

Asthma Mortality

There are an estimated 25 million individuals in the United States with asthma (4 million children under the age of 18 and 21 million adults 18 years and older) (1).

Death with asthma as the underlying cause of death is rare. Table 1 shows that in 2020 in the U.S., there were 4,145 asthma deaths. That means only a very small percentage, .017% of individuals with asthma, die from asthma each year. The rate of death from asthma is higher with increasing age, among women and among African Americans.

In 2020 in Michigan, there were an estimated 860,000 individuals with asthma and 132 deaths (.015% of individuals with asthma died) (2). Despite the small number of deaths from asthma, these deaths are preventable tragedies, given the effective treatment available for asthma.

From 2008 - 2018, we identified nine work-related asthma deaths (Table 2) (3). The decedents ranged in age from 19 to 77. Five were men. Five worked in manufacturing, and one each worked in construction, agriculture, food services, and automotive repair. Four were exposed to isocyanates, and one case each was exposed to secondhand cigarette smoke, milk tank cleaning agents, chemicals used in construction, mold machine release spray, and welding fume. Five of the decedents had new-onset work-related asthma (the four isocyanate related and one mold machine related deaths) and four had pre-existing asthma prior to the work exposure. The time from asthma diagnosis to death ranged from one to 37 years.

For five individuals we were able to obtain spirometry results; two were normal (FEV1>80% predicted), and three decreased (FEV1,<80% predicted). Case reports about three of these deaths have been published (4-6).

Table 1. Asthma Mortality in US (2020)

Characteristic	# Deaths	Death Rate/Million
Total	4,145	12.6
Children (Age <18 years) ³	204	2.8
Adults (Age 18+ years) ⁴	3,941	15.4
Age Groups (Years)		
0-4	16	—
5-11	91	3.2
12-17	97	3.9
18-24	158	5.3
25-34	348	7.6
35-64	1,725	13.8
65+	1,710	30.7
Sex		
Males	1,682	10.4
Boys (<18 years)	122	3.3
Men (18+ years)	1,560	12.5
Females	2,463	14.7
Girls (<18 years)	82	2.3
Women (18+ years)	2,381	18.1
Race/Ethnicity		
White Non-Hispanic	2,173	10.8
Children (<18 years)	52	1.4
Adults (18+ years)	2,121	13.0
Black Non-Hispanic	1,253	28.7
Children (<18 years)	119	10.7
Adults (18+ years)	1,134	34.9

(Adapted from Reference 1)

Table 2. Summary of Eleven Work-Related Asthma Deaths, Michigan, 1988-2022

Year	Age at Death	Sex	Exposure	Industry/Occupation	Asthma Type	Years With Asthma	FEV1 on Last Spirometry before Death
1998	60's	F	Mold Machine Release Spray	Rubber & Plastic Parts Manufacturing/ Machine operator	New Onset	16	59% of Pred.
2003	40's	M	Isocyanates	Auto Detailing/Truck bed liner sprayer	New Onset	1	None located
2004	Teens	F	Second-Hand Cigarette Smoke	Restaurant/Waitress	Aggravated	16	None located
2004	70's	F	Chlorine, HCL & Phosphoric Acid	Agriculture/Farmer cleaning milk tanks	Aggravated	Unknown	84% of Pred.
2005	50's	M	Isocyanates	Adhesive Manufacturing/ Production worker	New Onset	4	97% of Pred.
2006	70's	F	Toluene Diisocyanate	Auto Seat Manufacturing/ Machine operator	New Onset	26	33% of Pred.
2007	50's	M	Welding Fumes Chemicals	Plastic Car Parts Manufacturing/Welder	Aggravated	37	36% of Pred.
2013	20's	M	Construction	Construction/Laborer	Aggravated	Child	None located
2015	40's	M	Isocyanates	Rubber & Plastic Parts Manufacturing/ Casting room machine operator	New Onset	1	None located
2019	50's	F	Bleach and Vinegar used as Cleaning Agents	Pickle Manufacturer Supervisor	New Onset	2	None located
2022	30's	M	Grain Dust	Breakfast Cereal Manufacturer/Laborer	Aggravated	Child	None located

For 2019-2022, we are aware of two additional deaths from work-related asthma (added to Table 2).

The first death in April 2019, was of a woman in her 50's, who had worked for 15 years at a pickle manufacturer. Thirteen years after beginning to work at the facility she developed cough, chest tightness and shortness of breath after the process rooms were cleaned with a mixture of bleach and vinegar. During her break she would go out to her car because of breathing symptoms. Her symptoms resolved on weekends and vacations. She was a cigarette smoker but quit smoking a few months before her death. She was never hospitalized nor sought medical care from an emergency department. She had no allergies and did not have asthma before working at the pickle factory. Prior to working at the pickle factory, she worked as a cashier at food stores. Two months before her death she had normal spirometry results. She received treatment from a pulmonologist. She took Advair and a rescue inhaler. She was seen by the pulmonologist one month before her death. His impression was severe persistent asthma and occupational asthma. There was no discussion in her medical records of any work restrictions.

The most recent death occurred in May of 2022. This was an African American male in his 30's who had asthma since childhood. Five months before his death, he began working at a breakfast cereal manufacturer. His asthma became worse, requiring multiple emergency department visits. Three months after beginning this new work, his

primary care provider wrote in his medical record – “Patient reports working in a new position for the past 3 months, which is very dusty.” The provider wrote a prescription for a nebulizer and scheduled a follow up visit for six months. There was nothing in the medical record about advice about work or a work restriction. Two months later, the patient had an acute asthma attack at work, collapsed and was pronounced dead within an hour. Cause of death was asthma with acute exacerbation. On autopsy he had bronchial smooth muscle hypertrophy, and peri bronchial chronic inflammation with eosinophilic infiltrate on the lung microscopic exam. Influenza A and B and SARS -COV-2 RNA were negative. His blood was positive for THC.

Like previous work-related asthma deaths, the health care provider noted a work-related issue but took no action to address the work-related exposure component. Besides being a factor in work-related asthma deaths, more commonly this lack of attention to work-related exposures by the health care provider is the presumed cause for the increased morbidity of work-related asthma compared to non-work-related asthma (7-8).

The Consensus statement from the American College of Chest Physicians remains the best guide for practitioners who diagnose and treat adults with asthma to recognize and manage adults with asthma (9).

Kenneth Rosenman MD is available to consult on clinical diagnostic/management issues and as always, we thank practitioners who comply with the Michigan Occupational Disease Reporting Regulations. A message for Dr. Rosenman can be left at 1 800 446-7805 or he can be reached at rosenman@msu.edu to set up a time to talk.

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News

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