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New Insights from EPA Describe Factors Affecting Children's Exposures to Pesticides

The Food Quality Protection Act and Safe Drinking Water Act Amendments include special provisions that require EPA to assess all of the ways that children may come into contact with pesticides in their everyday environments. This requires a thorough understanding of the factors that affect children's exposures to chemicals in the environment. The EPA Office of Research and Development (ORD) has conducted or supported several targeted observational studies to address critical data gaps in the Agency's understanding of the factors affecting children's exposures. Results from these studies are described in a new report, *Important Exposure Factors for Children: an Analysis of Laboratory and Observational Field Data Characterizing Cumulative Exposure to Pesticides,* which will be available in April 2007.

This body of research provides important advancements in our understanding of factors that affect children's exposures to chemicals in their environment.

The report integrates results from 13 different research studies that include pilot-scale and large observational exposure studies, as well as laboratory evaluations of sampling and analysis methods used in these studies. It includes real-world data which are critical for improving exposure assessments. The findings ensure that EPA exposure scientists, modelers and risk assessors have the most up-to-date scientific information available for use in developing more accurate risk assessments and risk reduction measures.

Objectives

The overall EPA objective in conducting this research is to identify factors that may influence children's exposures to pesticides and to provide scientific knowledge and data to other researchers. The report:

- Describes the studies, the measurements performed, and summary statistics,
- Compares results across studies,
- Identifies trends and important exposure factors, and
- Identifies areas where significant progress has been made in reducing uncertainties and areas where further research is vital.

Results/Findings

- The authors present concentration measurement data, summary statistics, spatial and temporal patterns, and comparative analyses with discussion.
- The authors compare results across studies and across compounds from

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different classes of pesticides to identify trends and evaluate important factors influencing exposures to pesticides along each relevant route of contact.
- The report examines relationships among application patterns, exposures, and biomarkers

Examples of information that can be found in the report include the following:

- Pesticide products were found in nearly 90 percent of the homes studied. Usage appears higher in warmer climates. Pesticide use patterns were not clearly associated with socio-demographic factors, nor did responses to questions about pesticide use correlate with concentrations measured in the homes.
- Relatively high levels measured in food, compared to levels measured on surfaces or in air, suggest that dietary ingestion is often the dominant route of children's exposure to pesticides
- Levels measured in house dust suggest that incidental ingestion is also an important route of children's exposure to pesticides. The marketplace shift from organophosphate pesticides to the less-volatile pyrethroid pesticides points toward an increased importance of indirect ingestion as an exposure pathway.
- Concentrations in indoor air are strongly influenced by the pesticide's chemical properties.
- Estimates of pesticide intake based on environmental and dietary measurements are often lower than estimates based on measurements of excreted biomarkers of exposure.
- Standardization of the collection methods used to measure concentrations on surfaces (a key part of dermal exposure estimates) remains a challenge.

As in any observational exposure research study conducted by EPA, the protocols and procedures to obtain children's assent and parental consent were reviewed and approved by independent institutional review boards. These studies complied with all applicable requirements of the Common Rule regarding protections for children.

Citation: **Important Exposure Factors for Children: an Analysis of Laboratory and Observational Field Data Characterizing Cumulative Exposure to Pesticides,** Egeghy, P.P. and others, U.S. EPA, Washington, D.C., EPA/600/R-07/013, 2007.

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