

Racial Disparities in Perinatal Health: A Multiple Determinants Perinatal Framework with a Lifespan Approach

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Within the U.S., substantial racial disparities in perinatal outcomes persist. Moreover, since a narrowing of the racial gap has not accompanied improvements in perinatal health over the past century, a new approach is needed to close that gap. One possible approach to eliminate racial disparity utilizes a life course and multiple determinants framework with an emphasis on racial differences. Literature links perinatal health and racial disparities to the distal factors of social environment, physical environment, and genetic environment. Prepregnancy health, including chronic disease, obesity, and infection, is one proximal factor that may explain racial disparities. This framework focuses on the preconceptional and interconceptional

periods as targets for intervention to eliminate racial disparity. The health and welfare of African-American women must be ensured beginning at birth and throughout childhood to successfully address the distal and proximal factors emphasized in the framework. Tackling the racial disparity in perinatal outcomes with this framework will require a major shift in research, practice, and policy.

Introduction

Within the US, substantial racial disparities in perinatal outcomes persist. Rates of infant mortality have been twice as high for blacks as for whites for at least eight decades, dating back to the first

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analyses of birth certificate data.¹ Moreover, a narrowing of the racial gap has not accompanied declines in infant mortality over the past century.¹ In 2004, there were 13.6 deaths per 1,000 live births for black infants as compared to a rate of 5.7 deaths per 1,000 live births for white infants.² Disparities of similar magnitude are seen for preterm birth³ and Sudden Infant Death Syndrome (SIDS).⁴ Therefore, while there has been some success in preventing infant deaths, the factors that have been addressed have not been those that disproportionately burden blacks or explain the disparity. Maternal mortality, while rare for all women, also exacts a greater toll on black women. Past and present maternal mortality reports have unequivocally demonstrated that black women are at a greater overall risk of maternal mortality and are at a greater risk of each of the major causes of maternal mortality.⁵⁻⁷ Furthermore, as with infant mortality, declines in maternal mortality have had little or no impact on the gap between blacks and whites.⁵⁻⁷

A portion of this gap in infant and maternal mortality appears to be attributable to racial differences in known risk factors,⁸⁻¹⁰ including higher rates of low education, poverty, and lack of access to care. However, the causal determinants for the remainder of the disparity remain unknown. Shedding light on this problem and eliminating racial disparity may require a wholly different approach to the study of infant and maternal mortality. I hypothesize that a failure to consider a life course perspective has constrained the understanding of the etiology of perinatal outcomes and, in particular, the pervasive and persistent racial disparities therein.^{11,12} In a "glossary" article for the *Journal of Ep-*

idemiology and Community Health, Kuh and colleagues provide an excellent overview of life course epidemiology: "A life course approach offers an interdisciplinary framework ... [L]ife course epidemiology is defined as the study of long term effects on later health or disease risk of physical or social exposures during gestation, childhood, adolescence, young adulthood, and later adult life... The aim is to elucidate biological, behavioral, and psychosocial processes that operate across an individual's life course, or across generations, to influence the development of disease risk."¹³

Most studies of perinatal outcomes have been narrowly focused on the prenatal period and have failed to examine influences that occur long before pregnancy begins, therefore neglecting to apply a life course perspective.¹² An examination of life course effects on pregnancy may be particularly salient with regard to black-white disparities. Intergenerational studies suggest that birth and childhood environments have an effect on future reproductive outcomes,¹⁴⁻²³ and these factors have not been comprehensively evaluated with regard to explaining racial differences. Empirical and theoretical research also suggests the influence of women's adult health prior to pregnancy.²⁴ Therefore, racial differences in environmental exposures and experiences that precede conception may underlie the higher rate of adverse infant and maternal outcomes experienced by black infants and women.

We recently articulated a framework for perinatal health that integrates a life course approach with a multiple determinants model.¹² The life course perspective focuses attention toward the preconceptional and interconceptional periods as targets

for intervention in improving perinatal health. I propose that racial disparities in perinatal outcomes can be more effectively addressed through application of such a framework. If racial disparities in perinatal outcomes are rooted in exposures and experiences beyond the prenatal period, current strategies aimed at eliminating disparities may need to be broadened to include an emphasis on a woman's health and well-being prior to childbearing. This model lends itself to health policy recommendations to "close the gap."

