Title: Examining nutrient adequacy, iron deficiency, and anemia in US children 1-3 years of age using data from NHANES 2001-2016

Authors: Ariana Bailey, Victor Fulgoni III, Ashley Patterson, Fabiola Gutierrez-Orozco, & Kelly R. Walsh

Objectives: To assess nutrient intake adequacy from foods and beverages and to examine iron deficiency and anemia status in young US children.

Methods: National Health and Nutrition Examination Survey (NHANES) data for 2001-2016 in children 1-3 years of age were analyzed for mean dietary intake of individual nutrients (n=5,579), serum ferritin (n=2,498), and hemoglobin (n=3,919). Separate analyses for age groups 1-3 and 1-2 years were performed for gender combined and males/females separately. Dietary adequacy was assessed by comparing against estimated average requirements (EARs) and adequate intakes (AIs) as established by the IOM, as well as global recommendations for docosahexaenoic acid (DHAGR). Iron deficiency and anemia status were determined using ferritin (<10 ng/mL) and hemoglobin (<11 g/dL), respectively.

Results: The percentage of the population with intakes below the EAR for vitamin D, vitamin E, calcium, and iron were 82.7%, 70.9%, 3.6%, and 0.87% of children 1-3 years gender combined, respectively. Only 1% of children in this age group had fiber intakes greater than the AI. In addition, 97.6%-99.3% of these children did not meet the DHAGR of 70-100 mg/day. Similar results were found in the other age/gender groups. Compared to males, females had lower intakes of vitamin D, calcium and fiber, regardless of age. An estimated 6.9% of all children 1-3 years and 8.5% of all children 1-2 years appeared to be iron deficient. In comparison with other races/ethnicities sampled, Hispanic children appeared to have the highest (8.9% 1-3 years; 11.6% 1-2 years) and Non-Hispanic Black children (4.2% 1-3 years; 6.0% 1-2 years) the lowest rates of iron deficiency. Furthermore, 3.5% of all children 1-3 years and 4.3% of all children 1-2 years met the criteria for anemia.

Conclusions: Overall, dietary intake of US children 1-3 years of age appears to be adequate with the exception of vitamin D, vitamin E, calcium and fiber. Although iron intake was found to be adequate in this population, iron deficiency, as indicated by ferritin status, was still identified at 6.9% of children 1-3 years. Anemia as indicated by hemoglobin status was also identified. DHA intake was below recommendations for nearly all children. More research is needed to investigate these findings.

Funding Sources: Mead Johnson Nutrition/RB