

SYMPOSIUM

Health Disparities in Early Nutrition: Where the Problem Begins?

Prepregnancy Obesity: Determinants, Consequences, and Solutions^{1–3}

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ABSTRACT

Obesity among women of childbearing age is of paramount importance because of its association with multiple adverse health outcomes for the mother and fetus once a woman becomes pregnant. Obesity is more prevalent among women of lower socioeconomic status and of color who often times lack health insurance. This health disparity that exists within a framework of repeating cycle of risk emphasizes the urgency for accelerating the discovery of solutions for the obesity problem among women of childbearing age. *Adv. Nutr.* 3: 105–107, 2012.

Introduction

Obesity is a major global public health problem that has received much attention for the past 2 decades. Among women of childbearing age, it is of paramount importance because of its association with multiple adverse health outcomes for the mother and fetus once a woman becomes pregnant (1). The total number of women who become pregnant in any given year is unknown, but about 4 million births occur in the United States annually and currently ~60% of women of childbearing age are either overweight or obese (2). This percentage has increased by 31% (from 43.9% to 57.8%) for women and by 42% (from 25.6% to 36.4%) for adolescents since the late 1980s (3). There is some speculation that the increase in the obesity rates have stabilized, but more evidence is needed before we get optimistic that the epidemic is slowing down. Overweight and obesity vary to some degree by race, socioeconomic

status, and region of the country. It is more prevalent among women of lower (<100% of the Federal Poverty Level) income status (22.2% vs. 16%) than among those with higher incomes (>250% of the Federal Poverty Level) (4), women of color (43% for Hispanic, 51% non-Hispanic black, and 33% for non-Hispanic white women older than 20 y of age) (5), and those living in the South and Midwest compared with other regions of the country (6).

There are numerous implications of being obese for women of childbearing age. Obesity before pregnancy has been associated with decreased fertility (7). However, weight loss of at least 10% has been shown to improve an obese woman's ability to become pregnant. Obesity during pregnancy has been linked with many adverse reproductive outcomes that may be a result of impaired processes related to glucose and lipid metabolism (1). Obese women are more likely to become hyperinsulinemic compared with nonobese women (1). Given the physiological and metabolic changes that occur during a normal pregnancy, obese women are more likely to have gestational diabetes and pre-eclampsia than nonobese women and to have it develop earlier in pregnancy (1). This metabolic profile can induce rapid fetal growth such that the prevalence of large-for-gestational age (defined as >90th percentile of a birth weight for a given gestational age) infants is more frequent among obese women, and it may also causally alter the metabolism and other physiological processes in the fetus (1,8). In the short term, maternal obesity is also associated with increased risk of having a child with birth defects, a cesarean section, and postpartum anemia and a lower frequency of breastfeeding initiation (8–10). Obese women in the postpartum period

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have a difficult time losing the weight gained during pregnancy, especially if the weight gain has been excessive (11). In the long term, outcomes related to the obese pregnancy state are less well studied for the mother compared with that for the child. Numerous fetal programming studies that compare obese with nonobese pregnancies have shown an increased risk of diabetes, hypertension, and obesity in the child of the obese mother (12).

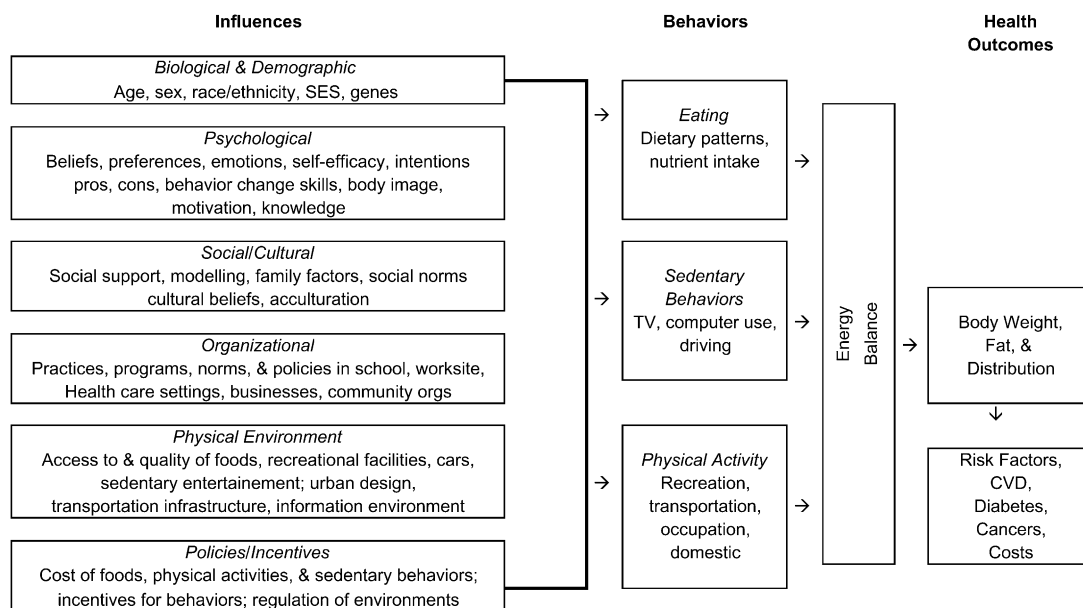
We see several examples of health disparities for outcomes during pregnancy as well as in the postpartum period. Black women have higher prevalence of gestational hypertension, Hispanics have higher rates of birth defects, and American Indian/Alaska Natives and Asian Pacific Islanders have higher prevalence of gestational diabetes (9,13). Black women have a lower prevalence of breastfeeding and a more difficult time in losing weight in the postpartum period (13,14). Minority women are more likely to become pregnant at a younger age and more frequently than white women (15), and as such, they will pass through multiple reproduction cycles, as described by Misra et al. (16). With each cycle, if excessive weight is gained during pregnancy without a substantial weight loss in the postpartum period, these women will be at higher risk of the pregnancy complications mentioned previously, and thus the obesity cycle of risk continues for both the mother and child.

