

FACT SHEET

Based on the report by: Michael C. Lu & Jessica S. Lu

Maternal Nutrition and Infant Mortality In the Context of Relationality

The Courage To Love: Infant Mortality Commission

BACKGROUND

The United States has one of the highest rates of infant mortality among developed nations. Disparities in infant mortality by race and class continue to be a national disgrace. Insofar as poor maternal nutrition may be linked to several leading causes of infant mortality, such as preterm birth and fetal growth restriction, a focus on maternal nutrition may help shed light on the causes and prevention of infant mortality.

The Facts:

- In 2003, the U.S. ranked 27th for Infant mortality rates, among developing nations with populations of greater than 250,000 (*one of the highest IMR among developed nations*)
- In 2002, the IMR was 13.9 for non-Hispanic black infants and 5.8 for non-Hispanic white infants.
- Infants born to mothers under the age of 20 or ages 35 and over have higher IMR's.
- Low pregnancy body mass index (BMI) and poor gestational weight gain have been linked to greater risk for pre-term birth.
- Diabetes complicating pregnancy is the second most reported medical risk factor during pregnancy.

Maternal Nutrition and Infant Mortality

We found good evidence linking poor maternal nutrition to several leading causes of infant mortality, including birth defects, preterm birth, fetal growth restriction, and maternal complications of pregnancy (preeclampsia, anemia, infections/ inflammation). Maternal folate and B12 deficiencies have been associated with neural tube defects, while deficiencies in B vitamins, vitamin K, magnesium, copper, and zinc have also been linked to other birth defects. Low pre-pregnancy body mass index (BMI) and poor gestational weight gain are associated with greater risk for preterm birth and fetal growth restriction.

Maternal nutrition can also mediate or modulate several of the major pathways (e.g., inflammatory) leading to spontaneous preterm birth. While the contribution of specific nutrient deficiencies to preeclampsia remains unclear, maternal nutrition can potentially play an important role in the pathogenesis of preeclampsia by affecting endothelial function, ameliorating oxidative stress, modulating inflammatory response, and improving insulin action. In light of the importance of abnormal implantation and placentation in the pathogenesis of preeclampsia, periconceptional nutrition may be of paramount importance. Nutritional deficiencies of iron, folate, and vitamins A, B6, and B12 can cause anemia. Vitamin A and other micronutrient deficiencies have been implicated in maternal infections, and antioxidants can potentially play a major role in modulating inflammation and oxidative stress from maternal infections. The growing body of research on fetal programming of adult diseases further elevates the clinical and public health significance of maternal nutrition.

Nutritional Status and Behaviors of Pregnant Women in the United States

Most pregnant women in the U.S. start off pregnancy overweight or underweight, and had inappropriate weight gain during pregnancy. For low-income African American women, only 40 percent enter pregnancy with normal BMI and less than 30 percent achieve ideal weight gain during pregnancy. Approximately one of every three low-income women is anemic in the third trimester of pregnancy; the prevalence of anemia is substantially higher (44 percent) among African American women than among all other racial-ethnic groups. The prevalence of diabetes during pregnancy is 3.3 percent. The prevalence, however, ranged from three percent for non-Hispanic black mothers to 5.4 percent for Asian and Pacific Islander mothers and 5.7 percent for Native American mothers.

Available data suggest that pregnant women in the U.S. consume more protein, fat and trans-fat, and carbohydrates than recommended. A substantial proportion of pregnant women do not meet their recommended daily allowances (RDA) for iodine, calcium, magnesium, iron, zinc, vitamins A, B1, B2, B3, B6, B12, and vitamin C from food sources. Dietary intake of folate is inadequate for over 95 percent of women, and that of vitamin E is inadequate for 25 percent of pregnant women, which perhaps reflects low intakes of fruits and vegetables. When multivitamins are accounted for, one in four still does not consume adequate amounts of folate and vitamin E. For African American women, only about one in four pregnant women meets the RDA for calcium, magnesium, zinc, and vitamin E, and about one in three does not meet the RDA for iron and folate.

