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2020 ANNUAL REPORT

Tracking Work-Related Deaths in Michigan



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2020 Annual Report

Tracking Work-Related Deaths in Michigan

A Joint Report
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Executive Summary

The Division of Occupational and Environmental Medicine (OEM) at Michigan State University (MSU) began tracking work-related fatalities in the state of Michigan in January 2001. This is the 20th annual Michigan Fatality Assessment and Control Evaluation (MIFACE) report on acute traumatic work-related deaths in Michigan. There were **131 work-related deaths in 2020**, a decrease of 32 deaths compared to 2019. There were 127 separate incidents representing 128 separate employers. A narrative summary of each work-related fatality is in [Appendix I](#). MIFACE educational material, including on-site Investigation Reports, Summaries of MIOSHA Investigations, and Hazard Alerts are located on the MIFACE webpage on the Michigan State University Division of Occupational & Environmental Medicine ([MSU OEM](#)) website. Key findings for 2020:

- The number of work-related deaths (131) in 2020 was down compared to 2019 (163 work-related deaths). The 2020 fatal injury rate of 3.0 deaths per 100,000 workers decreased from 3.4 deaths per 100,000 workers in 2019.
- Although not directly comparable, the *overall* rate of work-related deaths in Michigan is lower than the rate in the United States (3.4 deaths/100,000 full-time equivalent [FTE]s).
- The industry sector with the highest employment-based industry rate was Agriculture, Forestry, Fishing, & Hunting (29.1 deaths/100,000 workers), followed by Mining (20.5 deaths/100,000 workers) and then Construction (15.2/100,000 workers). Agriculture and Construction tied for the largest number of work-related deaths (25 deaths, 19.1% of all fatalities).
- Struck by incidents were the leading cause of work-related death (27 deaths, 20.6%), followed by falls and motor vehicle crashes (each 21 deaths, 16.0%), and suicides (14 deaths, 10.7%).
- By occupational group, Construction & Extraction had the largest number of work-related deaths (24 deaths, 18.3%) followed by Transportation & Material Moving (20 deaths, 15.3%) and then Management (18 deaths, 13.7%).
- Forty-five of Michigan's 83 counties (54%) had a work-related death. Wayne County had the highest number of deaths at 27 (20.6%), followed by Oakland with 8 deaths (6.1%), Macomb and Saginaw each with 6 deaths (4.6%), and 5 deaths each in Allegan, Bay, Ingham, and Kent (3.8%).
- Of the 131 work-related fatalities, 38 (29.0%) were MIOSHA program-related and were investigated by a MIOSHA compliance officer.
- The effect of the COVID-19 pandemic, from the stay-at-home work order and telecommuting, was reflected in the 20% reduction in the number of fatalities in 2020 compared to 2019.

Definitions

A **traumatic injury** is any unintentional or intentional wound or damage to the body resulting from acute exposure to energy or from the absence of such essentials as heat or oxygen caused by a specific event, incident, or series of events within a single workday or shift.

Work is defined as legal duties, activities or tasks that produce a product as a result and that are done in exchange for money, goods, services, profit, or benefit.

A **work relationship** exists if an event or exposure results in the fatal injury or illness of a person:

- (1) ON the employer's premises and person is there to work; or
- (2) OFF the employer's premises and person is there to work, or the event or exposure was related to the person's work, or status as an employee.

Incidence means the number of new cases of an illness, injury, or other health-related event that commence during a specified period in a specified population.

Background

In 2001, MSU OEM instituted a tracking program for all traumatic work-related deaths, first with financial assistance from LARA (now LEO) and then from the National Institute of Occupational Safety and Health (NIOSH). This is a joint project of LEO/MIOSHA and MSU OEM.

The purpose of the MIFACE tracking project is three-fold:

- Identify the types of industries and work situations where workers are dying from acute traumatic incidents,
- Identify the underlying causes of the work-related fatality, and
- Formulate and disseminate prevention strategies to reduce future work-related fatalities.

MIFACE uses the National Institute of Occupational Safety and Health (NIOSH) Fatality Assessment and Control Evaluation (FACE) as a model. Since 1982, NIOSH has funded selected states to operate a state FACE program. MIFACE investigations have provided aggregate data to identify high-risk industries and work practices as well as provided the stories or “faces” necessary to make the statistics real and influence change in the workplace. Emphasis on information dissemination and translation of information into user-friendly materials is an important part of the MIFACE program.

The MSU OEM webpage has many resources available to assist employers, employees, safety and health professionals and others to understand more about work-related illnesses, injuries and deaths.

Who is Included? Any individual of any age who meets the criteria of “at work”, including volunteers and prison inmates, who are exposed to the same work hazards and perform the same duties or functions as paid employees. Suicides are included, following the protocol established by the NIOSH FACE program and the Bureau of Labor Statistics (BLS), which collects the official work-related death statistics in all states.

Who is Not Included? Individuals who die while “at work” from diseases, such as a heart attack or stroke, individuals commuting to/from work, volunteers not working for a non-profit, students, and homemakers.

Methods

MIFACE utilizes multiple sources to identify work-related fatalities in Michigan: MIOSHA, Death Certificates, Newspapers, Medical Examiners, Police/Fire/EMT Departments, Workers' Compensation Agency, MSU Extension, Michigan Farm Bureau, Federal Agencies (MSHA, NTSB, etc.), Internet searches, and Michigan citizens reporting a work-related death.

<p>IDENTIFY INDIVIDUALS</p> <hr/> <ul style="list-style-type: none"> ◇ Receive Report of Death ◇ Determine if work related Death <ul style="list-style-type: none"> ▪ Paid employee, self-employed? ▪ Working at job or family business? ▪ Traveling "while on-the-clock" or compensated travel? ▪ Volunteer? ▪ In parking lot of business? 	<p>GATHER INFORMATION</p> <hr/> <ul style="list-style-type: none"> ◇ Contact MIOSHA <ul style="list-style-type: none"> ▪ If fatality is program-related ◇ Gather source documents <ul style="list-style-type: none"> ▪ Reports from agencies that investigated the death/ provided emergency services when event occurred ▪ Death certificate ▪ Medical examiner report and, when appropriate ▪ MIOSHA fatality investigation narrative 	<p>CONTACT EMPLOYER/FARM FAMILY</p> <hr/> <ul style="list-style-type: none"> ◇ Send MIFACE Introduction Letter and Brochure ◇ Follow-up phone contact <ul style="list-style-type: none"> ▪ Answer questions ▪ Ask if employer and/or family will voluntarily participate <ul style="list-style-type: none"> ➢ If Yes, schedule date and time for MIFACE site visit ➢ If No, write case summary or MIFACE Summary of MIOSHA Investigation 	<p>MIFACE SITE VISIT</p> <hr/> <ul style="list-style-type: none"> ◇ Explain MIFACE program ◇ Complete appropriate research forms ◇ Conduct interviews with appropriate personnel <ul style="list-style-type: none"> ▪ Learn about process, equipment involved, work activities of deceased, training, safety programs, etc. ◇ Observe area and/or equipment involved ◇ Take pictures, ensuring identifiers are removed
<p>ALL work-related deaths MUST be reported to MIOSHA within 8 hours of the death.</p> <p>The toll-free hotline to report a work-related death is: 1-800-858-0397</p>		<p>MIFACE INVESTIGATION REPORT</p> <hr/> <ul style="list-style-type: none"> ◇ Site Visit Report Includes: <ul style="list-style-type: none"> ▪ Summary statement ▪ Background information ▪ Detailed investigation narrative ▪ Cause of death as determined by the Medical Examiner ▪ Prevention recommendations, including discussion ▪ References ▪ Pictures, drawings, sketches ▪ Review process 	

MIFACE FOLLOW-UP ACTIVITIES

◇ Identify Stakeholders

- Internet search for similar companies and/or trade groups

◇ Update Database

- Information collected from each site visit and statewide tracking entered into a database

◇ Analyze Data

- Annual Report developed analyzing and discussing data

◇ Educational Outreach

- MIFACE Summary of MIOSHA Investigation if MIOSHA investigation takes place
- Hazard Alert
- Post on MSU OEM website:
 - Investigation Report
 - MIFACE Summary of MIOSHA Investigation
 - Hazard Alert
- Send notice of posted publications to MIFACE e-mail distribution list
- Guest speaker, display booths at health and safety conferences, industry trade group training programs

The level of information collected for each fatality depended on the type of incident.

For homicides, suicides and most transportation-related fatalities that occurred while the individual was at work, MIFACE collected only source documents.

For many of the remaining work-related fatalities including agricultural fatalities, MIFACE initiated contact with employers or farm family members to request permission for an on-site investigation. It is important to note that MIFACE investigators did not enforce compliance with Michigan Occupational Safety and Health Act (MIOSHA) rules and regulations and did not assign fault or blame. However, to decrease the burden to the employer of multiple investigations, MIFACE accompanied the MIOSHA compliance officer with employer agreement. In addition, MIFACE interviewed the compliance officers about their investigation.

Results

There were 131 acute traumatic work-related fatalities in 2020. One hundred twenty-three (93.9%) of the 131 work-related traumatic incidents occurred in 2020. Below is a description of the eight individuals who died in 2020 due to complications from a work-related injury sustained in a previous year:

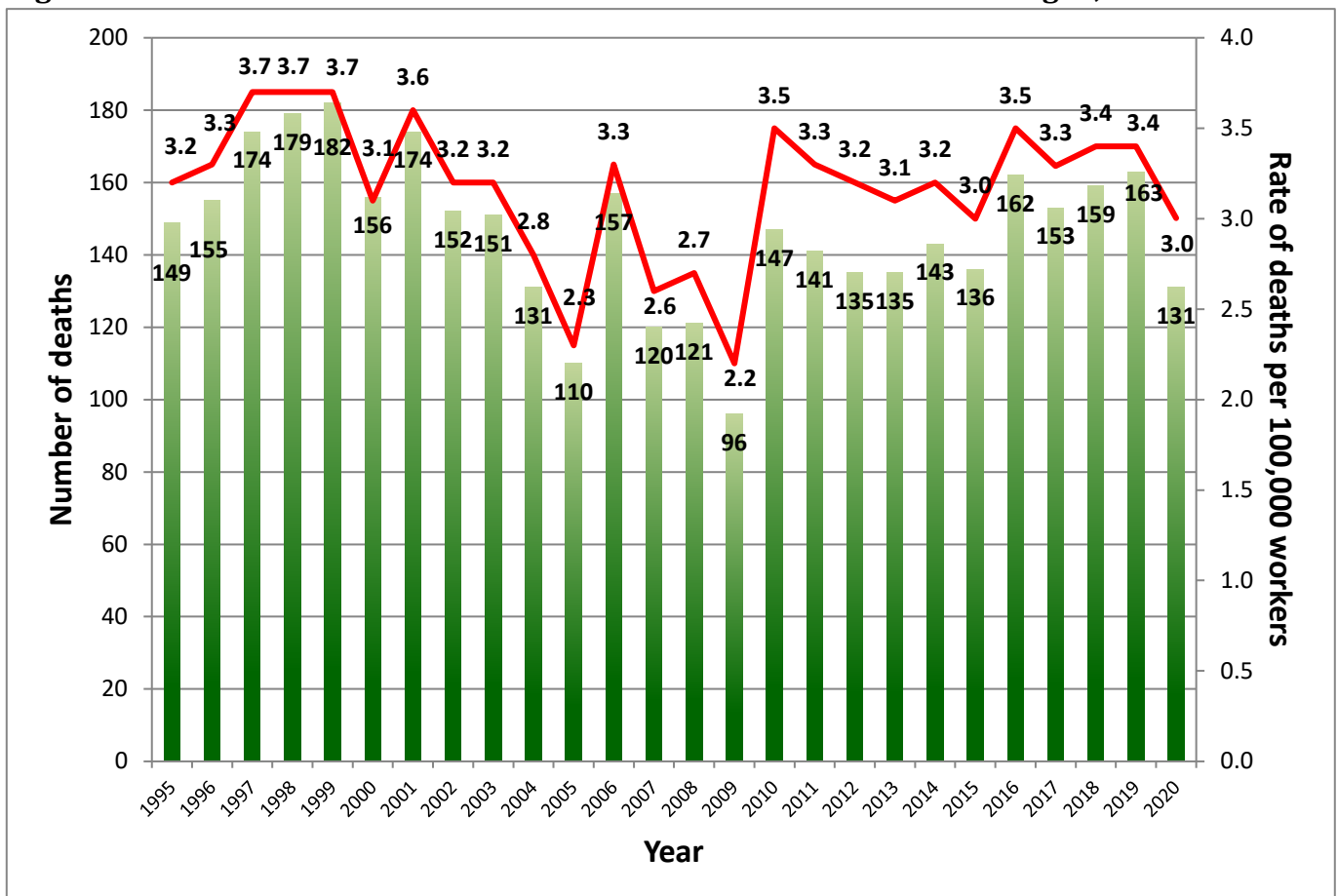
- A carpenter in his mid-70s died from complications of a fall he sustained in 1989.
- A roofer in his late 50s died from complications of a fall he sustained in 1991.
- A medical courier in his late 50s died of complications of a spinal cord injury sustained when he tripped and fell on an uneven parking lot in 2007.
- A farmer in her late 60s died from complications of a spinal cord injury sustained when she was struck by a bale of hay in 2016.
- A flight instructor in his late 60s died of complications of an aircraft crash in 2016.
- A paver in his late 20s died from complications of being struck by a tow truck while working on an intersection in 2017.

- A self-employed heating and cooling contractor in his mid-70s died of complications of injuries he sustained when an oil metal tank fell onto him in 2019.
- An automotive inspector in his early 50s died of complications from a fall he sustained in 2019.

The 131 individuals who died had 128 different employers and comprised 127 separate incidents. Two farmers died during the same incident, a construction company had an incident in which two construction workers died, and an ultimate frisbee organization had an incident in which three employees died.

Figure 1 shows the number of acute traumatic work-related deaths and incidence rate per year in Michigan since 1995. Incidence rates shown from 1995 to 2000 were obtained from the BLS website. Rates since 2001 were determined from MIFACE statistics.

Figure 1. Number and Incidence Rate of Work-Related Fatalities in Michigan, 1995–2020



Demographics

Table 1 shows the demographic characteristics of the 131 traumatic work-related fatalities in Michigan in 2020. Demographic characteristics were obtained from the individual's death certificate.

Race

Of the 125 males who died, 97 were White, 14 were Black, 9 were Hispanic, two were American Indian/Alaskan Native, one was multi-racial, and two were other. Five White women and one Asian/Pacific Islander woman died in a work-related incident.

Eleven individuals were of Hispanic ethnicity, all men. Death certificates indicated the race as White for one, multi-racial for one, and Hispanic for the other 9 individuals.

Age

The age at time of death ranged from 15 to 91 years. The average age was 50.3 years, a slight increase from 48.7 years of age in 2019. For men, the ages ranged from 15 to 91 years, and for women, the ages ranged from 24 to 69 years. The average age for men at the time of death was 50.7 years; for women, it was 42.3 years.

Twenty-six individuals were 66 years of age or older when they died; the same number of individuals died in 2019. The average age at time of death for these individuals was 74.0 years and included 25 men and 1 woman. Seven (26.9%) of the 26 individuals aged 66 years or older died due to a struck-by incident, 5 (19.2%) due to a fall, 4 (15.4%) due to motor vehicle crash, 3 (11.5%) due to a suicide, 2 (7.7%) due to machine-related incident, and 1 (3.8%)

Table 1. Demographic Characteristics of 131 Work-Related Fatalities, Michigan 2020

Demographic Characteristic*	Number	Percent
Gender		
Male	125	95.4
Female	6	4.6
Race		
White	102	78
Black	14	11
Hispanic	9	6.9
Other	2	1.5
American Indian / Alaska Native	2	1.5
Asian/Pacific Islander	1	0.8
Multi-racial	1	0.8
Education		
Less than High School	20	15
High School Graduate	42	32
GED	51	39
Some College (1-4 years)	6	4.6
Post College (5+ years)	2	1.5
Vocational School	4	3.1
Specialized Training	1	0.8
Not Provided	5	3.8
Age		
<20	2	1.5
20-29	16	12
30-39	18	14
40-49	29	22
50-59	27	21
60-69	22	17
70-79	12	9.2
80-89	2	1.5
≤90	3	2.3
Country of Origin		
United States	123	94
Mexico	5	3.8
Bangladesh	1	0.8
Chad	1	0.8
Yugoslavia	1	0.8
Totals	131	100

* Source: Death Certificate (percent may not add to 100 due to rounding)

a

each to hypothermia, aircraft, asphyxiation, bee sting reaction and homicide.

Table 2 describes the age distribution of the victims across industry sectors.