Perinatal Health Framework Life Course Rationale

There are several rationales for using the life course framework.¹² First, some of the most powerful influences on pregnancy outcome are related to influences on women's health that arise long before pregnancy begins. Yet, public health and clinical professionals have focused on factors in the antenatal period. In the latter sections of this paper, I will discuss three domains for which the lifespan perspective is particularly salient with regard to racial disparities: socioeconomic status, psychosocial stress, and women's (prepregnancy) health. Additionally, the demography of pregnancy has changed dramatically in the last three decades with women delaying age at first birth.²⁵⁻²⁷ While this trend is more pronounced among white women, black women are also increasingly delaying first births. Teen pregnancy among black women has declined such that the average age at first birth in 2000 was 22.3 years.²⁵ In 2002, black women thirty years and

older contributed 26.2% of all deliveries compared with 17% of deliveries occurring to black women 19 years or younger.²⁵ Although coverage for pregnant women has greatly expanded in the past three decades, rates of insurance coverage and the scope of covered services is currently decreasing as consumers face rising health care costs. In 2003, approximately 19% of all women ages eighteen to sixty-four were uninsured, and more than twice that percentage of black women were uninsured.²⁸ Given that only 29% of women between the ages of nineteen and twenty-four are insured, younger women of childbearing age are the least likely to be covered by insurance.²⁸ Moreover, young black women lack coverage at more than twice that rate.²⁸ While the lack of coverage may not produce chronic diseases, health insurance coverage increases access to and utilization of health care and may minimize the adverse effects of chronic disease.²⁹ Such effects are of greater concern for minority populations given their higher rates of chronic disease and historically more limited medical insurance coverage.²⁹ Finally, addressing prepregnancy health among women planning conceptions will not be an effective policy at the population level given that nearly one-third of pregnancies in the US are believed to be unintended (unwanted and/or mistimed).³⁰ This highlights the importance of promoting a woman's health regardless of her pregnancy plans. The higher rate of unintended pregnancies among black women (estimated at 35% of births to black women versus 17% to white women³¹) further underscores the relevance of the framework for understanding racial disparity.

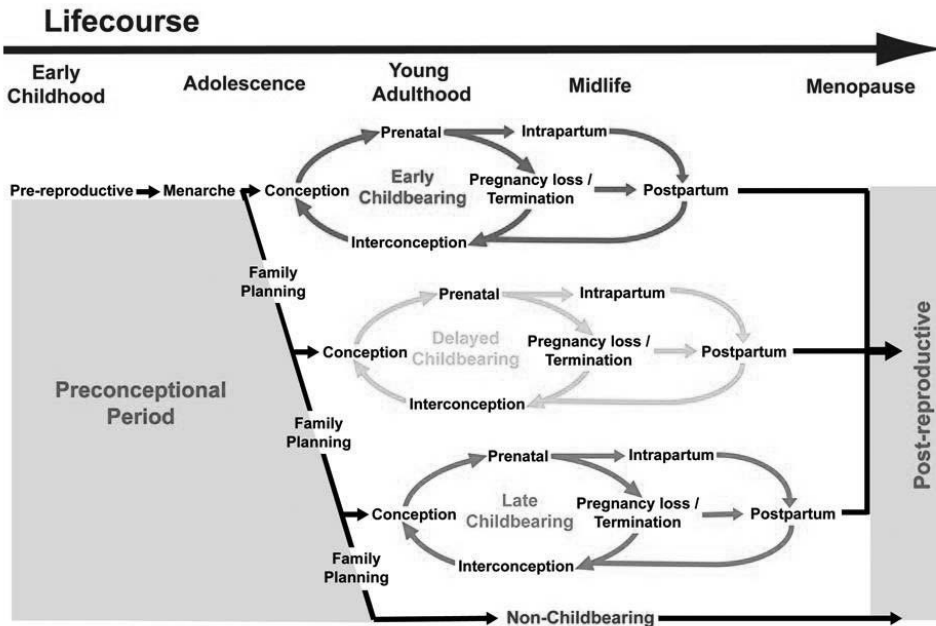
Perinatal Health Framework Overview

In response to these issues, our perinatal health framework combines a life-course perspective with a multiple determinants model, incorporating the manifold forces that influence women’s health through successive stages of their lives and their reproductive cycles. Integral to the framework are the potential reproductive periods and paths within a woman’s life course (Figure 1). The preconception period is conceptualized much more broadly than in past work and encompasses childhood and adolescence. Childhood and adolescence may represent critical periods for women for a range of behaviors and exposures

