were more likely to experience obesity in subsequent pregnancies (Flegal, Carroll, Ogden & Johnson, 2002). Obesity places women at higher risk of health problems during pregnancy, including hypertension and diabetes, and maternal obesity is associated with lower rates of breastfeeding (Ruowei, Jewell & Grummer-Strawn, 2000). Limited research findings also suggest that obesity may lead to more complications in African American women than other racial/ethnic groups, such as cesarean delivery. However, population based studies indicate that the effects of obesity on racial disparities in birth outcomes have not been studied sufficiently, and further research in this area may offer potential for reducing disparities (Steinfeld et al, 2000). Obesity is likely the result of complex interactions among genetic, social environmental, and psychological factors over the mother's entire life course. While there may be some benefit to mediate during pregnancy, there is a need to intervene well before pregnancy occurs.

Ectopic Pregnancy

Ectopic pregnancy is the leading cause of pregnancy-related deaths in the first trimester, accounting for 9% of all pregnancy-related deaths (Anderson, Hogan &

Ansbacher, 2004). The U.S. has observed a dramatic increase in ectopic pregnancy, rising from 4.5/1,000 pregnancies in 1970 to 19.7/1,000 pregnancies in 1992 (CDC, 1990). Yet due to the widespread use of outpatient therapeutic modalities, a reliable measure of incidence for this common disorder is not available. In the meantime, the mortality risk for ectopic pregnancy has decreased by 90% in the U.S. (CDC 1990; CDC, 1993), thanks to new diagnostic and treatment options. A large racial disparity, however, remains. African American women had an ectopic mortality ratio 18 times higher than white women (3.25/100,000 versus 0.18/100,000) (Anderson, Hogan & Ansbacher, 2004). This racial disparity is similarly apparent in sudden deaths, the presenting scenario in 75% of non-preventable ectopic deaths, indicating the need to educate both providers and patients about the risks, early signs and symptoms of this common disorder (CDC, 2004). It also suggests the need for African American women to receive early prenatal care by a qualified provider to assure an intrauterine pregnancy. While it has become common to delay the first prenatal visit until after the 12th week of gestation, several researchers recommend a visit at the first sign of pregnancy to help diagnose early pregnancy complications and assess ectopic pregnancy risk.

Human Immunodeficiency Virus (HIV)

Accounting for 12% of the U.S. population, African Americans made up half of the diagnosed cases of HIV/AIDS among adults in year 2002 (CDC, 2004). While many factors contribute to this disparity, much of which is social and not medical, several areas of medicine require improvement. For example, Blacks are more likely than Whites to receive inadequate health care, have less trust in the health care system, see a provider of a different race, and report experiencing racism. Health care professionals can play an important role in reducing the transmission of HIV from mother to infant, which can occur through transplacental infection or contraction at birth (Conner, et al., 1994).

Studies have shown that the incidence of perinatal transmission increases by four times with delivery before 34 weeks and that approximately one-third of seropositive women delivered preterm (Ellis, Williams, Graves & Lindsay, 2002), an indication that greater attention must be paid to the impact of HIV on adverse perinatal outcomes. Significant progress has been made in treating HIV, including the ability to decrease the risk of vertical transmission (Public Health Service Task Force, 1998; The International Perinatal HIV Group, 1999). Preventing HIV infection and assuring effective treatment of HIV in pregnancy, however, will require cross-disciplinary efforts involving social workers, public health officials, payers, doctors, nurses as well as business and community leaders.

Conclusions

It is clear from this review that interdisciplinary approaches to research and intervention are needed to solve the complex problem of racial disparities in birth outcomes, as single discipline, siloed approaches have not yielded measurable

progress. Health care providers in the United States have traditionally treated pregnancy as a disease rather than a life course event. Based on the conditions highlighted in this paper, we believe contributing factors likely have their origin early in the life course are generally better prevented and treated outside the confines of pregnancy. While it is convenient to compartmentalize pregnancy as a nine-month medical condition, we must look to a life course perspective to improve future birth outcomes and reduce health disparities. Investigators, clinicians, and policy makers should consider new and innovative strategies that optimize the individual's well-being from pre-conception to postpartum.

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