Farmworker Exposure to Pesticides: Methodologic Issues for the Collection of Comparable Data

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The exposure of migrant and seasonal farmworkers and their families to agricultural and residential pesticides is a continuing public health concern. Pesticide exposure research has been spurred on by the development of sensitive and reliable laboratory techniques that allow the detection of minute amounts of pesticides or pesticide metabolites. The power of research on farmworker pesticide exposure has been limited because of variability in the collection of exposure data, the predictors of exposure considered, the laboratory procedures used in analyzing the exposure, and the measurement of exposure. The Farmworker Pesticide Exposure Comparable Data Conference assembled 25 scientists from diverse disciplinary and organizational backgrounds to develop methodologic consensus in four areas of farmworker pesticide exposure research: environmental exposure assessment, biomarkers, personal and occupational predictors of exposure, and health outcomes of exposure. In this introduction to this mini-monograph, first, we present the rationale for the conference and its organization. Second, we discuss some of the important challenges in conducting farmworker pesticide research, including the definition and size of the farmworker population, problems in communication and access, and the organization of agricultural work. Third, we summarize major findings from each of the conference's four foci—environmental exposure assessment, biomonitoring, predictors of exposure, and health outcomes of exposure—as well as important laboratory and statistical analysis issues that cross-cut the four foci. *Key words:* **biomonitoring, data collection, environmental assessment, farmworker, health outcomes, pesticide exposure.** *Environ Health Perspect* **114:923–928 (2006). doi:10.1289/ehp.8531 available via** *http://dx.doi.org/* **[Online 16 February 2006]**

The exposure of migrant and seasonal farmworkers to pesticides at work and at home is an issue of continuing concern for public health (Arcury and Quandt 2003; Villarejo 2003). Accurately documenting exposure levels in this population is the focus of research programs across the nation. However, research on farmworker pesticide exposure is hampered by methodologic limitations and a lack of consensus on measures that should be used. On 30 September and 1 October 2004, a group of 25 scientists met to document the methodologic problems faced in farmworker pesticide exposure research and develop consensus on how these methodologic problems can be addressed.

The Farmworker Pesticide Exposure Comparable Data Conference was convened at the Graylyn International Conference Center, Wake Forest University, Winston-Salem, North Carolina. The conference participants included scientists of diverse disciplinary backgrounds employed by universities, private research organizations, governmental agencies, and industry. Participants included anthropologists, chemists, epidemiologists, nurses, physicians, psychologists, statisticians, and toxicologists. The articles in this mini-monograph document the results of this conference.

Conference Rationale

Domestic and international research on pesticide exposure has increased dramatically since 1990. This research documents extensive occupational pesticide exposure among agricultural workers and their families (Acquavella et al. 2004; Curl et al. 2002; Eskenazi et al. 2004; Fenske et al. 2002; Lambert et al. 2005; Lu et al. 2000; Mandel et al. 2005; Quandt et al. 2004). It also documents pesticide exposure in nonagricultural communities (Barr et al. 2004; Berkowitz et al. 2003; Curl et al. 2003; Whyatt et al. 2003). Studies are beginning to examine the health effects of this pesticide exposure in communities (Alavanja et al. 2004; Eskenazi et al. 1999; Kamel and Hoppin 2004; Strong et al. 2004).

The exposure of migrant and seasonal farmworkers and their families to pesticides is an important research agenda. This agenda reflects concerns for ensuring social and environmental justice for this population (Arcury and Quandt 2003). Farmworkers experience high levels of occupational illness and injury (Villarejo 2003). They are exposed to high levels of pesticides at work, and they, their spouses, and their children are exposed to agricultural and residential pesticides at home (Arcury et al. 2005; Eskenazi et al. 2004; Fenske et al. 2000; McCauley et al. 2001; Quandt et al. 2004). Farmworkers have limited control over their work and residential environments (Austin et al. 2001), and they receive limited economic rewards for the high levels of environmental health risk inherent in their work (Carroll et al. 2005). Current regulations to protect farmworkers and their families from pesticide exposure are limited in scope, and these regulations are often ignored (Arcury et al. 2001a; U.S. General Accounting Office 2000).

Pesticide exposure research has been spurred on by the development of sensitive and reliable laboratory techniques that allow the detection of minute amounts of pesticides or pesticide metabolites in both environmental and biological media (e.g., Bravo et al. 2004; Geno et al. 1995, 1996; Olsson et al. 2004). However, these laboratory techniques are not widely available and are not always comparable across laboratories. Furthermore, published reports from investigators using the same analytic laboratories use different methods for displaying data, making comparisons among studies difficult (Wessels et al. 2003).

The power of research on farmworker pesticide exposure is limited because of variability

This article is part of the mini-monograph "Farmworker Exposure to Pesticides: Methodological Issues for the Collection of Comparable Data."

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We thank the participants in the Farmworker Pesticide Exposure Comparable Data Conference held in Winston-Salem, NC, on 30 September–1 October 2004.

Financial support was provided by the Pesticide Environmental Trust Fund, N.C. Department of Agriculture and Consumer Services; the National Institute of Environmental Health Sciences (NIEHS) and the National Institute for Occupational Safety and Health (R13 ES/OH013378); and CropLife America, Inc. This work was supported in part by the intramural research program of the NIEHS, National Institutes of Health.

The authors declare they have no competing financial interests.

Received 11 July 2005; accepted 29 December 2005.