(e.g. family planning, protection against sexually transmitted infections, nutrition, physical activity). As noted above, strategies to improve perinatal health have primarily focused on the prenatal, intrapartum, and immediate postpartum periods. These strategies have failed to adequately address the impact of child, adolescent, and women’s health on maternal and infant outcomes and the associated racial disparities.

We adapted the perinatal health framework (Figure 2) from the Evans and Stoddart³² model of the determinants of health. Their framework describes two levels of risk factors, distal and proximal, which are defined in relation to the outcomes of the framework. Distal factors are

Figure 1. Women’s Reproductive Cycles.



Perinatal Health Framework

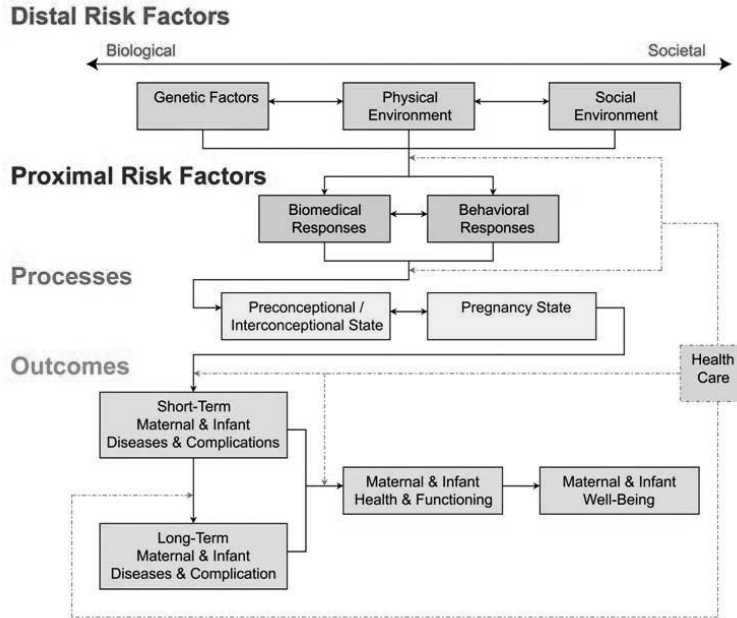


Figure 2. Perinatal Health Framework.

most distantly connected to the outcome. Defined as such, many factors may intervene between distal factors and the perinatal outcomes. Proximal factors exert the most direct influence on the outcomes. In the following sections, we will describe how distal and proximal factors in our framework could underlie racial disparities in perinatal health.

Distal Determinants

Distal determinants range from the biological to the social. At one extreme of the continuum is the genetic environment and at the other is the social environment. The physical environment falls somewhere between the biological and social ends of the

continuum of distal determinants. Distal determinants are the foundation for Figure 2. They exert influence throughout a woman’s reproductive life and may be addressed irrespective of the cycles and paths delineated in Figure 1. The emphasis of prior frameworks on the perinatal period may have led researchers and practitioners alike to overlook these distal factors, as they are unlikely to be resolved by perinatal interventions alone.

Genetic Environment

While relatively little research on genetics and perinatal health has been conducted, findings to date suggest that this type of research may provide insight into the

etiology of adverse perinatal outcomes and possibly into the racial differences in outcomes. Results from a number of intergenerational studies¹⁵⁻²¹ and other familial studies³³⁻³⁶ are consistent with an important role for genetic factors in perinatal outcomes. Recent reports have shown how perinatal outcomes may be linked to specific genetic polymorphisms (i.e. variation within genes)³⁷⁻⁴⁴ as well as to the interaction of genetic polymorphisms with the environment (e.g. smoking,⁴⁵ benzene⁴⁶). While the genetic variability between racial groups is limited and is unlikely to fully explain the gaps in disease, a quantitative appreciation of genetic variation, gene-gene interactions, and the interactions among multiple genes and the environment may provide insight into aspects of racial disparities. Consider a hypothetical example with regard to preeclampsia, a pregnancy complication that greatly increases risk of adverse perinatal outcomes. A genetic trait that increases incidence or severity of preeclampsia may be equally common in black and white women. But a black woman may be much more likely to develop preeclampsia in pregnancy, or be more severely affected, if the genetic susceptibility occurs in tandem with a particular environmental factor for which the rate of exposure does differ between black and white women (e.g. obesity).