Prenatal Nutritional Interventions: Evidence of Effectiveness

The evidence of the effectiveness of any single macro- or micronutrient supplement for preventing fetal growth restriction, preterm birth, birth defects, and maternal complications (preeclampsia, anemia, and infections) is far from conclusive, with the possible exceptions of periconceptional folic acid supplementation for prevention of neural tube defects and iron and folate supplementation for prevention of maternal anemia. Fish oil for prevention of recurrent preterm birth, balanced protein-energy supplementation for prevention of fetal growth restriction, and calcium supplementation for prevention of preeclampsia in high-risk women also appear promising. However, it is premature to conclude that maternal nutritional interventions do not work, as most trials have focused on supplementing one single nutrient during pregnancy; few studies have examined the impact of multi-nutrient supplementation that starts before pregnancy. Most evaluations of Women, Infant, and Children (WIC) programs have found evidence of their effectiveness for preventing low birthweight (LBW); however, their effectiveness may be overstated due to problems of selection bias, simultaneity bias, and lack of generalizability.

Rethinking Maternal Nutrition and Infant Mortality — The Context of Relationality over the Life Course

Nutrition can play a key role in preventing several leading causes of infant mortality, but only as part of a longitudinally and contextually integrated strategy for improving maternal and family health. In this report, we examine the problems of infant mortality and poor maternal nutrition in the context of relationality. We contend that both are, in essence, problems of broken relationships at many levels. These broken relationships are manifested in the lack of support for breastfeeding, the decline in family meals concomitant to the rise of fast food, the marketing of junk foods to children, and the prevalence of food insecurity in a land of plenty. These broken relationships create lifelong conditions of high stress and low support, which in turn pattern physiological, psychological, and behavioral responses that put the mother at risk for poor nutrition during pregnancy, and her baby at risk for fetal and infant death. African American families are disproportionately affected by these broken relationships, which contribute to disparities in maternal nutrition and infant mortality. Efforts to reduce maternal and infant mortality and morbidity must focus on the repair and support of relationships at all levels and across the life course.

POLICY RECOMMENDATIONS

The following are recommendations for future directions and priority areas in research, practice, and policy related to maternal nutrition and infant mortality.

Research

• *Preconceptional and Interconceptional Nutrition*

Researchers should conduct more intervention studies of maternal nutritional supplementation that begins before (preconceptional) and between (interconceptional) pregnancies. The National Institutes of Health and other funding agencies should support these studies.

• *Content of Nutritional Supplementation*

Researchers should conduct more intervention studies of multi-nutrient maternal nutritional supplementation. The National Institutes of Health and other funding agencies should support these studies.

• *Relational Context of Maternal Nutrition*

Researchers should conduct more research studies of the influences of partner support, provider encouragement, social network, social capital, and other relational contexts on maternal nutritional status and behaviors. Furthermore, researchers should conduct more intervention studies that build upon these relational contexts for improving maternal nutritional status and behaviors before and during pregnancy. The National Institutes of Health and other funding agencies should support this research.

• *Psychosocial Factors and Maternal Nutrition*

Researchers should conduct more research studies of the influences of psychosocial factors on maternal nutritional status and behaviors before and during pregnancy. Such research efforts should be guided by an integrative framework that takes into account the multilevel influences of stress and nutrition. Furthermore, researchers should conduct more intervention studies that test different social support strategies for improving maternal nutritional status and behaviors before and during pregnancy. Development of such strategies should be guided by the principles and methods of community participatory action research. The National Institutes of Health and other funding agencies should support these studies.

• *Life-Course Influences on Maternal Nutrition*

Researchers should conduct more research studies that identify critical influences over the life course on maternal nutritional status and behaviors. Furthermore, researchers should conduct more intervention studies that address these life-course influences to improve maternal nutritional status and behaviors before and during pregnancy and over the life course. The National Institutes of Health and other funding agencies should support such research.