In an attempt to explain the health disparities that exist during pregnancy, studies adjust for weight status by using BMI as a proxy, however, the differences in these outcomes by race/ethnicity seems to persist. This has led to research that examines fat distribution by race/ethnicity in women of childbearing age. Where fat is deposited has been shown to be associated with chronic disease; central fat deposition

is positively associated with cardiovascular disease, hypertension, glucose status, and insulin resistance, whereas leg fat is negatively associated with these risk factors (17–19). Among women of reproductive age, Rahman et al. (20) showed that non-Hispanic white women had the highest value for total fat mass, trunk fat mass, and leg fat mass as well as overall percentage of fat mass compared with Hispanic and black women. Hispanic women had the highest value for the percentage of trunk fat mass and fat mass ratio of the trunk to leg and of the trunk to limb, whereas black women had the lowest value for these measurements with exception of leg fat mass and percentage of fat mass of the leg (20). These same authors showed that the relationship between these body fat distributions and lipid profile is weaker in black women compared with whites and Hispanics (21), suggesting that this may be the result of either a greater capacity for clearing lipids or a lower lipid production in black women compared with the others (21–23). Research involving Asians and American Indian women along these lines are needed. Overall, this kind of information points to the value of tailoring weight reduction programs by race to focus on decreasing one’s risk of disease by reducing fat in different parts of the body.

Conclusion

There are many models that have been proposed to explain the complex web of the determinants of obesity and chronic diseases. A very comprehensive model illustrating this complexity is shown in **Figure 1** developed by Huang and colleagues for the National Heart, Lung and Blood workshop on Predictors of Obesity, Weight Gain, Diet, and Physical Activity held in Bethesda, Maryland (24). This model nicely



Developed for the NHLBI Workshop on Predictors of Obesity, Weight Gain, Diet, and Physical Activity; August 4-5, 2004, Bethesda MD

Figure 1 An ecological model of diet, physical activity, and obesity. Source: National Heart, Lung, and Blood Institute; National Institutes of Health; U.S. Department of Health and Human Services.

illustrates that the risk factors for chronic diseases are directly a function of an individual's body weight and body fat distribution, which is the end-product of overall energy balance. Energy balance, in turn, is determined by dietary, physical activity, and sedentary behaviors that are influenced by many factors in the biological, demographic, psychosocial, social/cultural, organizational, and physical environment domains and societal policies and incentives. This means that interventions aimed at obese women of reproductive age must be multidimensional and interdisciplinary and focus on the preconceptional and interconceptional periods if we are to help them have optimal pregnancy and long-term outcomes for both the mother and child. Pregnancy complications are thought to reveal the chronic disease profile of the woman later in life (25). At present, very few intervention studies exist that have been successful in helping obese women gain within the targeted weight gain guidelines or to lose weight in the postpartum period. These are reviewed in the paper by Abrams et al. (26) in this issue and thus are not covered in this review. The Institute of Medicine committee on re-examining the weight gain guidelines called for national funding in this area and the need for more studies that involve obese pregnant women (2). It is my hope that in another decade we will have found some solutions for all women, but in particular for minority women who tend to suffer the greatest burden of adverse pregnancy complications.

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