Physical Environment

The physical environment, captured by conditions such as air pollution and crowding, falls somewhere between the biological and the social endpoints of the continuum of distal risk factors. Evidence

of adverse effects of air pollution (e.g. carbon monoxide, particulate matter, sulfur dioxide) on perinatal health is just beginning to emerge.⁴⁷⁻⁵² While air pollution ostensibly appears to be a biologic variable, it is also strongly associated with social factors and, therefore, difficult to disentangle from them. As with the genetic environment, examining the physical environment is important in our efforts to understand and eliminate racial disparities. Environmental justice efforts have demonstrated that sources of environmental pollution (as in air, water, soil) are more prevalent in communities of color.⁵³⁻⁵⁵ Furthermore, as with genes that may predispose women to the adverse effects of other exposures, physical environment factors such as air pollution could also interact with other behaviors and exposures to produce disparities in birth outcomes. For example, the effects of air pollution may be negligible for infants born at term who are not low birth weight. But for fragile, low birth weight, premature infants, pollutant exposures in utero or after birth may lead to morbidity and mortality. The increased vulnerability of African-American infants, whether as the direct result of factors in the physical, social, or genetic environment, means that these infants are in increased jeopardy from such exposures.

Social Environment

At the far end of the continuum is the social environment. The importance of social factors has long been recognized by researchers studying racial disparities in perinatal as well as other health outcomes. However, until recently, the emphasis had

been on the social environment during the pregnancy without explicit examination of the environment over the life course. I focus here on two domains hypothesized to be of importance for understanding racial disparities: socioeconomic status and psychosocial stress.

Social Environment: Socioeconomic Status (SES)

The dimensions of maternal SES that have received the most attention are income and education at the time of pregnancy. Income and educational levels correlate with birth outcomes in the US and in other developed countries.⁵⁶⁻⁶⁰ While many studies claim that they have controlled for differences in socioeconomic status between blacks and whites without erasing the racial disparity in perinatal outcomes, such work has generally failed to fully capture all relevant dimensions of socioeconomic status.⁶¹⁻⁶³ For a number of reasons, equal educational attainment may in fact not result in equal income. However, even when income and education are comparable at the time of childbearing, black and white women could still have differential access to resources. The historic disenfranchisement of blacks has produced socioeconomic differences today that are not often ameliorated in one or two generations. The black middle and upper classes continue to grow but a significant proportion of blacks still grows up in poverty. While blacks now have more opportunities (e.g. education to achieve better employment), the costs of these opportunities may be higher for black indi-

viduals. For example, blacks and whites with similar education and income levels do not share similar levels of wealth.⁶⁴ Measures such as wealth are, therefore, needed to more fully capture socioeconomic status. Furthermore, wealth measured at the time of childbearing may also capture SES across the life course as it incorporates the increased opportunity costs for individuals who come from disadvantaged backgrounds.

If the focus remains limited to the mother's SES in the prenatal period, racial differences in perinatal outcomes may persist. We need to broaden our examination of SES and consider the social environment of the mother across her life span, including the potentially critical periods of infancy and childhood. This is particularly relevant for blacks in the US, as SES may substantially change from one generation to the next. Intergenerational studies suggest that birth and childhood environments, whether exposures or experiences, have an effect on future reproductive outcomes.¹⁴⁻²³ Therefore, as a consequence of low SES in early life, racial disparities may be present even for socially mobile women who attain higher adulthood SES. In recent research on intergenerational effects on birth weight, we found evidence that maternal SES in childhood and adulthood each made independent contributions to infant birth weight. The hypothesis that the effects of a mother's SES in childhood on her offspring's health is due to its correlation with her SES at the time of the pregnancy (or adulthood more generally) was not supported.⁶⁵

