

Prenatal Pesticide Exposure Is Associated With Lower Cognitive, Language, and Motor Development Scores in Children 20–40 Months of Age Rural Bangladesh

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Objectives: Pesticides are an often-overlooked dietary exposure, especially in low- and middle-income countries (LMICs). Evidence from high-income settings indicates that pesticide exposure during pregnancy can adversely affect early childhood development (ECD). However, evidence from LMICs is limited. Our objective was to quantify the associations between prenatal pesticide exposure and ECD in rural Bangladesh.

Methods: We used data from 284 mother-child pairs participating in a birth cohort established in 2008. Eight pesticide biomarkers were assessed in urine collected in early pregnancy (<16 weeks' gestation). Urinary pesticide biomarkers capture all exposure routes. In our sample, 0% of women and 23% of their husbands were employed in agriculture, and indoor residual spraying is rare in this part of Bangladesh. Thus,

we hypothesised that the primary pesticide exposure route was dietary intake. ECD was assessed at 20–40 months of age using the Bayley Scales of Infant and Toddler Development, Third Edition. Associations between creatinine-adjusted pesticide levels and child development raw scores were estimated using multivariable generalised linear models.

Results: 3,5,6-trichloro-2-pyridinol (TCPY) and 4-nitrophenol, metabolites of frequently used organophosphates, were detected in 98% and 100% of women, respectively. The metabolites 3-phenoxybenzoic acid (3-PBA, a pyrethroid metabolite) and 2-isopropyl-4-methyl-6-hydroxypyrimidine (IMPY, an organophosphate metabolite) were detected in 19.8% and 16.1% of women, respectively. Higher IMPY concentrations were associated with lower language (−0.67 points [95% CI −1.31, −0.04]) and motor development (−0.40 points [95% CI −0.71, −0.09]). Higher TCPY concentrations were associated with lower cognitive development, though the association was small: −0.01 points (95% CI −0.02, 0.00). We observed no associations between 4-nitrophenol and 3-PBA and child development.

Conclusions: Exposure to organophosphates, which are acetylcholinesterase inhibitors, in early pregnancy may adversely affect ECD. Interventions to reduce children's pesticide exposure in LMICs are needed.

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