Table 2. Traumatic Work-Related Fatalities by Age of Victim and Industry Sector, Michigan 2020				
Industry Sector (NAICS Code)	0-17	18-65	65+	Total
	Number (%)	Number (%)	Number (%)	
Agriculture, Forestry, Fishing & Hunting (11)	--	11 (44)	14 (56)	25
Mining (21)	--	1 (100)	--	1
Utilities (22)	--	--	--	0
Construction (23)	--	23 (92)	2 (8)	25
Manufacturing (31-33)	--	13 (100)	--	13
Wholesale Trade (42)	--	1 (20)	4 (80)	5
Retail Trade (44-45)	--	8 (100)	--	8
Transportation & Warehousing (48-49)	1 (7)	11 (85)	1 (8)	13
Information (51)	--	--	--	0
Real Estate & Rental & Leasing (53)	--	3(100)	--	3
Professional/Science/Technology (54)	--	--	--	0
Administrative & Support & Waste Management & Remediation Services (56)	--	8 (100)	--	8
Educational Services (61)	--	1 (33)	2 (67)	3
Health Care & Social Assistance (62)	--	2 (67)	1 (33)	3
Arts, Entertainment & Recreation (71)	--	3 (75)	1 (25)	4
Accommodation & Food Services (72)	--	1 (100)	--	1
Other Services (except Public Administration) (81)	--	7 (77)	2 (22)	9
Public Administration (92)	--	9 (90)	1 (10)	10
Totals	1 (1)	102 (77.9)	28 (21.4)	131

Nationally, the [hours-based fatal work injury rate](#) per 100,000 full-time-equivalent (FTE) workers for individuals aged 65 and over was 8.6. Although not directly comparable, Michigan's employment-based fatality rate for workers aged 65 and over was 9.5 deaths per 100,000 workers in 2020. While the percentage of individuals 65 years of age and older who were employed (17.2%) was smaller than other age categories, this age group had the highest fatality rate of all age groups (**Table 3**).

Table 3. Employment Number, Percent of the Civilian Non-institutional Population Employed and Fatality Rate by Age Group, Michigan 2020

Age Range (in years)	Employment		Number of Deaths	Fatality Rate (per 100,000 workers)
	Number employed	Percent of the civilian non-institutionalized population that is employed		
15	*	*	1	--
16-19	165,000	32.4	1	0.6
20-24	363,000	59.0	7	1.9
25-34	980,000	72.7	17	1.7
35-44	862,000	74.9	24	2.8
45-54	968,000	74.5	24	2.5
55-64	743,000	54.7	29	3.9
65 and older	295,000	17.2	28	9.5

^a Employment by age from the [BLS Local Area Unemployment state specific report](#).

*No data available

Geographic Distribution

Forty-five (54%) of the 83 Michigan counties had at least one work-related injury that led to the death of the worker (**Figure 2** and **Table 4**).

Table 4. County of Fatal Work-Related Injury, Michigan 2020

County	Number	Percent*	County	Number	Percent	County	Number	Percent	County	Number	Percent
Alcona	1	0.8	Dickinson	1	0.8	Lake	--	--	Oceana	--	--
Alger	1	0.8	Eaton	1	0.8	Lapeer	1	0.8	Ogemaw	--	--
Allegan	5	3.8	Emmet	1	0.8	Leelanau	--	--	Ontonagon	--	--
Alpena	--	-	Genesee	4	3.1	Lenawee	1	0.8	Osceola	2	1.5
Antrim	--	--	Gladwin	--	--	Livingston	2	1.5	Oscoda	1	0.8
Arenac	--	--	Gogebic	--	--	Luce	--	--	Otsego	--	--
Baraga	--	--	Grand Traverse	1	0.8	Mackinac	--	--	Ottawa	3	2.3
Barry	2	1.5	Gratiot	2	1.5	Macomb	6	4.6	Presque Isle	--	--
Bay	5	3.8	Hillsdale	2	1.5	Manistee	--	--	Roscommon	--	--
Benzie	--	--	Houghton	--	--	Marquette	2	1.5	Saginaw	6	4.6
Berrien	--	--	Huron	3	2.3	Mason	1	0.8	St. Clair	3	2.3
Branch	1	0.8	Ingham	5	3.8	Mecosta	--	--	St. Joseph	1	0.8
Calhoun	2	1.5	Ionia	4	3.1	Menominee	--	--	Sanilac	1	0.8
Cass	--	--	Iosco	--	--	Midland	1	0.8	Schoolcraft	--	--
Charlevoix	--	--	Iron	--	--	Missaukee	--	--	Shiawassee	2	1.5
Cheboygan	--	--	Isabella	--	--	Monroe	2	1.5	Tuscola	--	--
Chippewa	--	--	Jackson	1	0.8	Montcalm	1	0.8	Van Buren	4	3.1
Clare	1	0.8	Kalamazoo	--	--	Montmorency	1	0.8	Washtenaw	3	2.3
Clinton	2	1.5	Kalkaska	--	--	Muskegon	--	--	Wayne	27	20.6
Crawford	--	--	Kent	5	3.8	Nwaygo	--	--	Wexford	1	0.8
Delta	1	0.8	Keweenaw	--	--	Oakland	8	6.1	Unknown	--	--

Collectively, the three southeast Michigan Counties of Macomb, Oakland, and Wayne, comprising the Detroit Tri-County area, had 41 (31.3%) of all work-related deaths. Wayne County had the highest number of deaths (27 deaths, 20.6%), followed by Oakland (8 deaths, 6.1%), Macomb and Saginaw (6 deaths each, 4.6%), and Allegan, Bay, Ingham, and Kent (5 deaths each, 3.8%).

Occupation

Among the 131 deaths, **Figure 3** shows the occupation distribution of the 128 work-related deaths with known occupation utilizing 2020 Standard Occupational Classification (SOC) categories. Occupation was determined from the reporting source data. The SOC categories are divided into 23 major groups. These major groups combine occupations according to the nature of the work performed, placing all people who work together into the same group regardless of their skill level.

Figure 2. County of Fatal Work-Related Injury, Michigan 2020

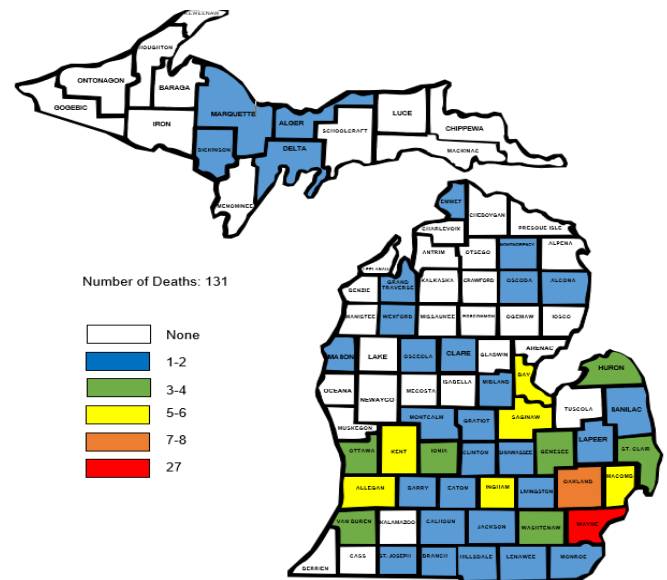
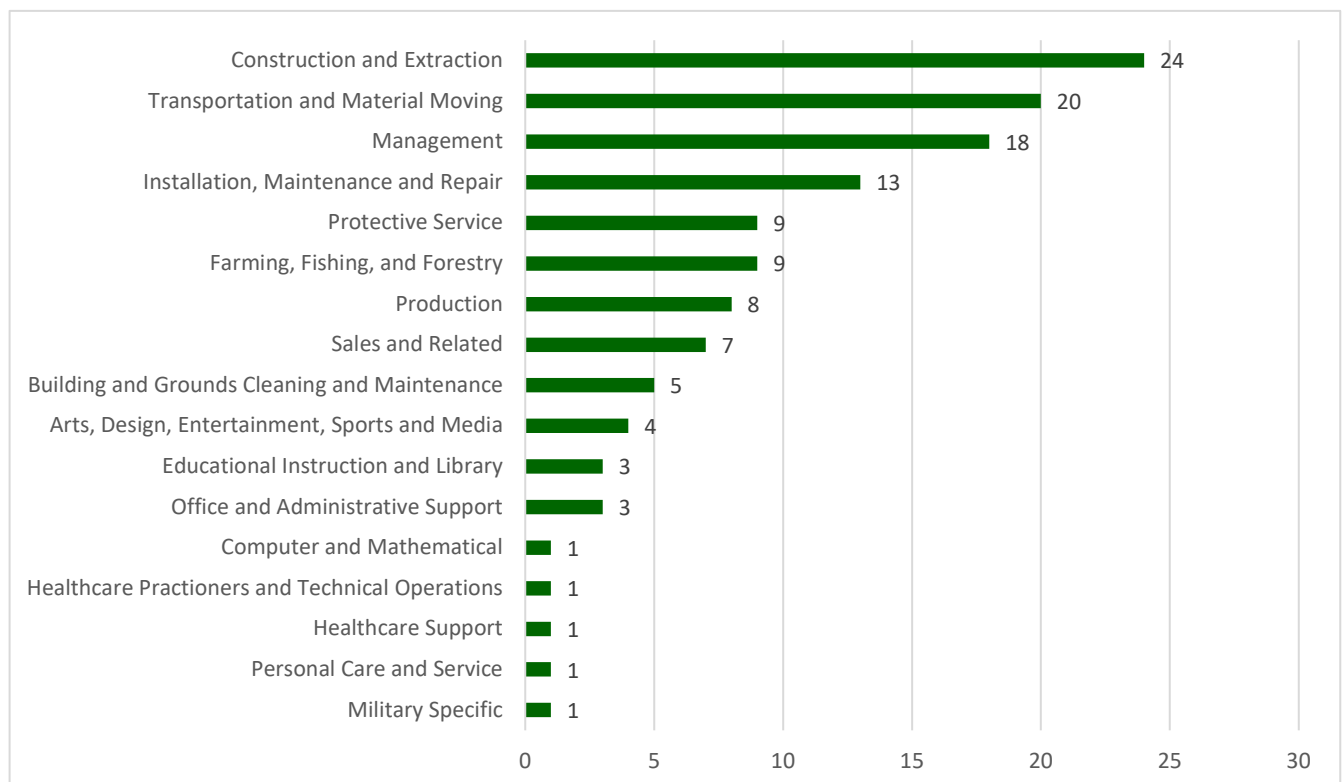


Figure 3. Number of Deaths by Standard Occupational Classification (SOC), Michigan 2020



The Construction & Extraction occupations major group had the largest number of deaths at 24 (18.8%). Construction & Extraction occupations are varied, such as construction laborers and helpers, construction equipment operators, electricians, roofers, carpenters, construction and building inspectors, flooring installers, ironworkers, masonry workers, or sheet metal workers.

The Transportation and Material Moving group had the second highest number of deaths at 20 (15.6%), followed by Management occupations (18 deaths, 14.1%), and Installation, Maintenance and Repair occupations (13 deaths, 10.2%).

Six of the 23 SOC major groups did not have a death in 2020: Business & Financial Operations, Food Preparation & Service, Life, Physical, & Social Science, Architecture & Engineering, Legal, and Community & Social Services.

Working Status of the Decedent

The 131 individuals who died had 128 different employers. The employer/employee status was known for 128 of the 131 (97.7%) work-related deaths. Eighty-nine (67.9%) individuals were employees with two of those individuals known to be a temporary/contract worker. Thirty-five (26.7%) were self-employed or the owner/co-owner of the business and four (3.1%) individuals were volunteer workers.

The decedent was working alone in 85 (64.9%) incidents, with a coworker in 37 (28.2%) incidents and the work status was unknown in 9 (6.9%) incidents. For the 11 homicides, the decedent was working alone in seven (63.6%) incidents and with a coworker in three (27.3%) incidents. For one homicide, it was unknown if the decedent was working alone or with a coworker at the time of the incident.

Work-Related Fatality Incidence Rates by Industry

Employment-based incidence rates measure the risk of fatal injury for those employed during a given period, regardless of hours worked.

Hours-based incidence rates measure fatality risk per standardized length of exposure. Hours-based rates use the average number of employees at work and the average hours each employee works (40 hours/week, 50 weeks/year).

The BLS uses hours-based incidence rates to measure fatality risk for industry sectors.

Employment-based and hours-based incidence rates will be similar for industries which tend to have full-time employees. However, differences will be observed for industries that tend to have a high percentage of part-time workers, such as in the fast-food industry.

The number of hours worked was not available for several industry sectors. When provided, MIFACE calculated the hours-based work-related fatality incidence rate (See **Table 5**).

Michigan data shows that in industry sectors with many part-time workers (30 hours or less), the work-related fatality hours-based rate is higher than the employment-based incidence rate, such as in Retail Trade and Accommodation & Food Service. When the

number of hours worked is 40 hours or more, the hours-based incidence rate is similar to or lower than the employment-based incidence rate, such as in Construction and Manufacturing.

Industry Highlights, Michigan 2020

Table 5 shows the number of traumatic work-related fatalities and Michigan's annual incidence rate by industry sector for number of employees and hours worked.

Highlights from Table 5

Eight industry sectors had fewer work-related deaths and a lower employment-based incidence rate in 2020 compared to 2019:

Industry	Decrease in Number of Deaths from 2019	Number of 2020 WR Deaths	2020 Incidence Rate	Number of 2019 WR Deaths	2019 Incidence Rate
Agriculture	7	25	29.1	32	37.4
Construction	6	25	15.2	31	17.9
Transportation & Warehousing	8	13	8.3	21	13.4
Retail Trade	6	8	1.9	14	3.0
Wholesale Trade	4	5	3.1	9	5.3
Healthcare & Social Assistance	2	3	0.5	5	0.8
Accommodation & Food Services	3	1	0.3	4	1.1
Mining	1	1	20.5	2	36.1

Five industry sectors had a higher number of work-related deaths and a higher employment-based incidence rate in 2020 compared to 2019:

Industry	Increase in Number of Deaths from 2019	Number of 2020 WR Deaths	2020 Incidence Rate	Number of 2019 WR Deaths	2019 Incidence Rate
Admin & Support & Waste & Remediation	1	8	3.3	7	2.5
Public Administration	6	10	3.9	4	1.5
Other Services	3	11	7.9	8	5.7
Arts, Entertainment & Recreation	1	4	11.2	3	5.6
Real Estate & Rental & Leasing	1	3	5.9	2	3.6

Two industry sectors had the same number of work-related deaths in 2020 compared to 2019 (although the Incidence Rate varies due to fluctuating levels of employment):

Industry	Number 2019 & 2020 WR Deaths	Incidence Rate 2020	Incidence Rate 2019
Manufacturing	13	2.3	2.1
Educational Services	3	0.9	0.8

The industry sector with the highest employment-based industry rate was Agriculture (29.1 deaths/100,000 workers), followed by Mining (20.5 deaths/100,000 workers) and then Construction (15.2/100,000 workers). The Agriculture, Forestry & Hunting industry sector had the highest overall subsector incidence rates—Support Activities for Agriculture (NAICS 115) and Forestry & Logging (NAICS 113), each had an incidence rate of 58.9 and 53.3 deaths per 100,000 workers, respectively.

Table 6 compares the employment-based and hours-based work-related fatality incidence rates by industry in Michigan to national hours-based rates for 2020 as computed by the Bureau of Labor Statistics (BLS). When calculating the fatal injury rates for the United States, BLS excludes workers under the age of 16 years, volunteers, and the resident military.

In 2020, the overall employment-based fatality rate of 3.0 per 100,000 workers, calculated by the MIFACE program, was lower than the BLS-calculated hours-based fatality incidence rate (3.4/100,000 FTEs) in the United States.

However, caution should be used when comparing hours-based and employment-based fatal injury rates because of the differences in the denominators used. When available, MIFACE used Michigan-specific hourly rates from Michigan DTMB CES; when unavailable, MIFACE used the BLS CFOI State-based hourly rate for Michigan.

Overall, Michigan's CFOI calculated hours-based work-related fatality rate of 3.1 deaths per 100,000 FTEs was lower than the United States national rate of 3.4 deaths per 100,000 FTEs. For the industries for which MIFACE or BLS calculated a Michigan-specific hours-based rate and for which BLS also calculated a nationwide hours-based rate, most Michigan industry groups had a higher hours-based rate than the United States rate for that industry. The exception to this was in the Wholesale Trade sector (3.3 vs 4.6) and Accommodations & Food Services sector (0.6 vs 2.4) (**Table 6**).