Social Environment: Psychosocial Stress

This domain has recently received considerable attention with regards to both the etiology of adverse perinatal outcomes and the explanation for black-white disparities.⁶⁶⁻⁷² Early work in this area focused on acute stressors as proximate risk factors, but the evidence linking proximate stressors to adverse birth outcomes is mixed. A number of studies find an increased risk associated with high stress levels in pregnancy. Others have reported no adverse effect.⁷³⁻

⁸⁰ Researchers, however, have often used measures most appropriate to the lives of white, middle-class women and these scales often exclude experiences more common to black and low-income women. Black women may experience more and different types of stress than white women.^{68, 78,81} The conceptualization of stress in pregnancy has expanded to include measures of chronic stress. This shift reflects, in part, the notion that chronic strain, not recent events, may be more relevant for poor and minority women. In two previous studies of low-income African-American women in Baltimore, we have found a significantly increased risk of preterm birth associated with elevated scores on a stress scale that may be more relevant for women from similar backgrounds.^{69, 82}

Experiences related to an individual's race, class, and gender could represent unique stressors not easily captured in generic measures of life stress. While race, class, and gender are each important, ultimately the intersectionality of various forms of oppression stemming from these and other factors must be appreciated to

understand the stress experienced by black. The Ontario Human Rights Commission defined the phenomenon of intersectionality as "...multiple forms of discrimination occurring simultaneously."⁸³ The concept of intersectionality has been advanced by a number of leading scholars in recent years.⁸⁴ However, we still lack valid and reliable measures to assess exposures and experiences in this manner because studies on health outcomes have generally focused on each form of oppression (e.g. racism, sexism) separately. Exposure to racism and discrimination, in African-American populations in particular, has been shown to be associated with adverse health outcomes.⁸⁵⁻
⁹⁰ Moreover, racism has been identified as one of the missing links which may explain pregnancy outcome differentials between African Americans and white women in the U.S.⁹¹ I hypothesize that racism is a particularly toxic exposure for middle-class black women.

There are a range of mechanisms by which racism may influence perinatal health. The stress resulting from the experience of racism might acutely increase levels of cortisol and catecholamine (hormones released in response to stress), potentially triggering preterm delivery. The response to experiencing racism could also provoke other negative health behaviors such as unhealthy eating and even obesity or increased cigarette smoking. Such behaviors thereby indirectly increase the risk of adverse maternal and infant outcomes. Furthermore, stress could increase the risk of infections, a well-established trigger for perinatal morbidity and mortality.

Racism has rarely been examined in the context of perinatal outcomes in large epidemiologic studies. However, in con-

trast to studies of other stressors, racism has more often been considered as a distal factor when considering lifetime experiences as opposed to more abbreviated ones. In one of the earliest studies of this factor, Shiono and colleagues⁹² examined the effect of racial discrimination, among other social factors, on birth weight in a large, racially heterogeneous sample of pregnant women. There was no significant adverse effect of discrimination, defined as experiencing one or more incidents of racial discrimination during pregnancy, on birth weight. The lack of effect on birth weight in this study could be ascribed to the simple fact that racism cannot be fully captured by measuring the number of incidents of racial discrimination. As with measures of stress, acute as well as chronic exposures to racism may be important.⁹³ With very low birth weight (VLBW) as the outcome, Collins and colleagues have studied racism more broadly, with an instrument assessing lifetime and pregnancy exposures in five domains.^{94, 95} In the first of the two published reports, an increased but statistically insignificant variation in risk associated with racism was present.⁹⁵ The second study was much larger than the first and found a statistically significant tripling of risk of VLBW associated with experiencing racism in three or more of the five domains.⁹⁴ Three published reports have included an examination of effects of racism on preterm birth in addition to or instead of effects on birth weight.^{74, 96, 97} In a cohort study of nearly 4,000 pregnant women based in North Carolina, Dole and colleagues reported a small (adjusted odds ratio=1.4) but statistically significant increase in risk of preterm birth associated with self-reported racial discrimina-

