



Center for Worker Health

Wake Forest School of Medicine

POLICY BRIEF

North Carolina Latino Farmworkers and Non-Farmworkers Experience High Levels of Pesticide Exposure

Summary

All pesticides can affect human health. Organophosphorus (OP) pesticides are a particular concern due to their extensive use and many health effects. This study analyzed urine samples for the presence and concentrations of the six dialkylphosphate (DAP) urinary metabolites of OP pesticides among North Carolina (NC) Latino male migrant farmworkers and Latino men not engaged in farm work. In 2012 and 2013, 204 farmworkers and 129 non-farmworkers participated.

Almost all farmworkers and non-farmworkers had DAP urinary pesticide metabolites in their urine sample, indicating that almost all were exposed to OP pesticides. High concentrations of these metabolites were found in the urine samples, indicating that farmworkers and non-farmworkers were exposed to high levels of OP pesticides. In every instance, the concentrations for the NC farmworkers and non-farmworkers were greater than any reference group for any year for which National Health and Nutrition Examination Survey (NHANES) data have been reported.

Research to reduce pesticide exposure among Latino farmworkers and non-farmworkers is needed. Policy that reduces exposure to OP insecticides among immigrant and other vulnerable communities is needed.

Why does it matter?

Thirty-three million pounds of OP pesticides were applied in the United States in 2007. OP pesticides are neurotoxicants that disrupt the nervous system by inhibiting cholinesterase. The immediate effects of small doses of OP pesticides include burning eyes, itch, rash, muscle ache, nausea, and fatigue. The immediate effects of large doses of OP pesticides include coma and death. The long term effects of small and large doses of OP pesticides for adults are increased risks for respiratory and reproductive problems, neurological problems, including dementia and parkinsonism, and cancer. For children, OP exposure has been related to developmental problems, in particular, decreased IQ.

What did the researchers do?

In 2012 and 2013, researchers collected urine samples from 204 Latino male migrant farmworkers working in three NC counties (Harnett, Johnston, Sampson), and 129 Latino immigrant men not engaged in farm work in one NC county (Forsyth). The urine samples for each year were analyzed using the mass-spectrometry based method for the six DAP urinary metabolites of OP pesticides. Metabolites are the products that the body produces as it breaks down chemicals it has absorbed.



Research for this policy brief is reported in:

Arcury TA, Laurienti PJ, Talton JW, Summers P, Chen H, Howard TD, Barr DB, Mora DC, Summers P, Quandt SA. Organophosphate Pesticide urinary metabolites among Latino immigrants: North Carolina farmworkers and non-farmworkers compared. *Journal of Occupational and Environmental Medicine*. In press.

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What did the researchers find?

- **Overall results**
 - Almost all farmworkers and non-farmworkers had DAP urinary pesticide metabolites in their urine sample, indicating that almost all were exposed to OP pesticides.
 - High concentrations of these metabolites were found in the urine samples, indicating that farmworkers and non-farmworkers were exposed to high levels of OP pesticides.
- **Comparing farmworkers and non-farmworkers**
 - With few exceptions, the farmworkers and non-farmworkers had similar levels of detection and concentration for the DAP urinary pesticide metabolites.
 - Farmworkers always had more DAP urinary pesticide metabolite detections and greater concentrations when farmworkers and non-farmworkers differed significantly.
 - Farmworkers in NC continue to experience occupational exposure to OP pesticides. The frequency of this OP pesticide exposure is similar to that found for NC farmworkers in 2007.¹
 - Latino men in NC, who are not employed in agriculture or other occupations in which pesticide exposure would be expected, experience exposure to OP pesticides at frequencies and concentrations comparable to Latino farmworkers in NC.
 - These results raise concerns as to the sources of OP pesticide exposure among the non-farmworker Latino men.
- **North Carolina farmworkers and non-farmworkers compared to other populations**
 - In every instance, the concentrations for the NC farmworkers and non-farmworkers were greater than any reference group for any year for which National Health and Nutrition Examination Survey (NHANES) data have been reported.²
 - The NC Latino farmworkers and non-farmworkers in this analysis had far greater DAP concentrations than did men aged 20 years and older who participated in the 2003-2008 NHANES.³ This is surprising given the decreased use of OP pesticides since 2008.
 - Male Latino farmworkers and non-farmworkers in the present study had DAP metabolite levels similar to those reported for Florida female farmworkers and non-farmworkers in 2011.⁴ The NC participants had higher levels of the total DAP metabolites than did the Florida participants.

Recommendations

- Research on reducing pesticide exposure among farmworkers remains important, as these results do not indicate a reduction in exposure since data collected in 2007.
- Further research is needed to determine pesticide exposure pathways among Latino non-farmworkers so that this disparity can be eliminated. In particular, this research should examine occupational exposure pathways in jobs not traditionally considered to be associated with pesticide exposure.
- Public occupational and environmental health policy should be considered that reduces pesticide exposure. These policies should address occupational exposures and exposure in all vulnerable communities.

References cited

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2. Centers for Disease Control and Prevention (CDC). *Fourth National Report on Human Exposure to Environmental Chemicals*, with Updated tables, February 2015. [online] Available at URL: <http://www.cdc.gov/exposurereport/index.html> [accessed 04/26/2016].
3. Jain RB. Levels of dialkylphosphate metabolites in urine among general U.S. population. *Environ Toxicol Pharmacol.* 2016;43:74-82.
4. Runkle JD, Tovar-Aguilar JA, Economos E, Flocks J, Williams B, Muniz JF, Semple M, McCauley L. Pesticide risk perception and biomarkers of exposure in Florida female farmworkers. *J Occup Environ Med.* 2013;55:1286-1292.