

MICHIGAN WORK-RELATED PESTICIDE ILLNESSES AND INJURIES

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Abstract

The Michigan Public Health Tracking Program (MiTracking) has worked with the Michigan Pesticide Illness and Injury Surveillance Program to create a dataset that contains acute pesticide illnesses and injuries reported to the State of Michigan where the reported cases meet the surveillance case definition for a confirmed case. (A confirmed case is a person who was exposed to a pesticide at work and developed at least two symptoms after the exposure that are consistent with the known toxicology of the pesticide.) The data are aggregated and stratified by sex, occupation, industry and pesticide type.

The data include the following measures:

- Number of confirmed work-related illnesses and injuries from a pesticide exposure.
- Crude rate of confirmed work-related illnesses and injuries from a pesticide exposure per 100,000 Full Time Equivalent (FTE) workers.

Counts and rates are broken down into separate measures by sex, type of pesticide, industry sector, and occupation category.

These data are provided by five-year time periods. Data for all measures are available from 2003 to the most recent year available, with the exception of data by occupation category (which became available starting in 2011).

Case data are from the Michigan Pesticide Illness and Injury Surveillance Program. The surveillance program is funded by the National Institute for Occupational Safety and Health (NIOSH) and is a joint research project of the Michigan Department of Health and Human Services (MDHHS) and the Michigan State University Division of Human Medicine's Occupational and Environmental Medicine surveillance team. Michigan's Public Health Code requires health care providers (including Michigan's Poison Control Center), health care facilities, and employers to report to the state information about individuals with known or suspected pesticide poisoning. In addition to information from reports submitted under the Public Health Code, the surveillance system collects information on individuals with pesticide exposures who have been reported to the Pesticide and Plant Pest Management Division of the Michigan Department of Agriculture and Rural Development (MDARD). See Supplemental Information below for data reporting limitations.

Crude rates per 100,000 FTE were calculated by dividing the numbers of confirmed cases by the numbers of full-time equivalent (FTE) workers in each category based on data from the Bureau of Census "Current Population Survey" and multiplying by 100,000.

All users are recommended to read and fully comprehend the metadata prior to data use. To access these data, please visit the [MiTracking data portal](#).

Purpose

Pesticide poisoning is a potential public health threat due to widespread pesticide use. A pesticide is any substance or mixture of substances used to prevent, destroy, repel, or reduce pests and the damage caused by pests.¹ Pests are living organisms that occur where they are not wanted or that cause damage or nuisance to crops, humans, or other animals. Pests can include insects, weeds, fungi, rodents, and germs. The term pesticide includes insecticides, herbicides, fungicides, rodenticides, disinfectants, plant regulators/defoliants/ desiccants, and nitrogen stabilizers.

Currently there are more than 15,000 different pesticides registered for sale and use in Michigan. There are more than 2,000 businesses licensed to apply pesticides and approximately 23,000 certified applicators in Michigan.²

This dataset is intended to provide public health professionals, researchers, and the general public with summary information on work-related pesticide illnesses and injuries in the state of Michigan.

Supplemental Information

Pesticide poisoning is reportable under the Public Health Code (Part 56 of Act 368 of 1978 as amended and R 325.71-5). These two parts of the Public Health Code require health care providers (including Michigan's Poison Control Center), health care facilities, and employers to report to the state information about individuals with known or suspected chemical poisoning and known or suspected occupational disease including pesticide poisoning. In addition to information from reports submitted under the Public Health Code, the surveillance system collects information on individuals with pesticide exposures who have been reported to the Pesticide and Plant Pest Management (PPPM) Division of MDARD. The PPPM receives complaints about pesticide misuse and health effects and is mandated to conduct investigations to address potential violations of pesticide laws. Other data sources include coworkers and worker advocates.

The potential for pesticides to harm people depends on the dose (amount, length of exposure and chemical concentration), the route of entry into the body (e.g., inhalation, eye[s], skin) and the toxicity of the pesticide. Pesticides have a range of toxicity from low toxicity, through slightly toxic, moderately toxic, to very toxic. Pesticide products are often mixtures including one or more active ingredients, as well as other inert ingredients that have no effect on the target pest but may have adverse human health effects.