tion. Rosenberg⁹⁷ used the Black Women's Health study cohort to examine effects of racism and found no significant association between perceived racism and preterm birth risk. However, unlike the other studies described here, items were not constructed as a scale and effects of individual items were the basis of the analysis.⁹⁶ Mustillo and colleagues studied preterm birth and effects of racial discrimination based on data collected in the Coronary Artery Risk Development in Young Adults (CARDIA) cohort study,⁹⁶ a longitudinal study of the antecedents and risk factors for cardiovascular disease. Effects of racial discrimination were sizeable and statistically significant. Women reporting one to two experiences of lifetime racial discrimination were at two-fold higher risk of preterm birth while those reporting three or more experiences were at three-fold higher risk. The study also examined the racial disparity. Controlling for racial discrimination to other social factors in the models led to the elimination of the racial disparity in preterm birth in this sample.⁹⁶ As with socioeconomic status, the reports in the literature discussed above suggest that racism may influence perinatal outcomes through exposures and experiences that occur throughout a woman's lifetime and before conception and not simply through incidents occurring during her pregnancy.

Proximal Determinants

At the proximal level of the framework, risk factors that have a direct impact on individual woman's health status are considered. However, consistent with the nature of distal factors, proximal factors

in the framework are not confined to the prenatal period, and the influence of these factors across the life course is emphasized. Factors were included in the framework if effective intervention was unlikely to achieve change unless the woman's health during the preconceptional and/or interconceptional periods was addressed. While the distal environment may have a strong influence on proximal factors, there are potentially strategies to address these proximal factors. Below, I review the evidence supporting prepregnancy health as the major proximal factor that could explain racial disparity with a particular focus on chronic disease, obesity, and infection within the domain of prepregnancy health.^{12, 24, 98}

Prepregnancy Health: Chronic Disease

There are several reasons for examining chronic disease as a risk factor for adverse perinatal outcomes and as a potential explanation for racial disparities. First, a wide range of chronic diseases have been reported to increase the risk of adverse pregnancy outcomes (e.g. asthma⁹⁹, diabetes,¹⁰⁰ hypertension,¹⁰¹ renal disease¹⁰²). Studying preterm birth in a low income and African-American population, we found a significantly increased risk of preterm birth associated with chronic diseases.⁶⁹ Two recent studies examined the effect of "poor maternal health," which would encompass but would not be limited to chronic disease. This likely reflects the burden of chronic disease but could also be capturing acute conditions that exacerbate chronic conditions. Women who reported poor

physical health prior to pregnancy had an approximately two-fold increase in the risk of preterm birth.^{103, 104} Pregnancy may also exacerbate chronic diseases.^{105, 106} Haas and colleagues reported that women were four times more likely to be hospitalized antenatally if they had a history of chronic hypertension and two times more likely if they had a history of diabetes mellitus.¹⁰⁷ Second, the burden of chronic disease falls disproportionately on two overlapping subpopulations of women who are at increased risk for adverse perinatal outcomes:²⁴ poor women¹⁰⁸⁻¹¹¹ and African-American women.^{109, 112-114} In a study of low-income African-American women of childbearing age, more than 25% of the women reported a chronic illness (diabetes, hypertension, asthma or any condition requiring regular medication).¹¹⁵ Third, chronic diseases and their treatments often have wide ranging effects on a woman's health (e.g. end-organ damage associated with untreated hypertension, steroid treatments which may increase susceptibility to infection¹¹⁶) and thereby increase risk of adverse perinatal outcomes. Finally, unlike many other risk factors, a pre-existing chronic disease affects a woman throughout the entire pregnancy from conception to delivery.

Prepregnancy Health: Obesity

Obesity has been increasing over the past twenty-five years and the prevalence continues to rise each year. The racial, ethnic and socioeconomic disparities seen for so many health conditions are also mirrored for obesity and overweight in adults

as well as in children. Based on the most current National Health and Nutrition Examination Survey (NHANES) data, nearly half of non-Hispanic black women twenty to thirty-nine years of age were classified as obese (46.6%) compared with one-quarter of non-Hispanic whites (24.9%) in this age group.¹¹⁷ Even more troubling are the increased rates of being overweight and the elevated risk for becoming overweight observed in children and adolescents, our future “mothers.” In that same time period, the percentage of the non-Hispanic young black female population that was overweight was nearly double (23.2%) that of non-Hispanic whites (12.9%).¹¹⁷

