



Center for Worker Health

Wake Forest University School of Medicine

POLICY BRIEF

Biomarkers of Farmworker Pesticide Exposure in North Carolina

Purpose

This policy brief documents farmworker pesticide exposure during the 2007 agricultural season in North Carolina. Based on these results, we present recommendations to improve safety and sanitation conditions for farmworkers. Urine samples were collected by Wake Forest University School of Medicine investigators from 284 farmworkers at monthly intervals during the period of May through August 2007. A total of 939 urine samples were provided by farmworkers and analyzed for pesticide urinary metabolites by the National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta.





Background

Exposure to pesticides can have immediate and long-term health effects. Immediate health effects of exposure to small amounts of pesticides include rash, dizziness, headache, burning eyes, and muscle ache. Immediate health effects of exposure to large amounts of exposure include coma and death. Long-term effects of pesticide exposure include neurological problems, like memory loss and dementia, infertility, and cancer.

Farmworkers are exposed to pesticides in the fields where they work and the houses where they live. However, little information is available that documents the number of farmworkers who are exposed to pesticides. Information from this study documents the proportion of farmworkers who are exposed to the urinary metabolites associated with 4 organophosphorus insecticides, a carbamate fungicide, 2 pyrethroid insecticides, and 3 herbicides regularly used in North Carolina agriculture.

Findings



Organophosphorus (OP) Insecticides: The four metabolites analyzed and their associated insecticides were APE - acephate, TCPy - chlorpyrifos, MDA – malathion, and Dmet - dimethoate.

-  More than 75% of the farmworkers had at least one sample that contained APE (acephate).
-  About 75% of the farmworkers had at least one sample that contained TCPy (chlorpyrifos).
-  More than 65% of the farmworkers had at least one sample that contained MDA (malathion).
-  About 16% of the farmworkers had at least one sample that contained Dmet (dimethoate).




Carbamate Fungicide: The metabolite ETU was analyzed; it is associated with mancozeb.

-  Almost 50% of the farmworkers had at least one sample that contained ETU (mancozeb).

Pyrethroid Insecticides: Two pyrethroid urinary metabolites were analyzed. 3PBA is general pyrethroid metabolite. TCC is associated with permethrin.

-  About 87% of the farmworkers had at least one sample that contained 3PBA.
-  About 9% of the farmworkers had at least one sample that contained TCC (permethrin).

Herbicides: Three herbicide urinary metabolites were analyzed, 2,4-D, ACE which is associated with acetochlor, and MET which is associated with metochlor.

-  92% of the farmworkers had at least one sample that contained 2,4-D.
-  72% of the farmworkers had at least one sample that contained ACE (acetochlor).
-  36% of the farmworkers had at least one sample that contained MET (metochlor).

Policy Implications

These results document the high percentage of farmworkers who are exposed to pesticides during an agricultural season. Greater effort is needed to reduce farmworker pesticide exposure through training farmers as well as farmworkers, more cautious use of pesticides, greater enforcement of current pesticide safety regulations, and new regulations documenting pesticide use. Implementing these changes will improve the immediate and long-term health of farmworkers.

Recommendations

Several steps should be taken to reduce pesticide exposure and improve pesticide safety for farmworkers.

- Agricultural employers should be educated about the pesticide exposure among their workers and the steps they can take to reduce this exposure.
- All agricultural workers should receive annual pesticide safety training that has detailed content and that is presented in a format that is appropriate to the language and education of the workers.
- Procedures should be implemented to systematically monitor biomarkers of pesticide exposure among all agricultural workers.
- The number of pesticide safety inspectors needs to be increased so that all farms can be inspected during the agricultural season.
- Penalties for violating pesticide safety standards need to be assessed and increased.
- Pesticide applicators should be required to make monthly reports to the North Carolina Department of Agriculture and Consumer Services documenting the types and amounts of pesticides they have applied, and the locations where they applied these pesticides using geographic positioning system (GPS) coordinates.

Further Information

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