Table 5. Number of Traumatic Work-Related Fatalities by Industry and Incidence Rates by Number of Employees and by Hours Worked, Michigan 2020

Industry Sector (NAICS Code)	Number	Percent	Employment-Based		Hours-Based	
			Number Employees ^a	Rate ^d	Number Hours ^e	Rate ^g
Agriculture, Forestry, Fishing & Hunting (11)	25	19.1	85,883^b	29.1	**	**
Crop Production (111) (Owners/Operators)	7	5.3	51,156 ^b	13.7	**	**
Crop Production (111) (Hired Workers)	5	3.8	59,903 ^b	8.3	40.9 ^f	8.8
Animal Production (112) (Hired Workers)	2	1.5	17,572 ^b	11.4		
Animal Production (112) (Owners/Operators)	3	2.3	29,276 ^b	10.2	**	**
Forestry & Logging (113)	1	0.8	1,875	53.3	**	**
Fishing, Hunting & Trapping (114)	0	--	183	--		
Support Activities for Agriculture (115)	2	1.5	3,393	58.9	**	**
Mining (21)	1	0.8	4,873	20.5	**	**
Mining (Except Oil and Gas) (212)	1	0.8	3,163	31.6	**	**
Utilities (22)	0	--	20,423	--	**	**
Construction (23)	25	19.1	164,115	15.2	40.2	15.1
Construction of Buildings (236)	5	3.8	40,154	12.5	37.9	13.1
Heavy & Civil Engineering Construction (237)	9	6.9	18,912	47.6	**	**
Specialty Trade Contractors (238)	11	8.4	105,049	10.5	40.0	10.4
Manufacturing (31-33)	13	9.9	554,618	2.3	40.8	2.3
Food Processing (311)	2	1.5	37,104	5.4	**	**
Beverage and Tobacco Products (312)	1	0.8	7,662	13.1	**	**
Wood Product Manufacturing (321)	2	1.5	9,481	21.1	**	**
Printing and Related Support Activities (323)	1	0.8	11,576	8.6	**	**
Chemical Manufacturing (325)	1	0.8	29,057	3.4	**	**
Plastics and Rubber Products Manufacturing (326)	1	0.8	36,624	2.7	**	**
Fabricated Metal Products (332)	1	0.8	67,866	1.5	40.2	1.5
Transportation Equipment (336)	4	3.1	162,379	2.5	44.4	2.2
Wholesale Trade (42)	5	3.8	160,754	3.1	37.2	3.3
Merchant Wholesalers, Durable Goods (423)	4	3.1	98,582	4.1	38.0	4.2
Merchant Wholesalers, Non-durable Goods (424)	1	0.8	48,809	2.0	**	**
Retail Trade (44-45)	8	6.1	428,314	1.9	28.2	2.6
Motor Vehicle & Parts Dealers (441)	1	0.8	58,904	1.7	36.9	1.8
Electronics and Appliance Stores (443)	1	0.8	12,207	8.2	**	**
Food & Beverage Stores (445)	1	0.8	73,725	1.4	**	**
Gasoline Stations (447)	1	0.8	25,706	3.9	**	**
Clothing and Clothing Accessories Stores (448)	1	0.8	21,043	4.8	**	**
General Merchandise Stores (452)	1	0.8	101,589	1.0	**	**
Miscellaneous Store Retailers (453)	1	0.8	24,238	4.1	**	**
Nonstore Retailers (454)	1	0.8	8,517	11.7	**	**
Transportation & Warehousing (48-49)	13	9.9	156,752^c	8.3	**	**
Truck Transportation (484)	6	4.6	44,790	13.4	**	**
Support Activities for Transportation (488)	4	3.1	14,813	27.0	**	**
Postal Service (491)	2	1.5	20,685 ^c	9.7	**	**
Warehousing and Storage (493)	1	0.8	34,496	2.9	**	**

Table 5. Number of Traumatic Work-Related Fatalities by Industry and Incidence Rates by Number of Employees and by Hours Worked, Michigan 2020, Cont.

Industry Sector (NAICS Code)	Number	Percent	Employment-Based		Hours-Based	
			Number Employees ^a	Rate ^d	Number Hours ^e	Rate ^g
Real Estate & Rental & Leasing (53)	3	2.3	51,140	5.9	**	**
Real Estate (531)	2	1.5	39,205	5.1	**	**
Rental and Leasing Services (532)	1	0.8	11,464	8.7	**	**
Administrative & Support & Waste Management & Remediation Services (56)	8	6.1	241,842	3.3	**	**
Administrative & Support Services (561)	6	4.6	229,274	2.6	**	**
Waste Management & Remediation Services (562)	2	1.5	12,568	15.9	**	**
Educational Services (61)	3	2.3	346,893^c	0.9	**	**
Educational Services (611)	3	2.3	346,893 ^c	0.9	**	**
Health Care & Social Assistance (62)	3	2.3	597,886^c	0.5	29.9	0.7
Hospitals (622)	1	0.8	235,390 ^c	0.4	34.5	0.6
Nursing and Residential Care Facilities (623)	2	1.5	98,693	2.0	**	**
Arts, Entertainment, & Recreation (71)	4	3.1	35,720	11.2	18.8	23.8
Performing Arts and Spectator Sports (711)	3	2.3	6,168	48.6	**	**
Amusement, Gambling, and Recreation Industries (713)	1	0.8	26,362	3.8	**	**
Accommodation & Food Services (72)	1	0.8	287,965	0.3	23.0	0.6
Food Services & Drinking Places (722)	1	0.8	258,875	0.4	**	**
Other Services (except Public Administration) (81)	9	6.9	114,170	7.9	**	6.2ⁱ
Repair & Maintenance (811)	7	5.3	38,507	18.2	**	**
Personal and Laundry Services (812)	2	1.5	33,627	5.9	**	**
Public Administration (92)	10	7.6	258,000^h	3.9	**	**
Executive, Legislative, and Other General Governmental Support (921)	1	0.8	**	**	**	**
Justice, Public Order, & Safety Activities (922)	8	6.1	**	**	**	**
Administration of Economic Programs (926)	1	0.8	**	**	**	**
National Security and International Affairs (928)	1	0.8	**	**	**	**
Totals	131		4,379,000ⁱ	3.0		3.1^j

^a Employment numbers from Michigan Department of Technology, Management and Budget (DTMB), Bureau of Labor Market Information and Strategic Initiatives, [OCEW Industry Employment and Wages](#) unless otherwise noted.

^b [2017 United States Department of Agriculture Census of Agriculture, Michigan-level data, Table 75](#). Summary by North American Industry Classification System. Number of owners/operators are defined as the number of "producers" in Table 75 summed by industry group (crop or animal). Hired workers are defined as the number of "hired farm labor" in Table 75 by industry group. Total number of employees in NAICS Sector 11 defined as total number of producers (owner/operators) for crop and animal production added to the number of employees in sectors 113 to 115 from Michigan DTMB QCEW data, excluding the count of "hired workers". See the [Agriculture section](#) for discussion.

^c Includes federal, state, or local workers obtained from Michigan DTMB, Bureau of Labor Market Information and Strategic Initiatives, [Current Employment Statistics \(CES\)](#) found under the classification Public Administration NAICS 92.

^d Employment-based incidence rates calculated per 100,000 workers.

^e Average number of hours worked per week by industry taken from Michigan DTMB [CES](#) estimates unless otherwise noted.

^f Number of hours worked per week by hired farm workers in the Lake Region for 2020 as reported in the [Quick Stats Search Option from the USDA National Agricultural Statistics Service](#). Corresponding hours-based rate is calculated using the number of hired farm worker fatalities from the Crop and Animal production sectors combined.

^g Hours-based incidence rates calculated as (N/EH)*200,000,000, where N is the number of fatalities, EH is the total employee-hours (number of employees * average number of hours worked per week * 50 weeks), and 200,000,000 is the benchmark number of hours worked by 100,000 FTE (40 hour/week) employees in one year.

^h The number of workers in the Public Administration sector was calculated as the sum of Federal, State, and Local

government employees in Michigan, minus the number of U.S. Postal Service workers, state and local hospital workers, and state and local education workers. All numbers from Michigan DTMB [CES](#) estimates.

^l Total 2020 state employment taken from Michigan DTMB [LAUS](#) report.

^j [Michigan CFOI 2020 hours-based incidence rate](#). Note for the Other Services (except Public Administration) NAICS 81, the CFOI rate was based on 10 deaths instead of the 9 deaths reported by the MIFACE program.

** No data available from corresponding sources.

Table 6. Traumatic Work-Related Fatalities by Industry Sector, Michigan Incidence Rates Compared to US Incidence Rates, 2020

Industry Sector (NAICS Code)	Number of Fatalities	2020 MI Employment- based Rate ^a	2020 MI Hours-Based Rate ^a	2020 US Hours-Based Rate ^b
Agriculture, Forestry, Fishing and Hunting (11)	25	30.3	40.0 ^c	21.5
Mining (21)	1	20.5	**	10.5
Utilities (22)	0	--	**	1.8
Construction (23)	25	15.2	15.1	10.2
Manufacturing (31-33)	13	2.3	2.3	2.3
Wholesale Trade (42)	5	3.1	3.3	4.6
Retail Trade (44-45)	8	1.9	2.6	2.0
Transportation & Warehousing (48-49)	13	8.3	**	13.4
Information (51)	0	--	--	1.3
Finance and Insurance (52)	0	--	--	0.3
Real Estate and Rental and Leasing (53)	3	5.9	**	2.8
Professional & Business Services (54)	0	--	--	0.5
Administrative & Support & Waste Management & Remediation Services (56)	8	3.3	**	**
Educational Services (61)	3	0.9	**	0.6
Health Care & Social Assistance (62)	3	0.5	0.7	0.7
Arts, Entertainment, & Recreation (71)	4	11.2	23.8	3.2
Accommodation & Food Services (72)	1	0.3	0.6	2.4
Other Services (except Public Administration) (81)	9	7.9	6.2 ^c	3.3
Public Administration (92)	10	3.9	**	**
Total	131	3.0	3.1^c	3.4

^a From Table 5 unless otherwise noted

^b From U.S. [BLS CFOI National hours-based fatal injury rates](#) by industry, occupation, and selected demographic characteristics, 2020.

^c Michigan Hours-based rate taken from [BLS state CFOI data](#)

** No rate available from either MIFACE or CFOI

Means of Work-Related Death

In 2020, the means of death was known for all 131 work-related Michigan deaths (**Table 7**). Struck by incidents were the leading cause of a work-related death (27 deaths, 20.6%). Tied for the second leading cause of work-related death were fall-related incidents and motor vehicle crashes (each 21 deaths, 16.0%), followed by suicides (14 deaths, 10.7%) and homicides/assaults (11 deaths, 8.4%).

Motor vehicle crashes were the, or one of the leading means of death in 5 of 15 industry sectors (33.3%), including Transportation and Warehousing (5 of 13 deaths, 38.5%), Administrative, Support, Waste Management & Remediation Services (2 of 8 deaths, 25.0%), Educational Services (1 of 3 deaths, 33.3%), Arts, Entertainment, & Recreation (3 of 4 deaths, 75.0%), and Public Administration (3 of 10 deaths, 30.0%).

Struck by incidents were the, or one of the leading means of death in 4 of 15 industry sectors (26.7%), including Agriculture, Forestry, Fishing & Hunting (8 of 25 deaths, 32.0%), Mining (1 of 1 death, 100%), Wholesale Trade (1 of 1 death 20.0%) and Administrative, Support, Waste Management & Remediation Services (2 of 8 deaths, 25.0%).

Suicides were the, or one of the leading means of deaths in 3 of 15 industry sectors (13.3%), including Educational Services (1 of 3 deaths, 33.3%), Accommodation & Food Services (1 of 1 death, 100%), and Other Services (except Public Administration) (4 of 9 deaths, 44.4%).

Fatal falls were the, or one of the leading means of death in 2 of 15 industry sectors (13.3%), including Construction (9 of 25 deaths, 36.0%), Manufacturing (3 of 13 deaths, 23.1%), Wholesale Trade (1 of 5 deaths, 20.0%) and Healthcare & Social Assistance (1 of 3 deaths, 33.3%).

Machines were one of the leading means of death in 1 of the 15 industry sectors—the Manufacturing industry (3 of 13 deaths, 23.1%).

Table 8 displays the number of fatalities across leading means of death by year from 2001- 2020. There are variations in the means of death each year and because of small numbers in any given means of death, it is difficult to identify any temporal trends.

In 2018, a review of the MIFACE database was performed to standardize the categorization of death by motor vehicle. All motor vehicle entries were reviewed. If the death was a result of the deceased being a driver or passenger in a motor vehicle crash, the death was categorized as a motor vehicle crash. If the death was caused by a motor vehicle striking a pedestrian or a worker on a machine, then the categorization of the death was changed from motor vehicle to struck by.

In 2018, there was a 150% increase in the number of fatal drug overdoses at Michigan workplaces (4 in 2017 to 10 in 2018). While the number decreased in 2019 to 8 and in 2020 to 7, the highest number of overdose deaths in the workplace per year occurred between 2018 and 2020 with 38% of all drug overdoses in the workplace from 2001–2020. This increase mirrors national trends of increasing opioid (e.g., fentanyl, heroin, hydrocodone), stimulant (e.g., cocaine, methamphetamine) and alcohol use both at home and at work.

Table 7. Traumatic Work-Related Fatalities by Means of Death and Industry Sector, Michigan 2020

Industry Sector (NAICS)	Aircraft	Asphyxiation	Drowning	Drug Overdose	Electrocution	Explosion/ Fire	Fall	Heat/Cold	Homicide/ Assault	Machine	Motor Vehicle	Struck by	Suicide	Other (Animal)	Total
Agriculture, Forestry, Fishing & Hunting (11)	--	3	1	--	--	--	3	1	--	5	2	8	2	--	25
Mining (21)	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1
Utilities (22)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
Construction (23)	--	1	--	2	1	--	9	--	--	1	2	8	1	--	25
Manufacturing (31-33)	--	1	--	1	1	--	3	--	1	3	1	2	--	--	13
Wholesale Trade (42)	--	--	--	--	--	--	1	1	--	--	1	1	1	--	5
Retail Trade (44-45)	--	--	--	1	--	--	--	--	3	--	1	1	2	--	8
Transportation & Warehousing (48-49)	--	1	--	--	1	--	2	--	1	--	5	3	--	--	13
Information (51)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
Real Estate, Rental, & Leasing (53)	--	--	--	2	--	--	1	--	--	--	--	--	--	--	3
Professional, Scientific, and Technical Services (54)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
Administrative & Support & Waste Management & Remediation Services (56)	--	1	--	--	--	1	1	1	--	--	2	2	--	--	8
Educational Services (61)	1	--	--	--	--	--	--	--	--	--	1	--	1	--	3
Health Care & Social Assistance (62)	--	--	--	1	--	--	1	--	1	--	--	--	--	--	3
Arts, Entertainment, & Recreation (71)	--	--	--	--	--	--	--	--	--	--	3	--	1	--	4
Accommodation & Food Services (72)	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
Other Services (except Public Administration) (81)	--	--	--	--	--	--	--	--	3--	1	--	1	4	--	9
Public Administration (92)	1	--	1	--	--	1	--	--	2	--	3	--	1	1	10
Total	2	7	2	7	3	2	21	3	11	10	21	27	14	1	131

