

# Position of the Academy of Nutrition and Dietetics: Nutrition and Lifestyle for a Healthy Pregnancy Outcome

## ABSTRACT

It is the position of the Academy of Nutrition and Dietetics that women of childbearing age should adopt a lifestyle optimizing health and reducing risk of birth defects, sub-optimal fetal development, and chronic health problems in both mother and child. Components leading to a healthy pregnancy outcome include healthy prepregnancy weight, appropriate weight gain and physical activity during pregnancy, consumption of a wide variety of foods, appropriate vitamin and mineral supplementation, avoidance of alcohol and other harmful substances, and safe food handling. Pregnancy is a critical period during which maternal nutrition and lifestyle choices are major influences on mother and child health. Inadequate levels of key nutrients during crucial periods of fetal development may lead to reprogramming within fetal tissues, predisposing the infant to chronic conditions in later life. Improving the well-being of mothers, infants, and children is key to the health of the next generation. This position paper and the accompanying practice paper ([www.eatright.org/members/practicepapers](http://www.eatright.org/members/practicepapers)) on the same topic provide registered dietitian nutritionists and dietetic technicians, registered; other professional associations; government agencies; industry; and the public with the Academy's stance on factors determined to influence healthy pregnancy, as well as an overview of best practices in nutrition and healthy lifestyles during pregnancy.

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## POSITION STATEMENT

It is the position of the Academy of Nutrition and Dietetics that women of childbearing age should adopt a lifestyle optimizing health and reducing risk of birth defects, suboptimal fetal development, and chronic health problems in both mother and child. Components leading to healthy pregnancy outcome include healthy prepregnancy weight, appropriate weight gain and physical activity during pregnancy, consumption of a wide variety of foods, appropriate vitamin and mineral supplementation, avoidance of alcohol and other harmful substances, and safe food handling.

**T**HIS POSITION PAPER PROVIDES Academy of Nutrition and Dietetics members, other professional associations, government agencies, industry, and the public with the Academy's stance on factors determined to influence healthy pregnancy, as well as emerging factors. Women with inappropriate weight gain, hyperemesis, multiple gestations, poor dietary patterns (eg, disordered eating), or chronic disease should be referred to a registered dietitian nutritionist (RDN) for medical nutrition therapy. For specific practice recommendations, refer to the Academy's practice paper on "Nutrition and Lifestyle for a Healthy Pregnancy Outcome."<sup>1</sup>

## TRENDS IMPACTING PREGNANCY OUTCOMES

### Birth Defects, Low Birth Weight, and Viable Birth Trends

Pregnancy is a critical period during which maternal nutrition and lifestyle

choices are major influences on mother and child health. Improving the well-being of mothers, infants, and children is key to the health of the next generation. One in 33 babies (approximately 3%) is born with a birth defect<sup>2</sup>; in 2010, low-birth-weight (LBW) infants comprised 8.1% of US births.<sup>3</sup> Birth defects and LBW are ranked first and second, respectively, among the 10 leading causes of death in US infants in 2006.<sup>3</sup> A woman's chance of having a healthy baby improves when she adopts healthy behaviors, including good nutrition; recommended supplementation; and avoidance of smoking, alcohol, and illicit drugs before becoming pregnant.<sup>2</sup>

## OBESITY AND GESTATIONAL DIABETES

Prepregnancy body mass index (BMI) is an independent predictor of many adverse outcomes of pregnancy. The prevalence of obesity in women 12 to 44 years of age has more than doubled since 1976. In 1999 to 2004, nearly two thirds of women of childbearing age were classified as overweight (BMI

≥25) and almost one third were obese (BMI ≥30).<sup>4</sup> Overconsumption/overweight throughout the reproductive cycle are related to short- and long-term maternal health risks, including obesity, diabetes, dyslipidemia, and cardiovascular disease. Caloric excess does not guarantee adequate intake or nutrient status critical to healthy pregnancy outcomes.<sup>5</sup>

To improve maternal and child health outcomes, women should weigh within the normal BMI range when they conceive and strive to gain within ranges recommended by the Institute of Medicine (IOM) 2009 pregnancy weight guidelines.<sup>4</sup> High rates of overweight and obesity are common in population subgroups already at risk for poor maternal and child health outcomes, compounding the need for intervention.<sup>4</sup> In addition to health risks, gestational weight gain beyond the recommendation substantially increases risk of excess weight retention in obese women at 1 year postpartum.<sup>6</sup> More information on obesity and pregnancy outcomes can be found in the