Practice

• *Increase Surveillance for Food Insecurity*

The American College of Obstetricians and Gynecologists (ACOG), the American Academy of Pediatrics, and other professional organizations should recommend routine assessments of food insecurity during perinatal care as practice guidelines, and the Centers for Disease Control and Prevention, the Maternal and Child Health Bureau, and state and local Title V agencies should routinely monitor food insecurity in maternal and child health (MCH) populations. Furthermore, prenatal care providers must ensure that women and families who screen positive for food insecurity receive appropriate nutritional services, and state and local Title V agencies must ensure that such services are available and accessible to

Leading Causes for Infant Mortality in the United States

- Birth defects
- Accidents
- Causes related to short gestation or low birthweight
- Sudden infant death syndrome (SIDS)
- Maternal complications during pregnancy
- Complications of placenta cord, and membranes
- Respiratory distress of newborn
- Bacterial sepsis of newborn
- Diseases of the circulatory system

women and families who need them. All eligible women and families who are at nutritional risk must be referred to WIC.

- ***Address Psychosocial Factors in Pregnancy***

Perinatal care providers, including WIC programs, should routinely assess psychosocial factors, including stress and social support among pregnant women and families. Those who screen positive should be referred to appropriate support services (e.g., psychological counseling for women with depressive or other affective disorders, support services for women and children who are victims of intimate partner violence).

- ***Support Healthy Nutrition in Relational Contexts***

Perinatal care providers, including WIC programs, should experiment with the use of a pregnant woman's own personal relationships to support her nutritional behaviors. Such experiments should be supported and encouraged by health plans, Title V programs, and other public agencies or private foundations. The use of *doulas*, group prenatal care (e.g., Centering Pregnancy), and other forms of social support for improving maternal nutrition should also be explored.

Policy

- ***Promote Baby-Friendly Hospitals and Workplace***

The U.S. Department of Health and Human Services, the Centers for Disease Control and Prevention, the Maternal and Child Health Bureau, state and local Title V agencies, and other public and private organizations should promote the adoption of baby-friendly policies in birthing hospitals in the U.S. All public agencies should adopt baby-friendly policies in the workplace, including provision of a breastfeeding room for nursing mothers.

- ***Regulate Marketing of Junk Foods to Children***

The Federal Trade Commission should regulate marketing of junk foods during children's television programming. State and local educational authorities should promote healthful diets for children and youth in all aspects of the school environment (e.g., restrictions on commercial sponsorships of school activities, banning of soda and other junk food vending machines from schools, provision of healthy nutrition through school lunch programs, and development of educational curricula to promote healthy nutrition).

- ***Strengthen Women, Infants, and Children (WIC) Programs***

The Department of Agriculture should continue to explore ways to strengthen WIC. The commissioned Institute of Medicine report on repackaging WIC food packages is a good start, but more can be done to enhance the content of WIC food packages to improve maternal health and optimize developmental programming. Additionally, more efforts and resources are needed to improve outreach, health education, service coordination and systems integration, and community building to increase food access and quality, particularly in disadvantaged communities. More attention must be paid to addressing psychosocial barriers to WIC participation. WIC alone is not the answer to infant mortality, however. The Department of Agriculture needs to join forces with the Centers for Disease Control and Prevention, the Maternal and Child Health Bureau, the National Institute of Child Health and Development, and other leaders in maternal and child health to develop a roadmap for addressing this nation's infant mortality problem, using an integrative approach and making improvement of maternal and infant nutrition a priority.

- ***Support Fragile Families and Strengthen Partner/Father Involvement***

Federal and state governments should pass legislation to encourage family formation and remove disincentives for partner/father involvement through Temporary Assistance for Needy Families (e.g., eliminating the distinction between single- and two-parent families for eligibility determination), the Earned Income Tax Credit (e.g., allowing a second-earner deduction), and child support programs (e.g., establishing amnesty programs; allowing greater "pass-through" of child-support payments to children; and extending TANF, EITC, and other support services to non-custodial fathers who pay child support). Policymakers should also increase support for educational programs, employment-related services, legal and social services, and marriage counseling for low-income fathers

