Deficient iodine intakes in US pregnant women

From **JM Kerver,** *et al. American Journal of Obstetrics and Gynecology. Published:July 09,2020*
→ https://doi.org/10.1016/j.ajog.2020.06.052

In the midwestern US, about a quarter of pregnant women have inadequate iodine intake

Maternal iodine deficiency can lead to child neuromotor, behavioral, and cognitive impairment, and is still one of the leading preventable cause of intellectual deficiency worldwide. Iodine is essential for the production of thyroid hormone, a key driver of normal brain development. Because of the known severe adverse health effects caused by insufficient maternal iodine, the American Thyroid Association recommends that all pregnant and lactating women receive a daily multivitamin or mineral supplement with 150 µg of iodine. However, excessive maternal intake of iodine may also cause adverse health outcomes, and the American Council of Obstetrics and Gynecology does not recommend iodine supplementation during pregnancy.

Endemic iodine deficiency was historically common in the midwestern US, but following voluntary salt iodization in the 1920s, US iodine status was thought to be adequate. However, data from national surveys indicate a sharp decline in estimated iodine intake in recent decades, with the decline thought to be mainly due to changes in commercial processing of milk and bread. At the US population level, it appears that iodine levels remain sufficient, but some subgroups including pregnant women and especially non-consumers of dairy products—a major source of iodine in US diets—have been found to be mildly iodine deficient. There is no evidence of excessive iodine intake at the US population level.

Iodine intake is difficult to assess accurately because of the high day-to-day variation in US iodine consumption. The iodine content of food and beverages is highly variable because it is dependent on the iodine content of soil and food processing. Urinary iodine concentration (UIC) is a good indicator of recent iodine intake

Low iodine intakes in US pregnant women may increase risk of poor development in their offspring

because most ingested iodine is excreted in urine within 48 hours, but the substantial variation in daily iodine intake makes spot urine specimens inappropriate for determining iodine status in individuals. Accordingly, the World Health Organization (WHO) recommends using median UIC to assess iodine status at the population level and sets the lower criteria for population iodine sufficiency at a median UIC of 150 µg/L for pregnant women. However, this approach does not describe the number of individuals with insufficient or excessive intake. The aims of a recent US study were as follows: (1) assess group-level iodine status (that is, median UIC) across pregnancy; and (2) estimate the prevalence of inadequate and excessive iodine intake among pregnant women living in a historically iodine-deficient region of the US.

The study participants were recruited from 2008 to 2015 in 3 clinics in Michigan, enrolling 801 pregnant women (mean gestational age at enrollment=13.4 weeks). Few exclusion criteria (<18 years or non-English speaking) resulted in a sample of women generally representative of the local community, unselected for any specific

health conditions. Urine specimens were obtained per trimester during routine prenatal care throughout pregnancy and stored at -80C until urinary iodine was measured to estimate the iodine intake.

The authors estimated the prevalence of inadequate and excessive iodine intake using the Estimated Average Requirement/Tolerable Upper Intake Level cutpoint method. Briefly, this method is commonly employed for assessing the nutrient intakes of groups. The estimated average requirement represents the daily intake value of a nutrient that is estimated to meet the nutrient requirement of half of the healthy individuals in a life stage and sex group. The upper intake level is the highest level of daily nutrient intake that is likely to pose no risk of adverse health effects to almost all individuals in the general population. In the US, the estimated average requirement for iodine for pregnant women (all ages) is 160 µg/d, and the upper intake level for iodine is 900 µg/d for pregnant women aged 14 to 18 years and 1100 µg/d for pregnant women aged 19 to 50 years.

Maternal characteristics reflected the local population, including diversity in race or ethnicity (52.6% non-Hispanic white, 22% non-Hispanic black, and 15.7% Hispanic), nearly half with high school education or less (48%), and most with annual incomes under $25,000 (71%). Most were aged ≤25 years (58.2%), unmarried (71.4%), and reported their pregnancy as unplanned (65.5%). Approximately 30% reported smoking during pregnancy, 8% were underweight, and 55% were overweight or obese (prepregnancy).

The overall median UIC in the pregnant women was 176 µg/L. Median UICs for the first, second, and third trimesters were 171 µg/L, 181 µg/L, and 179 µg/L, respectively. Using median UIC as a biomarker of population-level iodine intake in this pregnancy cohort located in a US geographic region known to be historically iodine deficient, iodine intake to be sufficient at the population level, above the threshold set by WHO for sufficient median UIC of 150 µg/L for pregnant women.

However, using multiple urine specimens per woman and accounting for the final within-person variability (0.248), the adjusted prevalence estimate of inadequate iodine was 23.1% (*Figure 1*), whereas the estimate of excessive iodine was <1%. This is a cause for concern in that nearly a quarter of pregnant women and their offspring were estimated to be at risk of iodine deficiency. The data confirm that the common practice of relying on population-level estimates of iodine status can fail to reveal the number of individual pregnant women who may be deficient in iodine—a critical nutrient involved in fetal brain development.

The authors concluded that it would be useful to characterize iodine status across pregnancy in different regions of the US among different population subgroups with varied dietary intake patterns. The high prevalence of inadequate iodine intake coupled with the low prevalence of excessive iodine intake in this US pregnancy cohort indicates a need for at least some women to increase their iodine intake. This may be best achieved by increased awareness among obstetricians and other healthcare professionals and women of childbearing age about the importance of consuming adequate prenatal iodine from foods and the existing recommendations for prenatal iodine supplementation.

FIGURE 1 Smoothed plot of estimated iodine intake (µg/L) in US pregnant women. The vertical red line indicates the cutoff for inadequate iodine intake.