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“Position of the Academy of Nutrition and Dietetics and American Society for Nutrition: Obesity, Reproduction, and Pregnancy Outcomes.”<sup>7</sup>

New diagnostic criteria for gestational diabetes mellitus (GDM) are expected to increase the proportion of women diagnosed with GDM, with potentially 18% of all pregnancies affected.<sup>8</sup> Immediately after pregnancy, 5% to 10% of women with GDM are found to have diabetes, usually type 2. Women who have had GDM have a 35% to 60% chance of developing diabetes in the next 10 to 20 years.<sup>8</sup> RDNs can provide valuable guidance to women seeking assistance regarding optimal weight and healthy food selection before, during, and post pregnancy. Additional information and guidance is available in the Academy's GDM Evidence-Based Nutrition Practice Guideline.<sup>9</sup>

### Hypertension and Preeclampsia

Prevalence of chronic hypertension in pregnancy in the United States is estimated to be as high as 5%. This is primarily attributable to the increased prevalence of obesity, as well as delay in childbearing to ages when chronic hypertension is more common.<sup>10</sup> Hypertension in pregnancy can harm both mother and fetus, and women with chronic hypertension are more likely to experience preeclampsia (17% to 25% vs 3% to 5% in the general population).<sup>10</sup> Age, preconception weight and health status, access to timely and appropriate health care, and poverty are some of the numerous factors affecting maternal health and the likelihood of a healthy pregnancy. Referral to the RDN and/or social worker may assure appropriate care will be available, given the aforementioned factors that can influence maternal and fetal outcomes.

### OPTIMIZING PREGNANCY OUTCOMES WITH HEALTHY LIFESTYLE CHOICES

Evidence is building that maternal diet and lifestyle choices influence the long-term health of the mother's children. Prepregnancy adherence to healthful dietary patterns, including the alternate Mediterranean Diet, Dietary Approaches to Stop Hypertension (DASH), and alternate Healthy Eating Index, have been associated with a 24% to 46% lower risk of GDM.<sup>11</sup> Population-based research provides evidence that

maternal metabolic conditions may be associated with neurodevelopmental problems, including autism and developmental delays in children.<sup>12</sup> Inadequate levels of key nutrients during crucial periods of fetal development may lead to reprogramming within fetal tissues, predisposing the infant to chronic conditions in later life. Those conditions include obesity, cardiovascular disease, bone health, cognition, immune function, and diabetes.<sup>13</sup>

Maternal weight gain during pregnancy outside the recommended range is associated with increased risk to maternal and child health.<sup>4</sup> Although physiological responses to prenatal overnutrition result in poor health outcomes that emerge in childhood and adolescence, fetal undernutrition responses range from fetal survival to poor health outcomes emerging later in the offspring's adult life.<sup>14</sup> The IOM recommends that more US women achieve gestational weight gain within the range identified for their prepregnant BMI.<sup>4</sup> Pregnant women benefit from eating a variety of foods to meet nutrient needs and consuming sufficient calories to support recommended weight gain. Details regarding recommended energy requirements and recommended weight gain during pregnancy can be found in the related practice paper.<sup>1</sup>

### Energy Expenditure

Physical activity during pregnancy benefits a woman's overall health. In a low-risk pregnancy, moderately intense activity does not increase risk of LBW, preterm delivery, or miscarriage.<sup>15</sup> Recreational moderate and vigorous physical activity during pregnancy is associated with a 48% lower risk of hyperglycemia, specifically among women with prepregnancy BMI <25.<sup>16</sup> A prenatal nutrition and exercise program, regardless of exercise intensity, has been shown to reduce excessive gestational weight gain and decrease weight retention at 2 months postpartum in women of normal prepregnant BMI.<sup>17</sup>

### Appropriate and Timely Nutrient Supplementation

**Iron.** Iron deficiency with resultant anemia is the most prevalent micronutrient deficiency worldwide, affecting primarily pregnant or lactating women and young children.<sup>18</sup> Iron-deficiency

anemia in pregnant women in industrialized countries is 17.4%,<sup>19</sup> with approximately 9% of adolescent girls and women of childbearing age in the United States having inadequate stores of body iron.<sup>20</sup> The high incidence of iron deficiency underscores the need for iron supplementation in pregnancy. During the first two trimesters of pregnancy, iron-deficiency anemia increases the risk for preterm labor, LBW, and infant mortality.<sup>18</sup> Maternal and fetal demand for iron increases during pregnancy; this increase cannot be met without iron supplementation.<sup>18</sup>

