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Biomonitoring for farm families in the Farm Family Exposure Study

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Objectives The Farm Family Exposure Study was conducted to evaluate real-world pesticide exposure for farmers, spouses, and children.

Methods Eligible farm families from Minnesota and South Carolina were randomly selected from a roster of licensed private pesticide applicators. Eligibility required that the family include a farmer, spouse, and at least one child between the ages of 4 and 17 years, that the family live on the farm, that the farmer planned to apply one of the target pesticides [glyphosate, chlorpyrifos, 2,4-dichlorophenoxy acetic acid (2,4-D)] to at least 10 acres (4.1 hectares) of land within 1 mile (1.6 kilometers) of the house. For each family member, geometric means were calculated for 24-hour composite urinary samples, with a 1 ppb (part per billion) limit of detection, the day before, the day of, and for 3 days after the application.

Results For the farmers, the peak geometric mean concentrations were 3 ppb for glyphosate, 64 ppb for 2,4-D, and 19 ppb for the primary chlorpyrifos metabolite. For the spouses and children, the percentage with detectable values varied by chemical, although the average values for each chemical did not vary during the study period. The applicators had the highest urine pesticide concentrations, children had much lower values, and spouses had the lowest values. Exposure to family members was largely, though not exclusively, determined by the degree of direct contact with the application process. The exposure profile varied for the three chemicals for each family member.

Conclusions The data of this study indicate the importance of chemical-specific considerations when exposure assessments are planned in epidemiologic studies.

Key terms agriculture; children; chlorpyridos; glyphosate; pesticides; spouse; 2,4-dichlorophenoxyacetic acid.