Reporting of pesticide illnesses and injuries is likely to be incomplete for a number of reasons:

- Diagnosis of pesticide illness/injury is challenging because:

- The symptoms of pesticide toxicity can be the same as those that occur with common conditions such as allergies, acute conjunctivitis, or acute gastrointestinal illness.³
- Health care providers receive limited education in the recognition and diagnosis of the toxic effects of pesticides and the role of pesticides may not be considered when evaluating patients.⁴
- Exposed workers may not seek medical care for certain exposures or symptoms.
- Even when diagnosed, pesticide illnesses and injuries may not be reported due to reluctance on the part of workers and their health care providers to involve state agencies, the busy work schedules of providers, or lack of knowledge of the Public Health Code reporting requirements.
- Migrant workers face additional barriers such as language difficulties, lack of access to care, and fear of job loss or deportation if they are not legal residents.⁵

Keywords

Pesticide; pesticide poisoning; occupational pesticide poisoning; pesticide exposure; occupational pesticide exposure; insecticide; insecticide poisoning; insecticide exposure; herbicide; herbicide poisoning; herbicide exposure; disinfectant; sterilant; chlorine; pesticide-related illness; occupational pesticide-related illness

Bounding Coordinates

Geographically, all cases in this dataset occurred within the State of Michigan. This means that all cases fit within the latitude/longitude coordinates listed below.

West Bounding Coordinate: -90.41813399999995

East Bounding Coordinate: -82.418394000000006

North Bounding Coordinate: 48.189534000000002

South Bounding Coordinate: 41.696088000000003

Other Information on Data

Level of Geographic Detail: State

Currentness Reference (when data were last updated): 03/26/2021

Frequency at which the data are updated: Annually

Data Status: Complete

Completeness Report

The dataset includes all reported cases of acute work-related pesticide illness or injury occurring in Michigan for the years 2003 through the most recent year available that met criteria for “confirmed case.”⁶ Data by occupation are available starting with 2011. Crude rates will lag one year behind counts due to a lag in population data.

Incidents where a person did not call Michigan’s Poison Control Center or seek medical care would not be reported. In addition, the reported cases may not include all the cases that sought treatment.

Data Processing Description

Data Source and Inclusion Criteria: The Michigan Pesticide Illness and Injury Surveillance Program receives reports of acute pesticide exposure from health care providers (including Michigan’s Poison Control Center), health care facilities, employers, the Michigan Department of Agriculture and Rural Development (MDARD), worker advocates, and workers. Reports are then evaluated, and if they meet the case definition for a confirmed case established by the National Institutes for Occupational Safety and Health (NIOSH)⁶ they are included in this dataset.

The surveillance program is funded by NIOSH and is a joint project of the Michigan Department of Health and Human Services (MDHHS) and Michigan State University (MSU) Division of Human Medicine's Occupational and Environmental Medicine surveillance team.

Case Definition:

In brief, a person who has been exposed to a known pesticide and develops two or more signs or symptoms after that exposure that could be related to the exposure based on known toxicological effects is considered a confirmed case.

Reported cases are classified based on criteria related to (1) documentation of exposure at work, (2) documentation of two or more adverse health effects, and (3) evidence supporting a causal relationship between pesticide exposure and health effects. The possible classifications are definite, probable, possible, suspicious, unlikely, insufficient information, exposed but asymptomatic. Cases classified as definite, probable, possible, or suspicious are considered confirmed cases and are included in this dataset.

See the detailed case definition document⁶ for the matrix of criteria for classifying cases and additional details.

Rate Calculations:

Due to the small number of reported work-related cases each year, all calculations were made using five-year aggregated data.

