Neurodevelopment Scores at 24 Months Are Associated With Maternal Education, Home Environment, and Linear Growth in Offspring of the Women First Trial

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Objectives: Healthy physical growth has been associated with better performance on neurodevelopmental testing in young children in low resource settings. We examined the relationship of growth indicators from 6 to 24 months of age to the sub-scales of the Bayley Scales of Infant Development-III (BSID-III) at 24 months in offspring of participants in the four-country preconception maternal nutrition trial, Women First (WF), which found the maternal intervention to benefit birth length, which was predictive of length and risk of stunting at 24 months.

Methods: With no post-delivery intervention, follow-up visits for anthropometry were obtained at 6-month intervals; BSID-III and Family Care Indicators (FCI) were completed at 24 months in a random sub-set of the WF offspring, representing 2/3 of infants with valid birth measurements. Multiple covariates (intervention arm, site, cluster within site, maternal education, age, SES, FCI subscales, LBW, and change in anthropometry Z-scores from 6 to 24 months, e.g., length-for-age, $DLAZ_{6-24}$) were considered as confounders or predictors and were adjusted in a general linear model to predict adjusted mean differences (AMD) in BSID scores.

Results: 1,386 infants (93% of those randomized to sub-set) were included in the analysis (n = 441,486, 459 for Arms 1, 2, 3, respectively). Four covariates were positively associated (p $\leq$ 0.01) with all 3 of the BSID subscales cognitive(C), motor(M), and social-emotional(SE) scales, respectively: maternal secondary education (+AMD 3.60(C), 3.35(M), 2.80(SE)); $DLAZ_{6-24}$ (+AMD 1.98(C), 3.15(M), 2.06(SE)); BW > 2500 g (+AMD 1.64(C), 2.20(M), 2.31(SE)); and FCI play materials (+AMD 1.46(C), 1.36(M), 1.72(SE)). No other anthropometric or maternal variables were consistently associated with BSID subscales.

Conclusions: The findings underscore the multiple critical components of nurturing care for early child development, including the caregiver, adequate birth weight, healthy linear growth, and opportunities for learning. Results suggest that the positive effects of maternal nutrition supplementation in the WF trial on birth length and postnatal linear growth may, in turn, have enduring downstream benefits for their children's neurodevelopment.

Funding Sources: The Bill & Melinda Gates Foundation, NICHD, ODS.