Table 8. Leading Means of Death by Year, 2001–2020

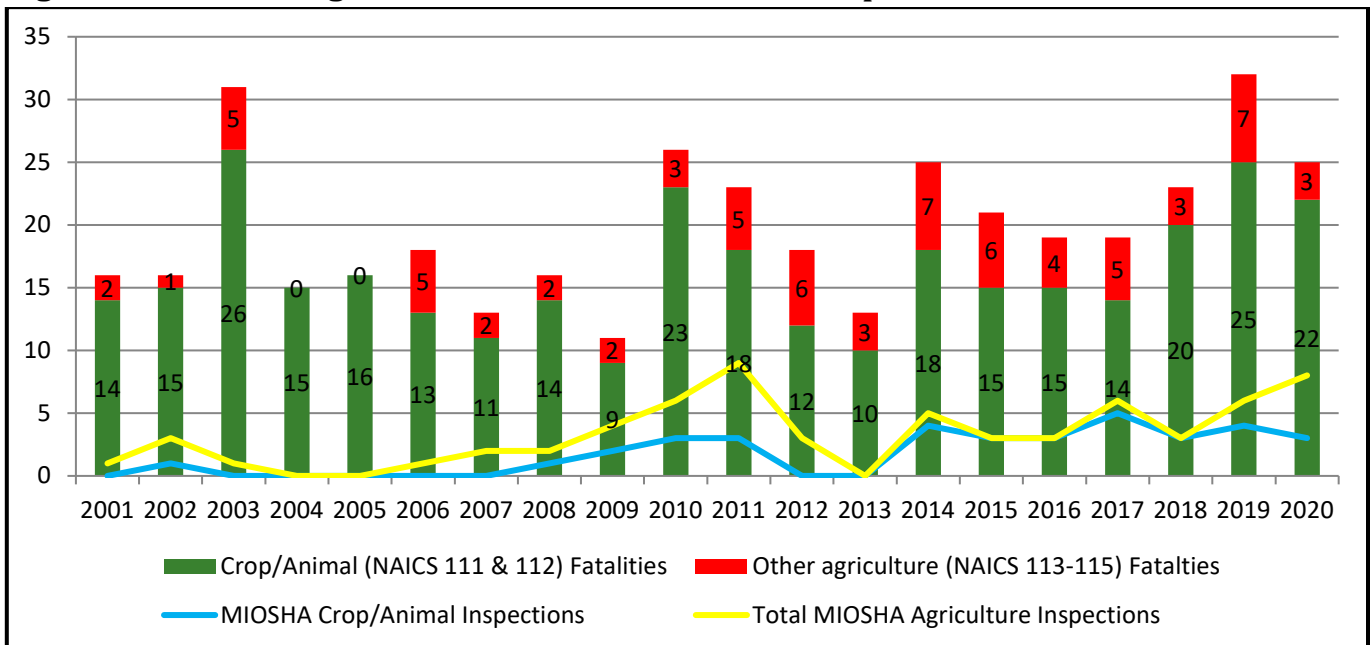
Year	Motor Vehicle	Struck by	Fall	Homicide/ Assault	Machine	Suicide	Electrocution	Aircraft	Toxic Exposure	Fire/Explosion	Drug Overdose	Drowning	Asphyxiation	Animal	Heat/Cold
2001	29	19	26	24	32	12	4	6	4	6	1	2	3	1	2
2002	28	21	21	22	20	11	8	5	4	4	--	2	1	2	2
2003	27	20	19	15	36	5	10	2	3	4	3	1	4	2	1
2004	26	16	16	22	26	4	7	4	4	3	1	--	1	1	--
2005	23	11	20	16	18	2	4	6	2	4	3	1	--	--	--
2006	32	34	24	11	14	8	10	8	6	4	1	2	1	2	--
2007	26	19	17	21	16	6	4	--	4	1	2	--	--	2	1
2008	22	23	26	14	12	9	5	--	2	3	2	1	1	1	--
2009	18	19	14	11	7	12	5	2	--	--	4	--	1	2	--
2010	23	20	24	26	16	11	7	4	6	3	2	2	--	--	1
2011	22	16	21	15	20	16	7	7	4	3	1	1	2	2	2
2012	31	19	18	28	14	12	3	--	--	--	2	3	--	--	--
2013	24	27	19	16	10	22	2	2	1	3	3	--	1	--	1
2014	26	30	24	19	11	9	5	5	--	1	4	3	3	3	--
2015	25	23	18	22	15	12	5	3	4	3	3	2	2	1	--
2016	28	19	32	22	19	13	5	1	9	2	5	3	1	1	1
2017	28	27	26	25	9	17	5	--	--	4	4	6	1	--	--
2018	24	36	21	22	10	15	5	3	2	4	10	2	4	1	--
2019	31	21	19	11	20	23	5	9	6	4	8	1	1	3	1
2020	21	27	21	11	10	14	3	2	--	2	7	2	7	1	3
Total	515	447	429	373	335	233	109	69	61	58	66	34	34	25	15

Highlights and Discussion by Select Industries and Means of Death

Agriculture, Forestry, Fishing & Hunting (NAICS 11)

Figure 5 shows the number of fatalities in the Agriculture, Forestry, Fishing & Hunting sector, split between crop and animal-raising industries (NAICS 111 and 112, respectively) and other agricultural industries (NAICS 113-115), by year for 2001–2020. The Figure also shows the number of fatalities which were investigated through MIOSHA fatality inspections by year.

Figure 4. Number of Agriculture Fatalities and MIOSHA Inspections, 2001–2020



The federal Appropriations Act exempts small farming operations from federally-funded activities. Only State funds can be used by MIOSHA for interventions at farming operations when a farm operation:

- Employs 10 or fewer employees currently and at all times during the preceding 12 months; and
- Has not had an active temporary labor camp during the preceding 12 months.

It is important to note that immediate family members of farm employers are not counted when determining the number of employees. Most agricultural work-related deaths in Michigan have occurred on family farms with fewer than 10 employees and who did not have an active temporary labor camp. Therefore, few MIOSHA work-related fatality inspections on family farm operations have been performed.

The average age of those who died working in Agriculture in 2020 was 62.4 years, with a range of 18-91 years. **Table 9** shows the average age at the time of death for the past 20 years for those employed in Agriculture. In 16 of the 20 previous years (80%), the average age of the individual was in their 50s or 60s.

Table 9. Age at Time of Death, Agriculture, Michigan 2001–2020			
Year	Age (in years)	Year	Age (in years)
2001	47.4	2011	56.6
2002	48.0	2012	52.2
2003	58.1	2013	56.6
2004	59.7	2014	46.8
2005	54.9	2015	55.3
2006	49.9	2016	61.0
2007	54.2	2017	52.5
2008	67.9	2018	58.4
2009	51.5	2019	58.5
2010	53.0	2020	62.4

Special Considerations Regarding Employment Estimates in Agriculture

Traditional farm operations (Crop and Animal Production) accounted for 22 of the 25 (88%) deaths in 2020. Fourteen of the 22 (70.6%) known work-related deaths were identified as a farm owner/operator, while eight (29.4%) were identified as hired labor/worker (one individual was a family member, one individual was a migrant worker, and two were undocumented migrant workers).

Hired labor includes paid family members, bookkeepers, office workers, maintenance workers, etc., if their work was primarily associated with agricultural production on the operation. Hired labor excludes contract (migrant) laborers. Unpaid workers likely make up a significant portion of the agricultural workforce – the [2017 USDA Census of Agriculture reports](#) 77,475 hired workers and 54,839 unpaid workers. The number of migrant workers was not noted on the 2017 Agricultural Census, only the number of farms utilizing migrant labor. The [2013 Michigan Migrant and Seasonal Farmworker Enumeration Profiles Study](#) estimated 49,135 migrant and seasonal farm laborers in 2013. Seasonal farm labor was described as “an individual whose principal employment is in agriculture on a seasonal basis, who has been so employed within the last twenty-four months”.

Migrant farm workers were defined as meeting the seasonal farm labor definition but “establishes for the purposes of such employment a temporary abode” (U.S. Code, Public Health Services Act, “Migrant Health”). Migrant farm workers include both individuals who met the definition of a migrant but only travel within the state of Michigan (intrastate migrants) and others who come from outside the state to work in Michigan (interstate migrants). The 2017 Agricultural Census reports that 11,907 farms in Michigan reported using hired labor, while only 828 reported using migrant labor.

If the total number of Agricultural operators (80,432), hired farm labor (77,475), and unpaid workers (54,839) identified in the 2017 Agriculture Census are added to the above estimate

for migrant and seasonal farm laborers (49,135), as well as to the number of employees working in Forestry & Logging (1,875), Fishing, Hunting & Trapping (183), and Agricultural Support Activities (3,393) estimated by the Michigan DTMB in 2020, the total number of workers in Agriculture was 267,332. The increase in the number of workers would dramatically lower the NAICS 11 Agriculture, Forestry, Fishing & Hunting work-related fatality incidence rate from 29.1 deaths per 100,000 workers to 9.4. Both rates are appreciably lower than the BLS CFOI hours-based rate for Michigan of 40.0 per 100,000 FTEs, which only includes hired employees. If only employment estimates from the Michigan DTMB Industry Employment and Wages report are used, the number of workers in agriculture totals only 30,034, which would drive the employment-based rate up to 83.2 per 100,000 workers.

The transient nature of crop production complicates the picture of Agricultural employment. A single farm may produce several crops utilizing hired labor to harvest. Workers may come and go (leave the state) to harvest other crops. Given that many of these work stints may be for durations significantly shorter than a year, it is possible that many hired and/or migrant workers will work at multiple farms in a year, each of which may count the worker in their reported number of hired workers, leading to overestimation of total employment in the industry.

Due to uncertainties regarding the true total number of hired, unpaid, and seasonal/migrant workers, and which of these categories may be overlapping or enveloped by others, the employment-based incidence rate of work-related fatalities across Agriculture (29.1/100,000 workers) utilizes only the total number of operators in Crop and Animal Production reported by the 2017 USDA Census of Agriculture combined with employee counts for Forestry & Logging, Fishing, Hunting & Trapping, and Agricultural Support Activities from the Michigan DTMB. It is likely that the most accurate employment-based incidence rate lies somewhere between this number and the rate given when all possible counts of hired, unpaid, and migrant labor are combined (9.4/100,000 workers).

Construction (NAICS 23)

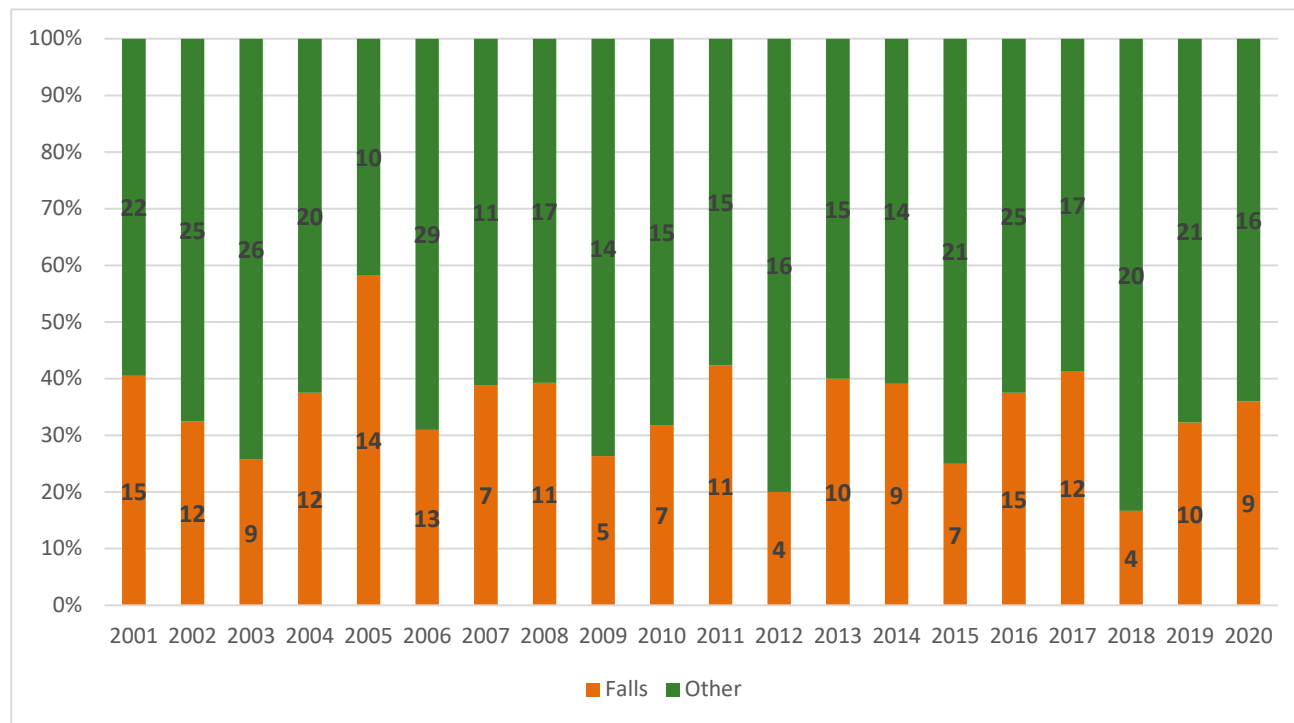
The number of deaths in Construction sector decreased by 6 (25 deaths in 2020 compared to 31 deaths in 2019). Number of deaths in the Heavy and Civil Engineering Construction subsector (NAICS 237) doubled from four deaths in 2019 to nine in 2020. Deaths in all other subsectors decreased from 2019 to 2020, respectively: Specialty Trade Contractors (NAICS 238) from 19 to 11 deaths, Construction of buildings (NAICS 236) from seven to five deaths, and Building, Development and General Contracting (NAICS 233) from one to no deaths.

Falls were the primary cause of death in Construction (9 of 25 deaths, 36%) in 2020. Six of the nine falls occurred in the Specialty trade contractors group subsector (NAICS 238), including four roofers, one carpenter, and one painter. **Figure 6** shows the number of fatal falls in Construction by year and the percentage of construction work-related deaths the fatal falls represent.

Between 2001 and 2020, the number of fatal falls in Construction ranged from a low of four falls in 2012 and 2018 to a high of 15 falls in 2001 and 2016. During the 20 years, falls were the leading means of death for 16 years and the secondary means of death for four years, with

a low of 16.7% in 2018 (secondary means of death) to a high of 58.3% in 2005 (leading means of death).

Figure 5. Fatal Falls as Percent of Total Construction Deaths by Year, 2001–2020



Retail Trade (NAICS 44-45)

In 2020, the Retail Trade industry sector (NAICS 44-45) had the largest number of homicides/assaults (3 of 11 deaths, 27.3%) among all industry sectors, while within the Retail Trade industry, homicides/assaults were the leading cause of death (3 of 8 deaths, 37.5%). Each year from 2001–2020, homicides were the leading means of death in the Retail Trade industry accounting for 54.5% of all fatalities. The next three most common means of death during the 20-year period were motor vehicle collisions (14.2%), suicides (14.2%), and falls (12.3%). Decedents in the Retail Trade industry have also made up the largest portion of total homicide deaths (26.5%) of any sector from 2001–2020; homicides in the Accommodation and Food Service sector make up the next highest proportion of total homicides at 12.0%, less than half the proportion of Retail Trade.

Transportation and Warehousing (NAICS 48-49)

Motor vehicle crashes were the most common means of death in the Transportation and Warehousing industry sector in 2020 (5 of 13 deaths, 38.5%). These reflect overall trends for 2001–2020, in which motor vehicle collisions comprise the most common means of death in the Transportation and Warehousing industry sector (40.9% of all deaths in the sector), with struck-by incidents being the next highest type of fatality (16.6% of all deaths in the sector).

Furthermore, this industry accounts for a quarter (131 deaths, 25.5%) of all motor vehicle crash deaths from 2001–2020, the largest proportion of all industry sectors, followed by Construction (64 deaths, 12.5%) (**Table 10**).

Table 10. Number of Motor Vehicle Crash Work-Related Deaths by Industry Sector, Michigan 2001–2020	
<i>Industry</i>	<i>Number MV-related deaths (%)</i>
Agriculture	31(6.0)
Mining	3 (0.6)
Utilities	3 (0.6)
Construction	64 (12)
Manufacturing	26 (5.1)
Wholesale Trade	34 (6.6)
Retail Trade	29 (5.6)
Transportation/Warehousing	131 (25)
Information	18 (3.5)
Finance/Insurance	6 (1.2)
Real Estate/Rental/Leasing	1 (0.2)
Professional/Scientific/Technical Services	14 (2.7)
Administrative/Support/Waste Management/Remediation	34 (6.6)
Education	12 (2.3)
Health Care/Social Assistance	21 (4.1)
Arts/Entertainment/Recreation	16 (3.1)
Accommodation/Food Service	7 (1.4)
Other Services	23 (4.5)
Public Administration	41 (8.0)

Comparisons to MIOSHA and CFOI Fatalities

MIOSHA Fatality Investigations

In 2020, MIOSHA personnel conducted a work-related fatality program-related compliance investigation for 38 (29.0%) of the 131 deaths (two fatalities occurred during the same incident and thus one inspection was completed for both fatalities: 37 inspections of the 127 incidents). Additionally, the federal Mine Safety and Health Administration (MSHA) completed a compliance inspection for one fatality. A fatality was recorded as a MIOSHA “Program-Related” fatality if the deceased party was employed in an occupation included under MIOSHA jurisdiction as defined in Public Act 154 of 1974, as amended, and the fatality appeared to be related to one or more of the following conditions:

- The incident was found to have resulted from violations of MIOSHA safety and health standards or the “general duty” clause.
- The incident was considered the result of a failure to follow a good safety and health practice that would be the subject of a safety and health recommendation.
- The information describing the incident is insufficient to make a clear distinction between a “Program-Related” and “non-Program-Related” incident, but the type and

nature of the injury indicated that there was a high probability that the injury was the result of a failure to adhere to one or more MIOSHA standards, the “general duty” clause, or good safety and health practice.