Crude rates per 100,000 full-time equivalents (FTE) were calculated by dividing the number of confirmed cases by the number of FTEs in each category obtained from the CDC Employed Labor Force (ELF) interactive tool for calculating employed labor force counts and FTEs from the Bureau of Labor Statistics “Current Population Survey” and multiplied by 100,000. ([ELF Estimates \(cdc.gov\)](#)).

FTEs were estimated by sex, industry (National Occupational Research Agenda (NORA) Industry Sectors),⁷ and by occupation (2010 Census Occupation Codes).⁸

Data were categorized by the following NORA Industry Sectors:

- Agriculture, Forestry and Fishing;
- Healthcare and Social Assistance;
- Services;
- Transportation, Warehousing and Utilities;
- Wholesale and Retail Trade;
- Construction;
- Manufacturing (except seafood processing); and
- Other/Unknown.

Data were categorized by the following Census Code groupings:

- Service Occupations;
- Natural Resources, Construction, and Maintenance Occupations;
- Production, Transportation, and Material Moving Occupations;
- Sales and Office Occupations;
- Management, Business, Science, and Arts Occupations; and
- Other/Unknown.

Because the occupation codes changed in 2010, counts and rates starting in 2011 are not comparable to years prior. Counts and rates by occupation were not calculated for earlier years.

Data were categorized by the following pesticide types:

- Disinfectant;
- Insecticide;
- Herbicide;
- Fungicide; and
- Other/Mixtures/Unknown.

Calculations for rates of work-related pesticide illnesses and injuries by pesticide type were calculated based on the total FTE for the five-year range. Because a person may have been exposed to more than one type of pesticide, the sum of the rates is greater than the total rate of pesticide exposures.

Access Constraints

There are no access constraints for data available through the Michigan Environmental Public Health Tracking program public portal.

Use Constraints

All users are recommended to read and fully comprehend the metadata prior to data use. Efforts have been made to ensure the accuracy of the data.

These data cannot be used for commercial purposes and shall not be used to engage in any method, act, or practice to conduct the solicitation of advertisement of goods, services, or real estate to Michigan consumers.

Data users are prohibited from attempting to learn the identity of any person included in the data and from linking these data with any other data for the purpose of matching records to identify individuals or entities (such as hospitals).

Security Handling Description

If data are distributed, the use constraints specified in this metadata apply to all recipients of the data.

Distribution Liability

The Michigan Public Health Tracking Network is maintained, managed, and operated by the Division of Environmental Health (DEH) within MDHHS. In preparation of these data, every effort has been made to offer the most current, correct, complete, and clearly expressed information possible. Nevertheless, some errors in the data may exist. In particular, MDHHS disclaims any responsibility for source data, compilation and typographical errors and accuracy of the information that may be contained in these data.

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The sale or resale of the data, or any portions thereof, is prohibited unless with the express written permission from the Michigan Pesticide Illness and Injury Surveillance Program. All rights reserved. These data may not be used for commercial purposes without first obtaining written permission from the MDHHS and the Michigan State University Division of Human Medicine's Occupational and Environmental Medicine surveillance team.

If errors or otherwise inappropriate information is brought to our attention, a reasonable effort will be made to fix or remove it. Such concerns should be addressed to the Michigan Tracking Program.

Custom Order Process

For more information or access to unrestricted or public use Michigan-specific data, see [MSU Occupational and Environmental Medicine Pesticide Illness and Injury](#).

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- ⁷ Sectors. Centers for Disease Control and Prevention website. <http://medbox.iiab.me/modules/en-cdc/www.cdc.gov//niosh/nora/sectorapproach.html>. Updated July 27, 2016. Accessed February 10, 2022.
- ⁸ Census 2010 Occupation Codes. U.S. Bureau of Labor Statistics website. <https://www.bls.gov/tus/census10ocodes.pdf>. Accessed February 10, 2022.

The Michigan Department of Health and Human Services will not exclude from participation in, deny benefits of, or discriminate against any individual or group because of race, sex, religion, age, national origin, color, height, weight, marital status, partisan considerations, or a disability or genetic information that is unrelated to the person's eligibility.