**Folic Acid.** Folic acid is recognized as important before and during pregnancy because of its preventive properties against neural tube defects. All women, including adolescents, who are capable of becoming pregnant should consume 400  $\mu\text{g/day}$  folic acid from fortified foods and/or dietary supplements, in addition to eating food sources of folate.<sup>21</sup> Pregnant women are advised to consume 600  $\mu\text{g}$  dietary folate equivalents daily from all food sources. Dietary folate equivalents adjust for the difference in bioavailability of food folate compared with synthetic folic acid. One dietary folate equivalent is equal to 1  $\mu\text{g}$  food folate, which is equal to 0.6  $\mu\text{g}$  folic acid derived from supplements and fortified foods taken with meals.<sup>14</sup> Women who have had an infant with a neural tube defect should consult with their health care provider regarding the recommendation to take 4,000  $\mu\text{g}$  folic acid daily before and throughout the first trimester of pregnancy.<sup>22</sup> An association between the lack of periconceptual use of vitamins or supplements containing folic acid with an excess risk for birth defects due to diabetes mellitus<sup>23</sup> highlights ongoing research.

**Vitamin D.** The function of vitamin D during pregnancy for both mother and fetus is not fully defined at present.<sup>24</sup> Although vitamin D supplementation during pregnancy has been suggested as an intervention to protect against adverse gestational outcomes, including LBW,<sup>25</sup> the need, safety, and effectiveness of vitamin D supplementation during pregnancy remains controversial.<sup>24</sup> The IOM recommends 600 IU per day of vitamin D to meet the needs of most North American adults, including pregnant women.<sup>26</sup> Ongoing

research suggests higher levels of supplementation are safe and effective for improving maternal and infant vitamin D status.<sup>24</sup>

**Choline.** Choline is an essential nutrient during pregnancy because of its high rate of transport from mother to fetus. Maternal deficiency of choline can interfere with normal fetal brain development. Although choline is found in many foods, the majority of pregnant women are not achieving the Adequate Intake for pregnancy of 450 mg choline per day.<sup>27</sup>

**Calcium.** The Dietary Reference Intake for calcium in pregnancy is equal to that of nonpregnant women of the same age because of increased efficiency in calcium absorption during pregnancy and maternal bone calcium mobilization.<sup>26</sup> Women with suboptimal intakes (<500 mg/day) may need additional amounts to meet both maternal and fetal bone requirements.<sup>28</sup>

**Iodine.** Iodine is required for normal brain development and growth; iodine deficiency worldwide is a growing concern. During pregnancy, iodine requirements increase, making mother and developing fetus vulnerable. Congenital hypothyroidism is associated with cretinism, and clinical hypothyroidism has been associated with increased risk of poor perinatal outcomes, including prematurity, LBW, miscarriage, preeclampsia, fetal death, and impaired fetal neurocognitive development.<sup>29</sup> Recent national surveys indicate a subset of pregnant and lactating US women may have mild to moderately inadequate dietary iodine intake.<sup>30</sup> The IOM recommends an iodine intake from dietary and supplement sources of 150  $\mu\text{g}/\text{day}$  before conception, and 220  $\mu\text{g}$  per day for pregnant women.<sup>31</sup>

**Environmental and Dietary Issues Foodborne Illness during Pregnancy.** Pregnant women and their fetuses are at increased risk of developing foodborne illness because of the hormonal changes of pregnancy that lead to decreased cell-mediated immune function. Of greatest concern during pregnancy are *Listeria monocytogenes*, *Toxoplasma gondii*, *Brucella* species, *Salmonella* species, and *Campylobacter*

*jejuni*.<sup>32</sup> Pregnant women should closely adhere to food-safety recommendations outlined in the 2010 Dietary Guidelines for Americans.<sup>21</sup> Updated food-safety guidelines can be reviewed on the Food and Drug Administration at [www.fda.gov/Food/ResourcesForYou/HealthEducators/ucm083308.htm](http://www.fda.gov/Food/ResourcesForYou/HealthEducators/ucm083308.htm).