Table 11 shows the number of work-related fatalities in Michigan in 2020 by industry sector and the number of MIOSHA work-related fatality compliance inspections for each industry sector. MIOSHA issued a violation citation to the firm at the conclusion of the fatality investigation in 28 of the 37 (75.7%) investigations. Citation penalties assessed at the conclusion of the compliance inspection (not the penalties decided after appeal) ranged from a low of \$50 to a high of \$35,000.

Table 11. Work-Related Fatalities and Number of MIOSHA Work-Related Fatality Compliance Inspections, Michigan 2020		
Industry	Number of Work- Related Fatalities	Number of Work-Related Fatality MIOSHA Compliance Inspections (%)
Agriculture, Forestry, Fishing & Hunting (11)	25	4 (16.0)
Mining (21)	1 ^a	0
Construction (23)	25	12 (48.0) ^b
Manufacturing (31-33)	13	8 (61.5)
Wholesale Trade (42)	5	0
Retail Trade (44-45)	8	1 (12.5)
Transportation & Warehousing (48-49)	13	2 (15.4)
Real Estate & Rental & Leasing (53)	3	1 (33.3)
Administrative & Support & Waste Management & Remediation Services (56)	8	4 (50.0)
Educational Services (61)	3	0
Health Care & Social Assistance (62)	3	1 (33.3)
Arts, Entertainment, & Recreation (71)	4	0
Accommodation & Food Services (72)	1	0
Other Services (ex. Public Administration) (81)	9	2 (22.2)
Public Administration (92)	10	3 (30.0)
Total	131	38 (29.0)

^a Inspected by the Mine Safety and Health Administration (MSHA)

^b One inspection was completed on an incident involving two fatalities.

Number of 2020 Deaths Compared to Michigan CFOI

The Census of Fatal Occupational Injuries (CFOI) is the surveillance system funded in most states by the US Department of Labor, Bureau of Labor Statistics. [The Michigan CFOI](#) program reported 131 work-related deaths in 2020.

Sensitivity of “Injury at Work” Box on Death Certificate

If the manner of death (Box 39) on the death certificate indicated accident, suicide, homicide, indeterminate or pending, the “injury at work” box (Box 41d) is completed by the Medical Examiner with “Yes”, “No”, or “Unknown”. “Yes” signifies that the fatal injury occurred at work, “No” signifies it did not occur at work, and “Unknown” signifies that the Medical Examiner did not know if the injury occurred at work. As described in the Methods Section, MIFACE determined a death to be work-related by compiling multiple source documents, including: Workers’ Compensation forms; Police/Fire/EMT Department reports; MIOSHA 24-hour fatality log; hospital records; newspaper reports; family interviews; and Federal agencies (OSHA, NTSB, MSHA, etc.).

Table 12 shows that from 2001–2020 13.1% to 44.8% of the work-related deaths would have been missed if MIFACE had solely relied on the “Injury at Work” box being completed with “Yes”.

Table 12. Sensitivity of Death Certificate “Injury at Work” Box Predicting Fatal Injury at Work, Michigan 2001-2019

Year	Number Deaths	DC Coded as at work (%)	DC not coded at work (%)
2001	174*	133 (79.6%)	34 (20.4%)
2002	151	126 (86.9%)	19 (13.1%)
2003	152	110 (74.3%)	38 (25.7%)
2004	131	93 (74.4%)	32 (25.6%)
2005	110	88 (83.0%)	18 (17.0%)
2006	157	122 (79.2%)	32 (20.8%)
2007	121	99 (85.3%)	17 (14.7%)
2008	121	100 (84.0%)	19 (16.0%)
2009	96	72 (75.8%)	23 (24.2%)
2010	147	102 (70.3%)	43 (29.7%)
2011	141	95 (69.3%)	42 (30.7%)
2012	135	74 (55.2%)	60 (44.8%)
2013	134	82 (62.6%)	49 (37.4%)
2014	143	89 (62.7%)	53 (37.3%)
2015	136	89 (67.9%)	42 (32.1%)
2016	158	99 (62.7%)	59 (37.3%)
2017	153	85 (55.5%)	68 (44.4%)
2018	152	91 (59.9%)	61 (40.1%)
2019	163	95 (58.2%)	68 (41.8%)
2020	131	82 (62.6%)	49 (37.4%)

*All death certificates were not obtained/reviewed each year.

Percentages based on number of death certificates received for that year.

Table 14 shows that in 2020, the “Injury at Work” box was misidentified at the highest rate in the designation of an injury at work in Accommodation and Food Service Industry (100% of deaths misidentified), followed by Arts, Entertainment and Recreation Industry (75.0%) and then Wholesale Trade (60.0%). Mining industry sector had none of the deaths misidentified.

Table 14. Industry and Number of Deaths and Number and Percent of Misidentified Deaths, Michigan 2020		
Industry (NAICS Code)	Number of Deaths	Number of Misidentified Deaths (%)
Agriculture, Forestry, Fishing & Hunting (11)	25	14 (56.0)
Mining (21)	1	0
Construction (23)	25	6 (24.0)
Manufacturing (31-33)	13	2 (15.4)
Wholesale Trade (42)	5	3 (60.0)
Retail Trade (44-45)	8	3 (37.5)
Transportation & Warehousing (48-49)	13	3 (23.1)
Real Estate & Rental & Leasing (53)	3	1 (33.3)
Administrative & Support & Waste Management & Remediation Services (56)	8	3 (37.5)
Educational Services (61)	3	1 (33.3)
Health Care & Social Assistance (62)	3	1 (33.3)
Arts, Entertainment & Recreation (71)	4	3 (75.0)
Accommodation & Food Service (72)	1	1 (100)
Other Services (ex. Public Administration) (81)	9	4 (44.4)
Public Administration (92)	10	4 (40.0)
Total	131	49 (37.4)

MIFACE Activities

Importance of Using Multiple Data Sources

MIFACE used multiple data sources to ascertain if a fatal injury was work-related. Reliance on just the information in the “Injury at Work” box on the individual’s death certificate would have missed 49 (37.4%) of the work-related deaths in 2020, particularly with causes of death from motor vehicle crashes, homicides, struck-by incidents, and work-related suicides. That MIFACE can capture these work-related fatalities that would otherwise be missed when relying solely on the “Injury at Work” box supports the utility, and need, for surveillance programs that collate fatality information from multiple sources.

Prevention Material Dissemination

On the MSU OEM website (<http://www.oem.msu.edu/>) are copies of the completed MIFACE Investigation Reports, Hazard Alerts, and MIFACE Summaries of MIOSHA Investigations (work-related fatality compliance inspection) conducted by MIOSHA personnel.

MIFACE Investigation Reports, MIFACE Summaries of MIOSHA Investigations, Hazard Alerts, and the annual MIFACE Data Fact sheet were posted on the MSU OEM website and distributed to stakeholders. MIFACE Summaries of MIOSHA Investigations included a summary of the work-related fatality and the citations issued to the employer by MIOSHA compliance personnel at the conclusion of the fatality investigation. Hazard Alerts are 1-page documents that review work-related fatalities and provide prevention recommendations that target specific industrial sectors or repeated work-related fatality incidents. The MIFACE Data Fact Sheet summarizes information received regarding the state's work-related deaths and was updated periodically when new information was received. The most current MIFACE Data Fact Sheet can be found [here](#).

For each MIFACE Investigation Report, MIFACE Summary of a MIOSHA Investigation, and Hazard Alert there was a dissemination plan to maximize awareness of the Report and Alert. Investigation Reports and Hazard Alerts were sent via email to appropriate trade associations, unions, trade journals, employers who did the same type of work, and to employers who have expressed interest in receiving the reports.

MIFACE presentations are regularly given to trade groups ranging from health and safety professionals in construction, agriculture, and general industry.

Case Narratives

Based on the information collected during MIFACE on-site investigations and/or from source documents, a brief narrative summary organized by industry of each of the 131 acute traumatic work-related deaths in 2020 is included in [Appendix I](#).

Table 15 provides the narrative case number and cause of death by NAICS code found in the Appendix. Each combination of industry and cause of death is hyperlinked to the beginning of the corresponding narratives. Additionally, each cause of death label is hyperlinked to its corresponding heading in the Appendix.

When the brand name of equipment was known, MIFACE included this information in the narrative. Unless noted, the inclusion of the brand does not signify that there was a defect or other problem with the equipment. Each case narrative that was a work-related fatality that had a MIOSHA work-related fatality compliance investigation is noted by a specific MIFACE case number and hyperlinked to its MIFACE Summary of MIOSHA Investigation (MIFACE Summary) on the MSU OEM/MIFACE webpage. If a MIFACE Investigation Report was written, the MIFACE Investigation number is hyperlinked to its corresponding report on the MSU OEM/MIFACE website.

Table 15. Narratives for 2020 Work-Related Fatalities

Industry Sector (NAICS)	Aircraft	Asphyxiation	Drowning	Drug Overdose	Electrocution	Fall	Fire/ Explosion	Heat/Cold	Homicide/ Assault	Machine	Motor Vehicle	Struck- By	Suicide	Other (Animal)
Agriculture (11)		1-3	4			5-7		8		9-13	14-15	16-23	24-25	
Mining (21)												26		
Construction (23)		27		28-29	30	31-39				40	41-42	43-50	51	
Manufacturing (31-33)		52		53	54	55-57			58	59-61	62	63-64		
Wholesale Trade (42)						65		66			67	68	69	
Retail Trade (44-45)				70					71-73		74	75	76-77	
Transportation & Warehousing (48-49)		78			79	80-81			82		83-87	88-90		
Real Estate, Rental, & Leasing (53)				91-92		93								
Admin. & Support & Waste Management & Remediation Services (56)		94				95	96	97			98-99	100-101		
Educational Services (61)	102										103		104	
Health Care & Social Assistance (62)				105		106			107					
Arts, Entertainment, & Recreation (71)											108-110		111	
Accommodation & Food Services (72)													112	
Other Services (81)									113-115	116		117	118-121	
Public Administration (92)	122		123				124		125-126		127-129		130	131

Conclusion

Traumatic occupational fatalities are an important public health issue in Michigan and throughout the United States. These deaths are not random events, and information about the settings and circumstances in which work-related deaths occur is necessary to prevent their occurrence in the future. There were 32 less deaths occurring in Michigan in 2020 compared to 2019. The numbers and rates of these acute traumatic fatalities have fluctuated from year to year, and there has not been a clear downward trend over multiple years. The decrease in 2020 is probably secondary to reduced work activity from the stay-at-home work order and increased telecommuting related to the COVID-19 pandemic. The MIFACE program will continue to monitor work-related deaths to determine if there is a return to pre-pandemic levels. However, further efforts are needed to have a meaningful reduction of the occurrence of these tragedies.

The lack of a consistent and lasting decrease in the number and incidence rate of work-related fatalities, both nationally and in Michigan, is likely a result of many factors and continued investigation of the causal factors of work-related fatalities is necessary to understand and effect a meaningful reduction in these deaths. Understanding the root cause(s) of these tragic events and sharing this information with stakeholders, from individuals to groups, employees to employers, makes these information-gathering efforts worthwhile. If what we learn from any of these deaths can help prevent further tragedies, then the surveillance program has been successful in its goal. An awareness of the hazards of one's job and an attitude of safety-mindfulness on the part of labor and management is critical to prevent future fatal events.

Some important points highlighted by the deaths:

- The workforce aged 65 and older continues to grow as individuals put off retirement and part-time workers enter the workforce due to economic or other reasons. Older workers have unique health and safety challenges, including resistance to change long standing work practices that may not be safe, medical issues, or strength issues, all likely contributing to the higher work-related fatality rate in this age group. Federal [OSHA](#) and [NIOSH](#), among other agencies, have developed resources which can help employers address the challenges faced by older workers and provide a safe working environment for this population group.
- Fatalities from falls remain a major concern, particularly in construction. Information regarding the National Construction Fall Prevention Campaign can be found [here](#). The campaign's goal is to prevent fatal falls from roofs, ladders, and scaffolds by encouraging construction contractors to:
 - ✓ PLAN ahead to get the job done safely.
 - ✓ PROVIDE the right equipment.
 - ✓ TRAIN everyone to use the equipment safely.
- Homicides in the retail trade and accommodations and food services sectors and workplace violence in the health care sector have been recognized as important workplace risks. [OSHA](#) and [NIOSH](#) have both developed extensive resources for employers and employees to use to address the risks associated with workplace violence, especially within certain workplaces such [hospitals](#).

- Motor vehicle crashes are a major cause of work-related fatalities. This should not be a surprise in the Transportation and Warehousing industry sector given the nature of work tasks within this industry sector, but it is also true for many industry sectors. Employers should create and maintain safe driving policies and offer driver safety training (including defensive driving) as part of their safety program and training. MIFACE has created [a hazard alert](#) containing recommendations and resources for employers to develop motor vehicle safety policies and programs.
- Drug abuse/overdose in the workplace is a challenging issue for employers. Solutions are not straightforward. Stakeholders, including the medical, legal, insurance, safety, and regulatory community must collaborate to develop state-specific interventions and resources that Michigan's employers and employees can utilize to address this issue. NIOSH [Opioids in the Workplace](#) webpage offers resources related to opioid use. Resources to address prescription drug use and misuse in the workplace can be obtained from the [Substance Abuse and Mental Health Services Association](#) and [National Safety Council](#).

Each of the 131 deaths in this report could have been prevented, whether through installation of engineering controls, development and implementation of health and safety plans, changes to work practice, or the identification and assistance of individuals seeking and receiving mental health counseling so they can better cope with both work and personal stressors. The descriptions of the acute traumatic work-related deaths in Appendix I highlight these tragedies and the need to act to prevent them.

Acknowledgements

We are extremely appreciative of the support of the Michigan OSHA Safety and Health personnel, the employers, the families, and the experts who have worked with us to improve work conditions in Michigan.

We are also appreciative of our Advisory Board who provided constructive comments on each MIFACE Report who assisted us by providing thoughts on developing MIFACE policies and educational outreach activities, and their promotion of the MIFACE program to their employees and constituents.

MIFACE is a research effort and relies on the voluntary cooperation of employers and for the self-employed, their family members. We have received funds from the National Institute for Occupational Safety and Health to continue this program through 2021 and look forward to identifying ways to prevent work-related traumatic deaths and sharing what we have learned with those who may benefit from this knowledge.

APPENDIX I - Narratives

AGRICULTURE, FORESTRY, FISHING & HUNTING (NAICS 11) (25 deaths)

ASPHYXIATION

1. A male laborer in the timber industry in his early 70's died when he was pinned between two vehicles. The decedent stopped at a contractor garage to drop off a logging map. Within the hour, another contractor found the decedent on the ground, pinned between two vehicles. The decedent's vehicle was left in gear. Emergency responders attempted resuscitation but were unsuccessful. The decedent was pronounced dead in the ambulance.
2. A male farmer in his early 60s died after being pinned under his tractor. The decedent was plowing a field when his farm tractor rolled over in a ditch. The decedent was found lying face down underneath the tractor. He died at the scene.
3. A male farmer in his early 60s died when a tractor rolled over and pinned him underneath. The decedent was driving a tractor with a brush hog northbound when the tractor left the roadway to the west, entered a field for approximately 50 feet before crossing a different road and back on the roadway, still travelling northbound. During the investigation, there were observed tire tracks and damage to a bean crop at the northeast corner of two roads where the decedent crossed through the ditch, travelling approximately 400 yards through the bean field before the tractor overturned in the ditch. The decedent's head and upper chest were crushed by the tractor. The decedent died at the scene.

DROWNING

4. A male farmer in his late teens died when he was pinned under water after a tractor he was riding overturned. The decedent and his grandfather were driving a tractor, which was hauling a trailer filled with wood. They were travelling through a farm field, westbound, on the north side of a ditch, when the tractor drove through mud and overturned into the ditch. The ditch was approximately 6–8 feet deep. It was filled with approximately 3–4 feet of water. The grandfather was able to get free of the tractor, but the decedent was trapped under the tractor. He was pronounced dead at the scene.

FALL

5. A male farmer in his early 70s died when his tractor rolled over him. The decedent was using another farmer's tractor towing a tiller device to help plow another farmer's field. Neighbors observed that the decedent was lying face down in a farm field while the tractor that he had been operating still ran nearby, completing circles. Tire tracks and other evidence indicated that the decedent may have driven through a hole, which dislodged the operator, and damaged the steering piston of the tractor. Multiple and severe face, body, and limb injuries were observed. The decedent died at the scene.
6. A male farmer in his early 90s died due to a fall. No additional information was provided on the incident.
7. A male farmer in his late 60s died after he fell from a bucket truck platform. The decedent was up on his bucket truck platform that raises and lowers and moves side to side attempting to perform maintenance on his barn roof which was leaking. The leveler arm that held the bucket platform from tipping let loose where the bolt threads into the arm causing the platform to fall backwards toward the barn. The action tossed the decedent out of the platform and onto the ground hitting his head on broken chunks of concrete that were located below the platform. He died at the scene.

