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Prenatal micronutrient supplementation boosts children's cognition in Nepal

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In developing countries where iron deficiency is prevalent, prenatal iron-folic acid supplementation increased offspring intellectual and motor functioning during school age, according to researchers from the Johns Hopkins Bloomberg School of Public Health. They examined the intellectual and motor functioning of children whose mothers received micronutrient supplementation during pregnancy and found that aspects of intellectual functioning including working memory, inhibitory control, and fine motor functioning were positively associated with prenatal iron and folic acid supplementation. The results are published in the December 22/29 issue of the *Journal of the American Medical Association*.

"Iron is essential for the development of the central nervous system," said Parul Christian, DrPH, MSc, lead author of the study and an associate professor with the Bloomberg School's Department of International Health. "Early iron deficiency can alter neuroanatomy, biochemistry, and metabolism, leading to changes in neurophysiologic processes that support cognitive and sensorimotor development."

Researchers conducted a cohort study in rural Nepal, following 676 children aged 7 to 9 years from June 2007 to April 2009 who were born to women in a community-based, double-blind, randomized controlled trial of prenatal micronutrient supplementation between 1999 and 2001. Child participants were randomly assigned to receive daily iron, folic acid and zinc, or multiple micronutrients containing these plus 11 other micronutrients. All received vitamin A, as did a control group of vitamin

A alone from early pregnancy through 3 months postpartum. Researchers assessed intellectual functioning using the universal nonverbal intelligence test (UNIT) and motor function was assessed using the Movement Assessment Battery for Children (MABC). The study found evidence that maternal prenatal supplementation with iron and folic acid was positively associated with general intellectual ability, some aspects of executive function, and fine motor control compared to offspring of mothers in the control group.

"This innovative study shows that in very low-income settings, children's cognitive performance is influenced by their mother's iron+folic acid status during pregnancy, along with school attendance, illustrating the importance of both nutritional and environmental interventions," said Maureen Black, PhD, professor of pediatrics at the University of Maryland School of Medicine and an adjunct professor with the Bloomberg School's Department of International Health.

"Few studies have examined whether micronutrient supplementation during gestation, a critical period of central nervous system development, affects children's later functioning," adds Christian. "Considering the significant role of iron and folic acid in the development of both intellectual and motor skills, antenatal use per international guidelines should be expanded in many low and middle-income settings where program coverage continues to be poor."

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