Obese women are at increased risk for complications of pregnancy (e.g. gestational diabetes,¹¹⁸⁻¹²¹ hypertensive disorders of pregnancy¹¹⁸⁻¹²²) regardless of their health prior to pregnancy.¹²³⁻¹²⁵ The evidence linking obesity to preterm birth is controversial, with studies reporting increased risk,^{119, 120, 126, 127} decreased risk,^{124, 125} and no effect.¹²⁷⁻¹²⁹ Obesity increases the risk of chronic disease, including diabetes, cardiovascular disease, osteoarthritis, and some forms of cancer,¹³⁰⁻¹³⁵ which may adversely affect perinatal morbidity and mortality (as described above). Labor and delivery problems are also correlated with maternal body mass index (BMI) and risks for cesarean deliveries are elevated for obese women.^{119-121, 123-125, 136} A recent study has raised the possibility that the effectiveness of oral contraceptives is reduced for overweight and obese women, increasing their risk of unintended pregnancy.¹³⁷ Other studies suggest that overweight and obesity may even limit a woman’s ability to successfully breastfeed,¹³⁸⁻¹⁴² a protective behavior known to reduce the risk of infant morbidity and mortality.

Prepregnancy Health: Infection

Prepregnancy health encompasses more than chronic disease. Persistent reproductive tract infections (RTIs) and recurrences of these infections may be a component of prepregnancy health in women that is particularly important with regard to preterm birth. RTIs include sexually transmitted infections, such as chlamydia and gonorrhea, as well as infections not strictly sexually transmitted, such as bacterial vaginosis (BV). A two to three fold increase in the risk of preterm delivery is associated with the occurrence of RTIs during pregnancy.¹⁴³ Specifically, investigators have reported increased risks of preterm delivery associated with BV,¹⁴⁴ chlamydia,¹⁴⁵ gonorrhea,¹⁴⁵ and group B streptococcus¹⁴⁵ (lower reproductive tract infections), as well as chorioamnionitis (an infection of the fetus and fetal membranes).¹⁴⁵

Racial disparities are pervasive and even greater for infections than for chronic health conditions. While many chronic diseases are two to three times more frequent for black women, the differential in rates of common sexually transmitted infections are much greater. Based on the 2004 surveillance data of the Centers for Disease Control (CDC), chlamydia rates were eight times higher and gonorrhea rates were nearly fifteen times higher for black women.¹⁴⁶ For BV, a reproductive tract infection that is not apparently predominantly sexually transmitted, routine surveillance data are not collected. However, based on a number of studies of BV, the CDC estimates that BV is present in 9% of pregnant white women as compared

with 16% of pregnant black women,¹⁴⁷ a substantial disparity albeit a smaller one than for chlamydia and gonorrhea.

While prenatal infections clearly appear to increase risk of preterm birth and while there are significant disparities in their incidence, we do not know if infections prior to conception influence preterm birth risk. However, there is evidence on other reproductive outcomes that these infections can have far reaching consequences, even years after being acquired. RTIs increase the risk of infertility both acutely, through increasing the risk of an ectopic (nonviable) pregnancy, and in the long term, through the development of pelvic inflammatory disease (PID) subsequent to infection.¹⁴⁸⁻¹⁵⁵ These consequences are more common if the infection is untreated but can even occur with treatment. This means that infection years before a woman intends childbearing may affect the health of the woman and infant. Research on infections in pregnancy also suggests the need for strategies that target the problem of infection outside of pregnancy. Treatment of infections during pregnancy may reduce the risk of adverse outcomes, but results have not been consistent.^{145, 156, 157} Reasons for this failure to achieve improved outcomes may include recurrence or persistence of the infection. Goldenberg¹⁵⁶ has hypothesized that some women may suffer from chronic persistent infections, seemingly asymptomatic, that are harbored in the uterus between pregnancies. These possibilities suggest, again, that the perinatal period may be too limited to address these issues. The well documented racial differences in access to medical care coupled with higher rates of these infections among African-American women suggest

that chronic and recurrent episodes will likely also occur more often among African-American women, particularly those with low incomes. A model that explicitly takes account of the periods outside of pregnancy is needed to understand how infections prior to conception may relate to risk of preterm birth and racial disparities.