HEAT/COLD

8. A male farm worker in his early 20s died from hyperthermia. The decedent was working in a farm field staking posts for eggplant growth. After working for approximately eight hours, he complained of being hot and was transported by his coworkers to his residence. He was later transported to a nearby hospital where

he died the next day.

MACHINE

9. A male farmer in his mid-60s died after he was pinned under a tractor. The decedent was fixing the hydraulics for the loader bucket. The decedent lifted the bucket up and was fixing the hose. It appears that the hydraulics ran out and the bucket dropped on the decedent. The decedent was pinned between the loader bucket and the front bumper of the tractor. He died at the scene.

10. A male farmer in his late 70s died when he became entrapped under a farm tractor. The decedent was getting onto the tractor while it was running, when the tractor engaged, and the decedent's trouser strap got caught on the tire which caused the decedent to be pulled off the tractor and pinned under the rear tractor tire. The incident was witnessed by a family member who was able to back the tractor off of the decedent. He was taken to a nearby hospital where he later died from injuries he sustained.

11. A male truck driver for a farm in his mid-60s was making a delivery of sugar beets. He backed up his truck full of sugar beets to a piler and then went to the back of his truck and climbed on to the piler to release the tailgate. The decedent then fell into the tail pulley of the cross conveyor. The incident was unwitnessed. It is not clear if the decedent was standing on his truck or the piler when he unlocked his tailgate. A machine operator immediately stopped the machine when he saw the decedent on the conveyor. He stated that there was very little room for the decedent to be able to reach through and unlock the tailgate from the ground or by standing on the tire of the decedent's truck. It would have been much easier for the decedent to reach the tailgate if he stepped up on the side of the machine, just above the conveyor belt.

12. A male dairy farm laborer in his early 40s died after his clothing became entangled in farm equipment. The decedent was cleaning the calf barns and was found by his coworker hanging on the south wall of the barn by the automatic tarp roller. The controls to lift/lower the automatic tarp roller was located on the east wall of the barn, approximately 12 feet from where the decedent was located. The decedent pushed the control to lift the tarp and the tarp was not rolling up, or it was rolling slowly. It appears the decedent walked to the corner of the barn where the motor was located and attempted to push up on the tarp roller. The right arm sleeve of the decedent's hoodie got caught in the roller and started to pull his arm/sleeve into the tarp roller. It appears the decedent pulled his right arm out of the hoodie sleeve and his sleeve continued to whine into the tarp roller until the hoodie sleeve came across to the left side of his body, choking him at the neck. The decedent's left side of his neck was also up tight to chicken wire, which most likely contributed to his being asphyxiated. The end destination of the tarp roller was at 5'6", the location of the tarp roller at its end full height. It was observed that the controller on the east wall had tripped, showing the motor was overloaded. The decedent was transported to a nearby hospital where he later died.

13. A male employee of a forest nursery in his early 90s died after a tractor he was driving left the roadway and subsequently he fell from the tractor. The tractor was found approximately 100 yards from the decedent's body in a corn field. There were tractor tire marks travelling southbound in large circles and random directions possibly striking the decedent while he lay on the ground. The crash occurred on a dirt road. It was a sunny day. He was declared dead at the scene from multiple blunt force injuries.

MOTOR VEHICLE CRASH

14. A male farm delivery driver in his early 70s died when his vehicle crashed. The decedent was transporting potatoes to a dumping ground. He was travelling southbound when the vehicle ran off the roadway to the right and entered a ditch. Then the vehicle struck a ditch embankment, it caused the vehicle to flip onto the passenger side, spilling approximately 18 tons of potatoes. The vehicle then slid approximately 50 feet down the road before coming to rest. The incident occurred on a dry, flat, straight gravel road in clear weather. The speed limit was 55 mph-not posted. The decedent was conscious and alert but had facial injuries and was trapped inside the cab of the truck. The decedent did not have a seat belt on at the time of the crash which caused him to be tossed inside the cab of the truck. The vehicle was not equipped with an airbag. The decedent stated he did not remember the crash. The decedent was taken to a local hospital but passed away three days later from the injuries sustained.

15. A male farmer in his mid-50s died after the farm tractor he was driving was struck from behind by another vehicle. The decedent was driving southbound when another vehicle attempted to pass his tractor in the oncoming lane. Then the tractor began swerving as if it was going to pull in front of the vehicle that was attempting to pass it which caused the other vehicle to change back to the right lane. During the change to the right lane, the tractor pulled back into the right lane as well, but the vehicle struck the rear of the tractor. The decedent was ejected from the tractor backwards striking his head and torso against the vehicle and then onto the asphalt road. The decedent was taken to a nearby hospital where he later died from the injuries sustained in the crash. The crash occurred in daylight and clear weather on a dry two-lane roadway. The posted speed limit was 55 mph.

STRUCK BY

16. A male farmer in his early 70s died after he was struck by a falling tree. The decedent did not realize a dead tree he was cutting was connected at the root to another tree. He cut a chunk of one tree but it did not fall over. It appeared that the decedent grabbed a chain and attached it to the bottom of the tree that was cut in an attempt to drag it out. While attempting to drag it out with the tractor, it moved the entire root, which brought down the second tree that was connected at the root. It appeared the second tree then fell forward, striking the decedent on top of his head while the tractor was in motion backward. The tractor continued backward until it could move no further with the chain being attached to the first tree. The decedent died at the scene.

17. (&18.) A male farming equipment driver in his mid-60's and a male farming equipment driver in his late 50's died after being struck by a vehicle. The decedent and his partner were in the process of changing a flat tire on the eastbound shoulder of a two-lane paved highway when they were struck by a sedan heading westbound. The at-fault driver was impaired from multiple drugs. The crash occurred during the day in clear weather on a dry road. The unposted speed limit was 55 mph. The first decedent was found lying semi-conscious, but not speaking in the roadway adjacent to the trailer with which he was assisting. The decedent sustained multiple blunt force injuries and hemorrhaging as the result of being struck by the automobile. He was transported to the nearby hospital, where he was pronounced dead shortly thereafter. The second decedent was found lying face-down in the roadway adjacent to the trailer that he was hauling, which carried a grain header. The decedent sustained multiple blunt force injuries as the result of being struck by the automobile.

19. A female farmer in her late 60s died was struck by a bale of hay and had a spinal cord injury. She died three years later from complications of the spinal cord injury.

20. A male farmer in his mid-40s died after being struck by and pinned underneath a large branch of a tree that had fallen. The decedent was using a chainsaw to cut a tree that had blown over that was approximately four feet in diameter and 12 feet tall from where the tree was being cut at the stump. At some point when he was cutting the trunk of the tree into sections, it rotated back towards him, knocked him down and trapped him underneath causing fatal injury.

21. A farmer in his mid-50s died after he was hit by a cement beam. The decedent was bringing a round hay bale into a barn on a Kubota LA524 tractor when a roll bar became caught on the concrete pillar above the entrance of the barn. The tractor had enough forward momentum to pull the concrete pillar off of the barn walls. The pillar fell on top of the decedent's back, right shoulder and neck, pinning him to the tractor. The tractor stopped just within the back entrance of the barn. A large part of the barn wall next to the tractor was found laying in a large pile inside the barn. The decedent's body was crushed from the weight of the concrete pillar. The decedent died at the scene.

22. A farmer in his early 80s died after he was pinned by a tractor's tire. The incident was not witnessed. The decedent was found lying face down on a dirt floor in the middle of the barn. The decedent's head was close to the left rear tire of the tractor. The involved tractor was a 1965 John Deere 3020. This tractor was known to have problems with the starter. The tractor was "on" and in the forward gear. The decedent died at the scene.

23. A male farmer in his early 80s died after he was struck by a falling tree. The decedent was cutting wood with a chainsaw in the woods when the incident occurred. He cut one tree and did not start any other work.

He was struck on his back by a dead/rotted ash tree that had fallen most likely due to the windy conditions that day. He was just a few feet away from the freshly cut tree. It did not appear that the ash tree would have been resting or lodged on the tree the decedent had cut. The decedent was found in a sitting position. It is believed the decedent never saw the tree falling that fell on his back and bent his upper body in a 90 degree angle over top of his legs. Next to the decedent was a protective hard hat and chainsaw which was still in the on position. The chainsaw had no fuel left in the tank.

SUICIDE

24. A farmer in his early 70s died from a self-inflicted gunshot wound.

25. A male farm hand in his late 20s died from a self-inflicted hanging.

MINING (1 death)

STRUCK BY

26. A male heavy equipment operator in his late 20s died while working with other miners to set a steel plate vertically against the frame of a feed hopper, when the plate fell on him. The miners had intended to build an earthen feed ramp against the steel plate so front-end loaders could travel up the feed ramp to dump sand and gravel in the feed hopper. The feed hopper would supply material to an overland conveyor, which conveyed material to the plant. Miners used lift rigging to attach the steel plate to the bucket of the front-end loader. The lift rigging consisted of two double chain slings with grab hooks on each end and clevis anchor shackles. A front-end loader equipped with a for attachment was used to hold the steel plate against the frame of the feed hopper. When the grab hook and chain were removed from the south side of the steel plate by one of the miners, the decedent attempted to remove the rigging from the north side of the steel plate; however, the grab hook was stuck in the lifting hole. The decedent told his coworker to lower the forks and the decedent stepped up onto the forks so he could reach and dislodge the grab hook from the lifting hole. The steel plate tipped over onto the decedent pinning him between the fork and the plate. The steel plate was lifted off the decedent with the bucket of the front-end loader. The steel plate weighted approximately 10 tons. Emergency response was called, and the decedent was transported to a local hospital where he died.

CONSTRUCTION (25 deaths)

ASPHYXIATION

27. A male public works supervisor in his mid-40s died after he was buried in mud and water during repair of a water main break. The decedent was a part of a crew assigned to fix the water main. The hole was two-tiered. The first tier was approximately five to six feet deep, and the second tier was approximately eight to ten feet deep. He was in the deepest part of the hole bent over clearing dirt from the main when the clay wall collapsed on him. He was pinned face down. The decedent's head was in the water and some of the parts of his body were not completely covered in dirt. Two of his co-workers jumped in the hole in an attempt to move dirt off of him from around his head. They continued until the Fire Department came. The decedent was manually lifted from the hole after an attempt to lift him using a rope failed. The decedent was unconscious and was taken to a nearby hospital where he later died.

DRUG OVERDOSE

28. A male iron worker in his late 20s died from a drug overdose. He was found in his car in the parking lot when he did not return to work from a fifteen-minute-break.

29. A male self-employed painter in his mid-30s died from a multiple drug overdose. He was found dead in the bathroom of a residential property that he was painting by the property owner.

ELECTROCUTION

30. A male electrician in his mid-40s died when he was electrocuted. The decedent was working at a commercial building. He removed the cover from a 480-volt electrical panel to repaint the cover. As the decedent was placing and securing caution tape in and around the electrical panel, his hand came into contact with exposed electrical conductors inside the panel thru which flowed 480 volts of alternating current. He was electrocuted and died on the scene.

FALL

31. A male iron and steel worker in his late 40s died after he fell from a rack 25 feet to the ground. He was erecting structural steel at a multi-employer construction project. He was connecting a T-brace to the structural steel when he fell. He was found on the scene. Emergency services transported the decedent to a nearby hospital where he died from the injuries he sustained.

32. A male roofer in his early 50s died after falling from a third story roof. The decedent fell from a three stories roof to a second story platform prior to rolling off and hitting the ground. The building was approximately 20–30 feet tall. The decedent did not remember what he landed on and was conscious after the fall. He was transported to a nearby hospital where he was found to have severe C-spine injury and where he underwent multiple procedures with neurosurgery. He died approximately two months after the fall after developing multiple complications in the ICU.

33. A male roofer in his mid-40s died after falling from a barn roof. The decedent was laying felt paper down on a barn roof when he lost his balance about 6' from the edge of the roof and fell approximately 15 feet striking a trailer on the way down. The decedent was hospitalized for his injuries and passed away five days later.

34. A male construction worker in his mid-50s died after he fell from a 30 ft ladder. The decedent was unresponsive at the scene and was taken to a nearby hospital where he died from the injuries he sustained.

35. A male painter in his mid-50s died from a blunt force trauma to his head after he fell from a 24 feet extension ladder to the pavement. A witness stated he fell from the top of the ladder. Emergency response was called, and the decedent was transported to a local hospital where he died.

36. A male carpenter in his mid-70s fell from a height in 1989. He died from complications of the injuries he sustained in 1989.

37. A male roofer in his late 50s was putting shingles on a roof in 1991 when he fell approximately 12 feet to the ground. He landed on his head onto a gravel and sand surface. The fall was not witnessed. He suffered severe injuries and was quadriplegic after the fall. He died from complications of the injuries 29 years later.

38. A male in his early 60s was climbing up a 12-foot ladder carrying a bucket to get onto a roof. When the decedent was almost at the top of the ladder, he slipped and fell. The decedent was falling sideways, and his coworker tried to catch him at the waist, which caused him to fall headfirst to the ground. He was transported to a nearby hospital where he died from his injuries.

39. A male heating and cooling installer in his early 60s died after a fall of approximately 20 feet from rafters at a construction site. He was found lying on his back unresponsive. He was transported to a nearby hospital where he later died.

MACHINE

40. A male heavy machine operator in his late 30s died when he was run over by a piece of equipment he was operating. The decedent was operating a bulldozer in the lot of an elementary school and driving up an incline that led to the foundation where the school used to be. The bulldozer was tilted back on the rear end and the decedent was performing what looked like a "wheelie". The decedent then lost control and was ejected from the bulldozer. It is believed the decedent was not wearing a seat belt. The bulldozer then got knocked into reverse and broke through the safety gate heading for a nearby residence. The decedent ran towards the bulldozer to try and stop it from hitting the residence before being crushed and killed by the bulldozer.

MOTOR VEHICLE CRASH

41. A male owner and operator of a home and commercial repair business in his early 50s died due to a motor vehicle crash. The decedent was driving northbound when he left the roadway on the west side of the street sideswiping a tree, striking another tree head on and then catching on fire. The vehicle's driver side was the area of impact. The driver's side door was no longer in place and was on the inside of the tree extended forward. The emergency services were unable to access the decedent due to flames. He was extracted from the vehicle by fire department personnel and transported to a nearby hospital where he later died due to injuries sustained in the crash. He had no signs of burns. The crash occurred in daylight, clear weather, on a non-freeway two-lane road. The posted speed limit was 25 mph. The decedent was wearing a seat belt. The air bag deployed during the crash.

42. A male worker in his mid-50's employed in a company that makes and installs fire suppression systems was travelling eastbound when his vehicle left the roadway and crashed into a river. The decedent was on the way back to his company after having dropped off some equipment and parts. The decedent's vehicle left the paved surface of the roadway and went into the median in an east bound direction. The vehicle continued travelling east and went toward the west bound lanes, wire guard rails, striking the guard rails along a path of about 60 yards. The vehicle then changed directions continuing east bound in the median. The vehicle then struck a sign and then the metal guard rail at the concrete barrier by a river. The vehicle then went airborne crossing the river, striking the concrete barrier on the other side of the river and then fell into the river. The decedent became trapped in the vehicle with his feet being stuck under the pedals of the vehicle. He was submerged in the water up to his chest level. It took approximately 30 minutes to extract the decedent from the vehicle. He was transported to a nearby hospital where he later died from the injuries sustained in the crash.

STRUCK BY

43. A male paver in his late 20s died from complications three years after being struck in 2017 by a tow truck while working on a two-lane intersection.

44. A male truck driver in his late 40s died after he was pinned against his dump truck. There was a large excavator loading gravel into a dump truck. East of the excavator there was a five foot stack of road mats. A road mat is a series of large timbers (approximately 8"x12"x20") linked together to form a road through swamy areas. The decedent parked his dump truck next to the timbers and got out of his truck so the excavator could load the dump truck with gravel. The excavator swiveled, and the counterweight (rear of the tractor) struck the timbers and pinned the decedent against the dump truck. The decedent sustained an open chest wound. He was transported to the nearby hospital where he died from the injuries he sustained.

45. A male road worker in his mid-20s died after being struck by a vehicle. The decedent was working with two other coworkers on the right shoulder of the divided highway with a barrier. They were working by the two orange Macomb County Road Commission pickup trucks parked on the right shoulder with the orange overhead lights activated. They were finishing the work they were doing on a drain cover when the decedent was struck by a passing vehicle. The vehicle involved failed to stop at the scene of the crash. The crash occurred during the day in clear weather on a dry road. The posted speed limit was 55 mph. The decedent died at the scene.