**Benefits and Concerns Regarding Fish and Seafood Consumption.** The nutritional value of seafood is particularly important during fetal growth and development, as well as in early infancy and childhood.<sup>14</sup> Intake of n-3 fatty acids, particularly docosahexaenoic acid, from at least 8 oz of seafood per week for pregnant women is associated with improved infant visual and cognitive development.<sup>14</sup> Although prenatal mercury exposure ( $\geq 1 \mu\text{g}/\text{g}$ ) was found to be associated with a greater risk of attention-deficit hyperactivity disorder–related behaviors, prenatal fish consumption of more than two servings per week was protective of those behaviors.<sup>33</sup> RDNs and dietetic technicians, registered, can help pregnant women balance the benefits of eating fish while avoiding high-mercury content seafood.

**Non-Nutritive Sweeteners.** Although calorie and blood glucose control are acknowledged benefits of non-nutritive sweeteners, limited research addresses the safety of non-nutritive sweeteners on healthy pregnancy or in GDM.<sup>34</sup>

**Alcohol.** Alcohol should not be consumed by pregnant women or those who may become pregnant.<sup>14</sup> Drinking alcohol during pregnancy, especially in early pregnancy, may result in behavioral or neurological defects in the offspring and affect a child's future intelligence. No safe level of alcohol consumption during pregnancy has been established.<sup>14</sup>

**Caffeine.** Caffeine half-life increases in pregnancy from 3 hours in the first trimester to 80 to 100 hours in late pregnancy. Women who are pregnant or trying to become pregnant are advised by the American College of Obstetricians and Gynecologists<sup>35</sup> to consume no more than 200 mg of caffeine per day—the approximate amount in one 12-oz cup of coffee. However, birth defects research indicates moderate or high amounts of beverages and foods

containing caffeine do not increase the risk of congenital malformations, miscarriage, preterm birth, or growth retardation.<sup>36</sup>

**Hydration and Water Needs.** Adequate hydration is essential to healthy pregnancy, as a woman accumulates 6 to 9 L of water during gestation. The total water Adequate Intake for pregnancy (including drinking water, beverages and food) is 3 L/day. This includes approximately 2.3 L (approximately 10 cups) as total beverages.<sup>37</sup>

**Energy Drinks.** An energy drink is any beverage that contains some form of legal stimulant and/or vitamins added to provide a short-term boost in energy. These drinks may contain substantial and varying amounts of sugar and caffeine, as well as taurine, carnitine, inositol, ginkgo, and milk thistle. Many of these have not been studied for safety during pregnancy. Ginseng, another common ingredient, is not recommended for use during pregnancy. The avoidance of energy drinks during pregnancy is advised.

**Sugar-Sweetened Drinks.** Sugar-sweetened beverages, including regular sodas, sport drinks, energy drinks, and fruit drinks, provide 35.7% of added sugars in the US diet.<sup>14</sup> Reduced consumption of sources of added sugars lowers the calorie content of the diet without compromising nutrient adequacy.

### Health Conditions Between and After Pregnancies

Maternal return to healthy weight status postpartum can prevent future overweight and obesity.<sup>14</sup> The 2010 Dietary Guidelines for Americans forms the basis for nutrition counseling for postpartum women, and RDNs and dietetic technicians, registered, can assist women in achieving their prepregnancy weight.<sup>21</sup> Outside of weight status, recent research has shown that diet quality, dietary intake, and overall nutritional status can affect the risk of postpartum depression. An association among n-3 fatty acids, serotonin transporter genotype, and postpartum depression has been identified.<sup>38</sup> Low-income women with depressive symptoms and life stressors are at risk for low-prenatal diet quality, so

intensive dietary intervention before and during pregnancy may be needed to promote optimal health.<sup>39</sup> The risk of maternal and infant mortality and pregnancy-related complications can be reduced with increased access to quality interconception care.

**CONCLUSIONS**

Pregnancy has been regarded as a maternal phase with requisite additional nutritional requirements; mounting evidence suggests that the prenatal period constitutes a critical convergence of short- and long-term factors affecting the lifelong health of mother and child. The aim of prenatal nutrition is to support a healthy uterine environment for optimal fetal development while supporting maternal health.<sup>5</sup> The ideal prenatal diet should limit overconsumption for the mother and prevent undernutrition for the fetus<sup>5</sup>; a healthy lifestyle includes regular physical activity and avoidance of harmful practices.

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