Policy Implications

In previously published work, I have argued that improvements in perinatal health for the population require that we broaden our efforts to consider factors that may originate long before pregnancy.^{12, 158} This comprehensive perinatal health framework, however, also suggests that the failure to identify and address factors prior to conception may explain why racial disparities in perinatal outcomes persist despite programs and policies specifically designed to eliminate these disparities. In the preceding sections of this paper, I have highlighted the relevance of our perinatal framework in addressing racial disparities in perinatal outcomes. While addressing these factors has the potential to improve perinatal outcomes for all women, I would argue that the factors emphasized in this framework are even more salient in efforts to reduce disparities. To explain the racial disparity in perinatal outcomes, we must identify either: 1) those risk factors more prevalent among black women; or 2) those risk factors that are of equal prevalence but are more “virulent” in black women. The latter may be the result of an interaction between two factors (e.g. gene - environment) such that the effect of the one

factor is magnified in the presence of the other factor or vice versa. The distal and proximal factors discussed in the preceding sections meet at least one and often both of these conditions. For example, chronic diseases are much more common among black women and the higher rates of uninsurance and poverty increase the likelihood that these conditions will exact a greater toll than for white women. This is vividly illustrated by studies of asthma in pregnancy which demonstrated that untreated disease, even in its milder forms, rather than simply the disease itself, is associated with poorer birth outcomes.¹⁵⁹⁻¹⁶²

While the evidence linking factors in the framework to perinatal health is strong and consistent, it remains a challenge to develop and implement policies that address these factors. In a recent paper focusing on maternal mortality and morbidity (“safe motherhood”), Misra and Grason considered a set of strategies that could be used to advance components of the perinatal health framework.¹⁵⁸ All of the categories of strategies are relevant for addressing racial disparity and many of the examples illustrate strategies that would be particularly important in addressing the disparity. However, the discussion was generic to the population, and we did not explicitly consider issues related to disparities. Just as with understanding the etiology of disparities requires a focus on factors more frequent or more “virulent,” so too must our policies emphasize the factors driving the disparity unless we are content to allow these gaps to persist. As I have noted, the distal and proximal factors explored above are indeed those factors for which black women should be more likely to benefit if

policies were developed and implemented to address such factors.


Perhaps the greatest challenge in developing and implementing these strategies is the inherent difficulty in demonstrating success in the short term. I have argued that we must invest in the health of black women beginning at the time of their own birth. An evaluation of the effects of such efforts on birth outcomes would necessarily require long-term follow-up and intergenerational studies. Given the reality of the political environment in which health policy is embedded, we must find intermediate outcomes for evaluating the effectiveness of strategies that address the framework factors and racial disparities. The success of the “Zero to Three” early intervention movement may serve as an instructive model as we endeavor to change thinking and policy. Just thirty years ago, the notion of providing infants and toddlers with intensive developmental and educational services was met with considerable skepticism and little funding. Longitudinal research was needed and was thus begun. However, in the meantime, other indirect evidence was critically examined. This included research showing the effectiveness of early intervention on short-term outcomes. Landmark legislation (Public Law 99-457, “the preschool law”) was passed in 1986, entitling children with disabilities to receive services from birth to five years of age. I would argue that the level of evidence underlying this legislation was no greater than what we have amassed for the importance of life course factors for perinatal health. A key difference is likely the lack of an identified core constituency that has organized to ad-

vocate for change.

We can also examine the early intervention movement with regard to racial disparities. Given the higher prevalence of disability among black infants and toddlers, there is little doubt that the legislation should have had a greater impact on this population. However, navigating the system of services is complex, and minority families may face additional obstacles in obtaining the services to which their child is entitled. Similarly, unless we are careful in our approach to the development and implementation of strategies responsive to the life course perinatal framework, the disparity may grow rather than shrink despite the clear evidence that these factors explain at least part of the disparity.

Conclusion

Public health has a long history of addressing health issues from a broad perspective. However, even progressive public health practitioners have rarely undertaken prevention programs in which the benefits are as distant as this framework outlines. Yet, it is clear that our efforts over the past century to eliminate racial disparities have met with little success. I hypothesize that this is due, at least in part, to our collective failure to acknowledge and address the factors that originate far before a woman's childbearing years. These include the more distal factors of the social, physical, and genetic environments, as well as the proximal factors relating to a woman's health in childhood and young adulthood (chronic disease, obesity, infection). Investments decades before pregnancy must be made if we expect to produce improvements in

perinatal health and to narrow racial disparities. 

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