46. A male road worker in his early 40's died after being struck by a vehicle. The decedent was performing work duties on a two-lane highway overpass when he was struck by a pick-up truck. The crash occurred during the day in clear weather on a dry road. The decedent sustained multiple blunt force injuries as the result of being struck by the automobile. The posted speed limit was 55 mph and there were road construction signs posted prior to the collision point. Resuscitation was attempted, but was unsuccessful, and he was pronounced dead at the scene.

47. A male underground excavating foreman in his early 50s died when the broom tractor he was driving was rear-ended by a passenger vehicle. The crash occurred on a dry two-lane public roadway. Dirt was freshly brushed away from the concrete by the tractor prior to the crash. The vehicle was travelling

westbound sweeping the roadway clear of dirt prior to the crash. The posted speed limit was 50 mph. The tractor was equipped with a mud brush attached to the front. The tractor was utilized as special mobile construction equipment to remove mud tracked on the roadway by trucks from a construction staging ground on the north side just east of the crash. The section where the crash occurred was not part or marked as a construction zone. The decedent was unresponsive on the ground and was transported to a nearby hospital where he died seven days after the crash.

48. (&49.) Two male construction workers, both in their early 20s, died after they were struck in a highway work zone by a motor vehicle. They were working with a third coworker on the east bound side of a highway exit. It was still dark. They were standing next to the open driver door of one of the two work trucks looking at a computer. A third employee of the crew was further away inside of another work vehicle, backing it up to provide some lighting until the actual light truck arrived. The vehicle that struck the workers travelled at a high speed, passing construction barrels and driving over several cut holes in the concrete. It struck the generator near the truck the workers were near, and then it struck the drivers rear of the work truck and both workers. The first worker was thrown approximately fifty feet. The other worker was thrown and possibly dragged, approximately one hundred and forty-five feet. Both workers were pronounced dead at the scene.

50. A self-employed heating and cooling male contractor in his mid-70s died from complications of injuries he sustained in 2019 when a metal oil tank fell onto his chest and legs. The decedent was unloading the tank from his truck when the tank unexpectedly shifted and struck him.

SUICIDE

51. A male owner of a construction company in his late 50s died from a self-inflicted gunshot wound.

MANUFACTURING (13 deaths)

ASPHYXIATION

52. A male equipment operator in his late 50s died after his clothes became entangled in a conveyor belt. The equipment operator was working outside putting salt onto a Nicholson Debarker conveyor to help prevent the belt from slipping. He was standing on piles of mulch by an unguarded sprocket. The conveyor system was not shut down or locked out. As the decedent was placing salt on the conveyor system, a rotating sprocket snagged his coat, and lifted him into the air. The decedent's coat became wrapped up in the gears and tangled around his body and neck, covering everything but his head. The decedent's hard hat and winter hat were laying in the snow right by him. When the decedent was found by his co-worker, the co-worker unsuccessfully tried to free the decedent from the gears of the machine with a utility knife. When Emergency Services arrived at the scene, they helped free the decedent using scissors. The decedent was pronounced dead at the scene.

DRUG OVERDOSE

53. A male fit and finish technician for an automotive manufacturer in his early 40s died from a drug overdose.

ELECTROCUTION

54. A male maintenance technician and electrician in his early 60s was electrocuted. The decedent was working alone inside an electrical junction box that contained live parts. The decedent was making connections in the junction box for the drive motor wiring. There were multiple parts in the shared junction box. The decedent did not deenergized all live parts entering the junction box and made contact with live parts. The decedent sustained an electric shock after making contact with live parts and was killed. The decedent was discovered by his coworkers. He was pronounced dead at the scene.

FALL

55. A male dryer technician in his 50s died after falling from an overhead catwalk. The decedent was cleaning using an air hose wand while standing on a catwalk approximately 23 feet above the ground. During the cleaning task, the decedent fell through the catwalk's guardrail system. The fall was not witnessed. He died at the scene.

56. A male electrician in his early 60's died after falling. The decedent was in the breakroom of his place of employment, waiting to clock out from work, when he fell and injured his forehead. This incident was not witnessed. The decedent had reported to coworkers as having had a headache earlier that day, Emergency Response found him unresponsive and transported him to the hospital, where the lead emergency room doctor suspected that the decedent had suffered a brain aneurysm. The decedent died in the hospital 5 days later.

57. A male automotive inspector in his early 50s died from complications from a fall that occurred in 2019.

HOMICIDE/ASSAULT

58. A male clothing store co-owner and a graphic designer in his early 40s died from a gunshot wound to his head. He was discovered by a coworker in the office of his store.

MACHINE

59. A male press operator in his mid-30s died after he was trapped in an industrial press. The decedent was loading and unloading parts into the cavity of a 200-ton horizontal hydraulic press used to form metal. The decedent was positioned within the sensing field of the light curtains. The machine cycled and crushed the employee between the ram and the collet die. He was declared dead at the scene.

60. A male supervisor at the steel processing plant in his mid-30s was working with other coworkers on a banding line to straighten a roll of coil steel. The industrial compression type machine was restarted while the decedent was still inside the machine. The decedent was not able to get out of the way in time and his head was crushed between the machine's moving transfer mechanism part and the mechanism's fixed steel support. The decedent was taken to a nearby hospital by emergency services and pronounced dead at the hospital.

61. A male general laborer in a sugar beet processing plant in his early 50s died after he fell into a press. The decedent was a part of a crew working in an elevated area cleaning a chute. The decedent fell down a chute into an auger designed to crush and pulp sugar beets. He fell approximately 120 feet. He died at the scene.

MOTOR VEHICLE CRASH

62. A male truck driver in his mid-40s died when his vehicle crashed. The decedent was travelling southbound on a curved two-lane roadway with a posted speed limit of 70mph. He had recently dropped a trailer off and was being followed by a co-worker in a separate semi. It was dark, raining heavily and the road was wet and slippery and unlit. The decedent lost control of his semi which flipped over multiple times and rolled into the median where it rested on its top. The decedent was trapped in the cab that was completely crushed and his extraction took approximately an hour. During that hour, the only part of the body the Fire Department could see was his leg, which they were unable to free from the twisted steel to check for a pulse. Upon extraction of the decedent, he was declared dead at the scene. The decedent was wearing a seat belt and the vehicle's air bags did not deploy.

STRUCK BY

63. A manufacturing supervisor in his late 50s died after he was crushed underneath a shop painting blaster. The decedent had advised his coworker, who had been having trouble running the machine, to empty the

machine and run an empty cycle. When the coworker pushed the buttons for the blaster to remove the materials, another coworker noticed that the decedent was under the machine. The decedent's head was caught between the machine and the base of the machine and instantly crushed. The decedent died at the scene.

64. A male mold laborer in an automotive industry in his early 40s died after being struck by a 14,000-pound mold. The decedent was observing an installation of the mix head on the cavity side of a two-piece mold, which was mounted on the booked open vertical platens of the PPD 10 inches by 12 inches Reaction Injection Molding clamp press. The 23,000-pound core side of the two-piece mold unexpectedly fell from the platen to the floor and crushed the bottom half of his body from his waist down trapping him underneath the mold. He died at the scene.

WHOLESALE TRADE (5 deaths)

FALL

65. A male executive of a motor vehicle supplies and new parts wholesaler in his early 90's died due to a fall. The decedent was taking out garbage and fell outside of his workplace building. The fall was unwitnessed. He died two weeks after the incident from the injuries sustained in the fall.

HEAT/COLD

66. A male auto salvage owner in his mid-70s died from complications of hypothermia. The decedent was found wedged in his tractor in his field for an estimated 24 hours outside overnight in cold weather. From the way he was found it appeared that he fell over backward, and his legs got caught between the tractor and the wheel and he was unable to extricate himself. He was hanging upside down half on the ground. He was cold and confused and brought to a nearby hospital where he later died.

MOTOR VEHICLE CRASH

67. A male truck driver in his late 60s died when his vehicle rolled over. The decedent was travelling northbound delivering food products with the use of a tandem semi-truck and a double trailer configuration. The crash occurred on a divided highway with a barrier when the vehicle drove off the roadway on the left as the roadway curved right. As a result of the crash, the truck and the first trailer had come to rest with the driver's side down. The second trailer became detached from the other two units during the crash. The decedent was the sole occupant in the cab of the truck and was found pinned underneath the steering wheel. The decedent was conscious but had difficulty breathing. He was removed from the cab of the truck and airlifted to a nearby hospital. He died from the injuries sustained in the crash two weeks after the crash. The decedent was wearing shoulder and lap belt and the air bag did not deploy during the vehicle's rollover. The incident occurred on a dry, dark – unlighted roadway in clear weather. The posted speed was 75 mph.

STRUCK BY

68. A male towing and recycling business owner in his early 70s died after being run over by a skid steer. The decedent was working with a coworker and a family member on a chain on the skid steer. The decedent was standing in front of the skid steer and no one was inside the machine. When they were able to hook the chain up, the decedent began moving the skid steer back and forth by reaching inside to check their work. At one point, the skid steer went forward and drove on top of the decedent up to his chest. The skid steer weighed approximately 2000 pounds. The coworker and the family member tried to move the skid steer off the decedent and pull him out from under the machine. At some point, the skid steer went forward and drove over the coworker, pinning him up against a pickup truck and the ground. Both the decedent and his coworker were separately transported to a nearby hospital where the owner later died.

SUICIDE

69. A male IT programmer in his early 30s died from a self-inflicted hanging.

RETAIL TRADE (8 deaths)

DRUG OVERDOSE

70. A female gas station clerk in her mid-40s died from a drug overdose. She was found unresponsive by customers in the bathroom at her workplace.

HOMICIDE/ASSAULT

71. A male owner of a marijuana dispensary store in his mid-30s died from multiple gunshot wounds to his chest when his store was robbed. He was declared dead at the scene.

72. A male security guard in his mid-40s died from a gunshot wound to his head.

73. A male clerk in his late 30s died from a gunshot wound to his abdomen after he was shot by another person. The decedent was selling clothing at a tent at his brother's business. Emergency response was called, and the decedent was transported to a local hospital where he died.

MOTOR VEHICLE CRASH

74. A male truck driver in his late 40s died when his vehicle crashed. The decedent was travelling westbound in the left lane when the box truck he was driving was struck by another vehicle that was in the center lane. The other vehicle's tire blew out which caused the driver to lose control of his vehicle and strike the decedent's vehicle. After the vehicles collided, the decedent's vehicle struck a cement barrier and overturned. After overturning, the box truck caught fire and was quickly engulfed in the fire. The decedent was trapped inside the vehicle and died at the scene. The crash occurred in a daylight, clear weather and on a dry divided highway with barrier. The speed limit was posted 70 mph.

STRUCK BY

75. A male mechanic in his early 40s was kneeling on the ground, removing gallon size containers of coolant from a cabinet in front of a vehicle. The decedent's coworker had finished completing an oil change on a manual transmission vehicle and was going to check the vehicle for leaks. The coworker placed his foot inside the vehicle on the clutch pedal and started the vehicle. The coworker did not realize the transmission was in first gear and not in neutral. The vehicle's hood was still raised and the coworker was unable to see if the decedent was to the right of the vehicle or exactly in front of it. When the coworker started the vehicle, it jumped forward about four feet striking and pinning the decedent against the toolbox. The decedent suffered multiple blunt force injuries. Emergency services were called and the decedent was taken to a hospital where he was pronounced dead.

SUICIDE

76. A male assembler in his mid-50s died from a self-inflicted gunshot wound.

77. A male record shop owner in his late 50's died from a self-inflicted hanging.

TRANSPORTATION AND WAREHOUSING (13)

ASPHYXIATION

78. A male truck driver in his late 50s died when he was crushed by a dump truck trailer. The decedent was

delivering gravel when while dumping the gravel, the raised box contacted powerlines. The semi and the trailer became fully engulfed in flames. While the decedent was underneath the trailer trying to unhook it from the cab, the trailer's tires burst, and trailer pinned the decedent to the ground and he died of mechanical asphyxiation.

ELECTROCUTION

79. A male in his mid-teens died when he was electrocuted. The decedent was working on a roof of a warehouse when he contacted high voltage electrical lines. He was earning money by cleaning up the warehouse for the tenant of the building. He died at the scene.

FALL

80. A male truck driver in his late 50s died after a fall from a truck. The decedent was found unresponsive on the ground at the rear of his semi-tractor trailer at a truck stop. The decedent died from an unwitnessed fall which resulted in multiple blunt force injuries of chest.

81. A male material handler in his mid-50s died when he fell off a Hi-Lo. He was found unconscious, not breathing and bleeding from his head. He was taken to a hospital where he died from complications of multiple injuries.

HOMICIDE/ASSAULT

82. A male tow truck driver in his early 60s died from multiple gunshot wounds. No additional information was provided on the incident.

MOTOR VEHICLE CRASH

83. A female mail carrier in her 50s died when the mail truck she was driving was rear-ended by another vehicle. The crash occurred in the daylight on straight, dry two-lane road. The speed limit 55 mph-not posted. Both vehicles were driving southbound. The decedent's mail truck was parked while delivering mail when it was rear-ended by a vehicle that drifted across the fog line and struck it. The mail truck flipped over and landed in a ditch trapping the mail carrier inside and caught on fire. The decedent was not wearing her seatbelt and the vehicle was not equipped with airbag.

84. A tow truck driver in his mid-30s died when his vehicle rolled over. The decedent was travelling southbound with a four-door sedan being transported on the bed when a tire of his tow truck popped. The decedent lost control of his vehicle and rolled several times into a ditch. The sedan was thrown from the tow truck during the roll-over crash. The decedent was wearing a seat belt at the time of the crash. The decedent was trapped inside of the upside-down, crushed truck cab. Prior to the decedent's extraction from the vehicle's cab, the paramedics confirmed he was deceased. The incident occurred on a dry, straight divided highway without a barrier in clear weather. The roadway was free and clear of any debris. The speed limit was 70 mph - posted. The vehicle's front air bag deployed.

85. A male mail carrier in his late 60s died when the mail truck he was driving collided with another vehicle. The crash occurred during the day in clear weather on a dry intersection of a two-lane road. The decedent was travelling eastbound, and the other vehicle was travelling southbound. The road running north/south had the right-of-way and was paved with a bituminous material. The road running east/west was controlled with stop signs and was paved east of the intersection and gravel to the west. There were no observed pavement defects that could have contributed to the crash. The speed limit in this area was unposted 55 mph. The decedent's vehicle stopped at the stop sign as he approached the intersection and then pulled into the southbound vehicle's path. The southbound vehicle could not stop in time to avoid a collision and struck the right side of the decedent's vehicle. The southbound vehicle was travelling more than double the speed limit of 55 mph when the mail truck pulled into the intersection. The collision separated the body of the mail truck from the chassis. The decedent was ejected from his vehicle and came to rest outside of the shoulder on the

west side of the road south of the intersection. Damage was clearly on the right side of the mail truck. As is typical on mail delivery vehicle's the decedent was operating the vehicle from the right side. The collision deformed the decedent's footwell area trapping the decedent's shoe in the twisted metal. The decedent's lower portion of his left leg was severed. The decedent was wearing a shoulder and lap belt and the airbag deployed. The decedent was pronounced dead at the scene.

86. A male truck driver in his mid-20s died after the flatbed truck he was driving crashed. The decedent was a temporary driver. The decedent was driving eastbound near the curve of the two-lane highway when the truck he was driving went on to the south side of grassy shoulder. The decedent then attempted to reenter the roadway but failed to do so which caused the vehicle to flip several times before coming to rest in the grassy shoulder. The crash occurred in the daylight on rainy day on a wet roadway. The posted speed limit was 45 mph. The decedent was transported to a nearby hospital where he later died.

87. A male truck driver in his late 40s died when the semi he was driving crashed. The decedent was travelling southbound when on a slight curve the semi drifted off the right shoulder of the roadway. The decedent tried to correct by turning left sharply, but the trailer went off the road and down the hill. The trailer was loaded with non-hazardous materials. The semi and trailer rolled and landed upright in the ditch. The decedent was ejected from the vehicle and was found approximately 30 feet in front of the semi. He died at the scene. His co-driver was asleep in the sleeper area and suffered serious injuries. There were personal items and trash scattered around the vehicle. The trailer had some mud and scrapes on the top edge and its right side was damaged. The cab was severely damaged, and the windows and windshield were gone. The incident occurred in daylight, in cloudy weather, on a curved and dry two-lane highway divided with barrier. The posted speed limit was 65 mph.

STRUCK BY

88. An owner operator of a logging truck in his early 60s died when he was run over by his truck. The decedent's truck was parked on the side of highway and not occupied. The decedent had exited the vehicle to perform unknown actions although it appeared he might have gone to the bathroom on the shoulder of the road near the passenger side of the trailers. At some point the brakes of the truck either failed or were not set properly and the truck began to roll forward. Based on the evidence at the scene, it appeared that the driver tried to run in front of the truck to get back into the cab and gain control of the vehicle but was struck and run over. The witnesses of this incident were all driving southbound when they had to stop when they observed the truck crossing the road and centerline at a slow pace. They then witnessed the truck strike a sign, and then come to a rest after hitting a building. The witnesses found the truck cab unoccupied, called 911 and shortly after found the body of the decedent in the roadway. He died at the scene. None of these witnesses observed the truck run over the decedent because it was dark and they were only watching the truck itself.

89. A male truck driver in his late 40's died after being struck by his semi-truck. The decedent was in a parking lot picking up a load to transport. He left the truck cab to enter the building, failing to apply the air brake. Upon exiting, he noticed that his vehicle had begun to roll forward, eastward. The decedent moved in front of his truck, attempting to stop it, but was pushed forward and briefly pinned between his truck and a stationary semi-trailer facing north. His chest and abdomen were crushed, creating multiple blunt force injuries. Resuscitation efforts by the ambulance team were unsuccessful and he was pronounced dead at the scene.

90. A male mechanic in his early 20s died when he was crushed between two semi-trailers. The decedent was assisting in hooking up the two trailers. This death occurred when the driver of the semi-truck attached to a trailer was slowly backing (east) to hook up to a second trailer. The driver of the semi-truck was being assisted by the decedent. The driver indicated he thought he was given a hand signal to proceed to back up. The decedent got in between the two trailers and based on the statements and injuries it is believed he was facing east with his back to the semi-truck and trailer that were currently backing. The decedent appeared to have started to lift the draw bar to the second trailer prior to getting pinned between the two trailers. He had extensive chest trauma. The decedent was transported to a nearby hospital where he died from the injuries.

REAL ESTATE, RENTAL AND LEASING (3 deaths)

DRUG OVERDOSE

91. A male service technician in his late 40s died from a drug overdose. He was found lying on the ground by his car which was parked next to his company's building.

92. A male property manager in his early 40s died from a multiple drug overdose. He was found dead in his office when he did not return home from work that evening.

FALL

93. A male mechanic in his early 60s died after falling. The decedent was outside moving brush from a trailer to a brush pile when he fell and hit his head on cement. When the decedent returned inside his workplace, he did not remember anything. He told his coworker that he fell or passed out, found himself in his truck and did not know how he got there. He asked his coworker to check his head and the coworker found a bruise and a bump on the decedent's head. That evening the decedent was taken to the hospital from his home where he died next day.

ADMINISTRATIVE AND SUPPORT AND WASTEM MANAGEMENT AND REMEDIATION SERVICES (8 deaths)

ASPHYXIATION

94. A male landscaper in his mid-50s died when a trench collapsed on him. The deceased was working in a trench that was approximately 13 feet deep, 40 feet long and 8 feet wide. The walls of the trench had been dug out with a backhoe with the north side of the trench having smooth edges, but the south side of the trench having breaks in the sidewall. At the time of the incident the weather was clear, sunny and with a light wind coming from the west off of Lake Michigan. The decedent was working with another coworker laying pipe to hook into the sewage drainage system. At the time of the incident, the decedent was inside of the trench and was cleaning off the end of the pipe and as he was doing so the walls of the trench collapsed and entrapped the decedent inside the trench. His coworker used a Deere excavator to remove the dirt from where the decedent was buried. It took approximately five minutes to remove enough dirt to remove the decedent out of the trench. The decedent did not show any signs of life after he was removed from the trench. The coworker indicated there were no safety precautions to work in a trench and there was no safety equipment.

FALL

95. A male electrician in his early 60s died after he fell approximately 15 feet through the outside roof and soffit portion of the building onto the pavement below. The decedent was performing electrical repairs to a storefront sign when he fell. The fall was not witnessed. He was transported to a nearby hospital where he was put on life support systems and later died from his injuries.

FIRE/EXPLOSION

96. A male repair technician in his early 40s died due to an explosion. The decedent was working on a pool pump when it exploded. He suffered a blast injury to his head and face with multiple fractures and traumatic brain injury. The decedent died from the injuries sustained in the explosion five days later at a in the hospital.

HEAT/COLD

97. A male waste collector in his mid-30s died from complications related to heat exposure. The decedent

was loading plastic and paper yard waste bags into the back of a hauling truck from a residential neighborhood. The victim was newly hired and was only performing half a normal collection route. He began work at 6:15 am and around 3:30 pm he was found unresponsive and was transported to a hospital after experiencing dehydration symptoms. He suffered from agonal breathing with a temperature of 106.9 F. He received treatment at a hospital but died approximately one hour after admission. Microscopic examination of the heart showed areas of very early heart muscle injury. Postmortem toxicology disclosed cocaine breakdown products in the blood but electrolyte levels from the fluid of the eyes reflected adequate hydration. The chronic cocaine abuse and hyperthermia contributed to his death.

MOTOR VEHICLE CRASH

98. A self-employed female in her mid-20s, who worked for a cleaning services company, died from a motor vehicle crash. She was a passenger in a car driven by her co-worker. The crash occurred driving from a client's home to their place of employment. They were travelling southbound when the co-worker oversteered her vehicle causing the vehicle to enter into a yaw. The vehicle then crossed over into the northbound lanes where it was struck on the passenger side by a vehicle travelling northbound. The vehicle overturned and landed on the passenger side. The decedent was trapped in the vehicle and died at the scene. The crash occurred in daylight on a dry straight concrete 5 lanes of two-way travel roadway, in cloudy weather. The speed limit was posted 45 mph. The vehicle's airbags deployed due to the crash.

99. A male landfill operations manager in his mid-40's died in a four-vehicle crash. The decedent was the front passenger of an SUV heading southbound to a work training session when the driver collided with a large manure spreader that was being towed by a tractor. The tractor was driving on the right shoulder of the southbound lane, though the spreader occupied most of the travel lane. The tractor was equipped with an array of rear lighting, but the spreader only had a muddied reflective sign. The SUV Event Data Recorder indicated that the driver was traveling at a speed between 61-63 mph and did not brake. After striking the spreader, the SUV veered into the northbound lane, colliding head-on with a pickup truck traveling northbound. The pickup was forced off the road, into the southbound ditch. The driver of the SUV then exited the vehicle parked in the northbound lane to assess the damages. A fourth vehicle heading northbound, blinded by the headlights of the tractor, was unable to see the SUV parked in the northbound lane, and failed to completely stop, glancing off of the front corner on the driver's side. The decedent suffered multiple blunt force head injuries and emergency response did not attempt to resuscitate. The crash happened in clear weather on a dark-unlighted non-freeway straight and dry road. The posted speed limit was 55 mph. The decedent was wearing a seatbelt and the vehicle's airbags deployed due to the crash.

STRUCK BY

100. A male tree cutter in his early 40s died when he was struck by a falling tree. The decedent had used a chainsaw to cut approximately 90% of the 21-inch diameter of a 17-foot ash tree. He was standing approximately 20 feet away cutting smaller logs when the tree fell unexpectedly. He was pronounced dead at the scene.

101. A male owner of a tree removal/landscaping company in his mid-30s died when a tree branch fell on him. The decedent and his coworker were attempting to cut down a tree located to the rear (west) of the garage. They tied a rope around the tree, and the decedent began to cut away at the trunk. The coworker was operating a Toro Dingo hydraulic power machine and pulling on the trunk to assist it in its fall. During the cutting, the trunk began to turn and rolled vertically across the western portion of the garage roof. The decedent was standing between the tree and a telephone pole, and thus, had nowhere to go. The trunk subsequently rolled off the garage roof and landed on the decedent. The decedent died on the scene.

EDUCATIONAL SERVICES (3 deaths)

AIRCRAFT

102. A male flight instructor in his late 60s died when the weight-shift aircraft crashed during a landing. The flight instructor and student pilot were returning to the airport to land following an instructional flight in the weight-shift aircraft. The decedent performed the approach and landing, and, upon touchdown, the engine power increased. The aircraft lifted off the runway, drifted toward the right side of the runway, began a mild oscillation, then impacted the ground. The trim position was set to "fast". The operating instructions indicated that the trim should be set to a "slow" position during landing. It is likely that the aircraft experienced greater than expected control forces and difficulty in slowing the aircraft during landing due to its improper trim setting. This subsequently led to his loss of control during landing. Both the decedent and the student pilot were wearing a helmet and safety belts. The decedent had severe injuries and had been initially trapped inside the aircraft which was overturned. The decedent was transported by Aero med medical transport to a hospital where he was treated for his injuries. He became a paraplegic from the airplane crash and died four years after the incident.

MOTOR VEHICLE CRASH

103. A male driver instructor in his late 60s died in a motor vehicle collision. The decedent was instructing a trainee in her first driving lesson. The trainee turned west bound when she overturned and jumped the curb and hit a tree. The decedent was unable to correct the turn in time to keep the vehicle on the road. The crash occurred on a two-way, non-divided road with a continuous turn lane, in daylight and clear weather. The road surface was dry, and the posted speed limit was 35 mph. The decedent died the next day from complications of the crash.

SUICIDE

104. A male professor in his late 40s died from a self-inflicted gunshot wound.

HEALTH CARE AND SOCIAL ASSISTANCE (3 deaths)

DRUG OVERDOSE

105. A female caregiver in her mid-30s died from multiple drug overdose. She was found dead at a home where she was providing care.

FALL

106. A male medical courier in his late 50s died from complications of a spinal cord injury from a fall that occurred in 2007. He had tripped and fallen on an uneven parking lot surface, injuring his neck.

HOMICIDE/ASSAULT

107. A male worker in his early 70s at a residential mental health facility died when he was pushed and fell to the ground and struck his head after intervening in an altercation. He died a month and a half later from injuries sustained during the incident.

ARTS, ENTERTAINMENT AND RECREATION (4 deaths)

MOTOR VEHICLE CRASH

108. (&109 &110.) Three male professional ultimate frisbee players in their mid- and late 20s died after their vehicle was rear ended by another vehicle. The decedents were travelling eastbound to their team's practice when their vehicle stopped in traffic due to a separate single-vehicle rollover when a speeding driver failed to slow down and collided directly with the decedents' and several other vehicles. The crash happened

on a dry two-lane highway in daylight and clear weather. The posted speed limit was 70mph. The decedents were wearing seat belts and the vehicle's airbags deployed due to a crash. The decedents were unconscious due to the crash and were taken to two nearby hospitals where they later died.

SUICIDE

111. A male dockmaster in his late 60's died from a self-inflicted gunshot wound.

ACCOMMODATION AND FOOD SERVICES (1 death)

SUICIDE

112. A male restaurant owner in his mid-40s died after he intentionally jumped from a two-story building where the restaurant he owned was located.

OTHER SERVICES (9)

HOMICIDE/ASSAULT

113. A male laborer in the funeral services industry in his early 50's died from a gunshot wound to his chest after he was shot by the owner following a verbal altercation. Emergency response was called and pronounced him dead on the scene without attempting resuscitation.

114. A male in his early 30s died from multiple gunshot wounds to his head, neck, and trunk. He was helping the owner of a barber shop to re-open the barbershop to customers. He died at the scene.

115. A male car wash employee in his early 40s died from a gunshot wound to the chest after he was shot by another person in the parking lot of a car wash where he was working. He was declared dead at the scene.

MACHINE

116. A heavy equipment mechanic in his late 40s died after being pinned while working on a forklift. The decedent was working on a broken load lifter. His coworker heard the deceased calling for help and found the deceased trapped between the upright load lifter and the roll cage of the load lifter. The coworker was advised by the decedent to press the release upright. The coworker released the upright and the decedent became unconscious and fell sideways on the load lifter. It took five coworkers to lift the decedent off the load lifter. Resuscitation efforts by coworkers and medical responders were unsuccessful.

STRUCK BY

117. A forklift repair technician in his mid-60s died after being crushed underneath a forklift. The decedent was performing maintenance underneath a raised industrial fork truck. During the maintenance, the 4-ton hydraulic floor jack slipped out from underneath the raised fork truck. The forklift had no blocks under the frame and no blocks to prevent the wheels from moving and appeared to cause the jack to slip backward, thus causing the forklift to drop 8" onto the decedent's head. The decedent died at the scene from crushing injuries to his head.

SUICIDE

118. A male mechanic in his early 30s died from a self-inflicted hanging.

119. A male mechanic and owner of a diesel engine repair service in his late 30s died from a self-inflicted hanging.

120. A male tattoo artist in his mid-50s died from self-inflicted knife wounds in his friend's auto body shop.

121. A male motorcycle shop owner in his late 60s died from a self-inflicted hanging.

PUBLIC ADMINISTRATION (10 deaths)

AIRCRAFT

122. A male Air Force pilot in his mid-30s died after his plane crashed in the wooded area of the Hiawatha National Forest. The decedent was flying a F-16 fighter jet and was conducting a training exercise at night. The decedent's use of night vision goggles restricted his field of view and he was likely unable to identify a true horizon. The night conditions, lack of light and entering a cloud layer also reduced visual cues. The decedent observed that the GPS was degraded due to a lack of satellite tracking data. He decided to perform an alignment to another navigation system and focused on recovering the system while losing overall spatial awareness. All required ground inspections were completed prior to flight. Total destruction of the aircraft limited the ability to analyze physical evidence.

DROWNING

123. A male firefighter in his late 40s died due to drowning in a river. The deceased was assisting in rescuing three children who fell into the river. He brought one child to safety while an unknown boat came over and rescued the other two children. The deceased never made it back to the shore. His body was found the next day.

FIRE/EXPLOSION

124. A male firefighter in his early 20s died while performing firefighting operations on a tri-level residence. During the structure fire, the decedent partially fell through floor joints up to his armpits on the upper level of the residence. A "mayday" was issued by the decedent thru his radio. The decedent's air supply was still working at that time. It took about twenty minutes to free the trapped decedent. The decedent's air pack had to be cut off. When the decedent was brought down to the basement floor, he was unconscious. He no longer had his air pack on. He died enroute to the hospital.

HOMICIDE/ASSAULT

125. A male police officer in his late 40s died from complications of a gunshot wound.

126. A male corrections officer in his early 50s died after being assaulted by an inmate. He was found unresponsive by his coworker. Review of a video from a surveillance camera showed an altercation between the decedent and an inmate during which the inmate was on the top of the decedent. The decedent's death was caused by asphyxia due to compression of his neck and chest. The decedent was taken to a hospital where he later died from complications of the injuries he sustained.

MOTOR VEHICLE CRASH

127. A female animal control officer in her mid-20's died in a three-vehicle crash. The decedent was driving southbound when her patrol vehicle was struck on the driver's side by a vehicle traveling westbound that failed to stop at a red light. The at-fault driver was inebriated from drinking alcohol. The two automobiles then struck a third vehicle that was in the eastbound left-turn lane. The decedent had to be extracted from her vehicle. She was transported to a hospital where she died the following day from medical complications of injuries she sustained in the crash.

128. A male state police trooper in his early 30s died in a two-vehicle crash. The decedent was driving westbound when his patrol car was struck head on by a vehicle travelling eastbound that had crossed the centerline. After the collision, the vehicle travelling eastbound caught on fire. The decedent had to be extracted from his vehicle. He was transported to a hospital where he died three weeks after the crash from medical complications of injuries he sustained in the crash. The crash happened in clear weather on a dark-

unlit non-freeway straight and dry road. Posted speed limit was 55 mph. The decedent was wearing a seat belt and the vehicle's airbags deployed due to the crash.

129. A male firefighter in his early 30s died in a single motor vehicle crash. The crash occurred in daylight, on a straight, two-lane dirt road with a posted speed limit of 55 mph. The decedent was travelling eastbound and responding to a barn fire with emergency lights and sirens activated on his personal vehicle. The vehicle left the roadway to the north and rolled a number of times. The decedent was ejected from the vehicle at some point during the rollover. Disabling damage was observed on the driver's side of the roof, as well as many other areas of the vehicle. The decedent was not wearing a seatbelt and the vehicle's airbags did not deploy. The decedent was transported to a nearby hospital where he was pronounced deceased.

SUICIDE

130. A male police officer in his early 30s died from self-inflicted gunshot wound.

OTHER (ANIMAL)

131. A male city inspector in his early 70s died from an allergic reaction to bee stings. The decedent was inspecting city property for issues of blight. During the inspection, the decedent was stung by multiple bees. The decedent had an allergy to bees. He administered an epinephrine pen to himself. Medical personnel arrived on scene and attended to the decedent. The decedent was transported to a nearby hospital where he was later pronounced deceased. The medical examiner report concluded that the decedent experienced arrhythmia and later died from anaphylactic shock.