

Purdue University

Agricultural Safety and Health Program

2018 Indiana Farm Fatality Summary with Historical Overview¹

Compiled by the Purdue University Agricultural Safety and Health Program

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Abstract

Purdue University's Agricultural Safety and Health Program has been monitoring farm-related fatalities in Indiana for nearly 60 years. The earliest identified summary of cases, published in 1966, examined 76 fatalities reported during 1963.² Purdue's fatality database, though acknowledged as not being comprehensive of all farm-related deaths, provides a unique capacity to explore trends that have occurred over several decades, during which time agricultural production experienced considerable transformation in technology and practices. Analysis of only recent fatality data, for example, fails to recognize that during the 1940's and early 1950's the leading identifiable cause of death was livestock, primarily horses and bulls. These animal-related causes of injury and death largely have been replaced, at a much lower frequency, with tractors and machinery. The fatality data continues to show a general downward trend that parallels the decline in the number of farm operations, which has likely contributed more to the reduction in farm-related fatalities than any other single factor.³

Publication of the annual summary is viewed as a tool in keeping the public aware of the fact that agricultural production remains one of Indiana's most hazardous occupations.

The 34 documented cases in 2018 reflects a continuing pattern over the past four years of a significant increase above the 10-year average of 27.2 fatalities per year. Of great concern were the four fatalities involving children and youth age 18 years and under. Sixteen victims were age 60 and older, including 3 over the age of 70. Incidents involving those 60 and older now account for nearly half of all documented cases over the past five years, including 47% in 2018. Tractor-related incidents still comprise the single largest category of fatalities representing as much as 75% of all documented cases in some years. Over the past 50 years, tractor overturns have accounted for the single largest category of farm-related deaths, even considering that Rollover Protection Structures (ROPS) have been standard equipment on new tractors since 1985. In 2018,

¹ Appreciation is extended to Executive Director Stacy Wart, BLS Coordinator Joseph Black, and Survey Assistants Richard Clark and Rhapsody Owens with the Indiana Department of Labor Quality Metrics & Statistics Division for contributing to this report.

² Mitchell, Bailey W. (1966) Indiana Farm Accident Report 1963-1965. Purdue University, West Lafayette, IN.

³ Data from USDA National Agricultural Statistics Service

https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA

https://www.nass.usda.gov/Statistics_by_State/Indiana/Publications/Annual_Statistical_Bulletin/index.php

there were 15 documented fatalities that involved tractors or skid steer loaders, of which 6 (40%) were related to an overturn and three involved a tractor runaway. Findings suggest that over the last decade the diversity of agents involved in farm-related fatalities has been increasing, Males continue to comprise a large majority of farm-related fatalities, and the average age of all victims was 48.6, younger than the current average age of Indiana farmers of 55.5.⁴ An unusually high number, five, female fatalities were documented in both 2017 and 2018. In 2018 this included 2 under the age of 18 and 2 over the age of 60. Amish/Old Order communities in the state still account for a disproportionate share of farm-related deaths. Hazards identified as needing special attention include the use of older, non-ROPS equipped tractors and self-propelled mowers on steep grades; working in wood lots and tree felling on farms; ATV and UTV operation on farms; working with livestock, including horses and bulls; and extra riders on equipment. Findings are being used to guide the allocation of injury prevention resources.

Methods of Data Collection

The 2018 Indiana Farm Fatality summary was compiled by Purdue's Agricultural Safety and Health Program from a variety of sources, including published news reports, web searches, voluntary reporting from Extension educators and others, and personal interviews with witnesses, family, or responders. No additional cases were identified from sources outside of the state, including Federal government sources such as the Census of Fatal Occupational Injuries or Bureau of Labor Statistics. Data were compared with findings by the Indiana Department of Labor and adjusted to reflect differences due to data interpretation, data collection sources, and occupational classification. There is no claim made that the presented data are comprehensive but rather represent the best assessment currently available.⁵

As has been the case in the past, there is no requirement to report farm-related injuries or fatalities to a central location, as is mandated for most other industry classifications under the provisions of the Occupational Safety and Health Administration (OSHA). Currently, there are no known efforts being made nationally to enhance the quality of Indiana farm-related fatality and injury statistics beyond the level of reporting found in these annual summaries. The Bureau of Labor and Statistics maintains records on national fatalities in farming, but that set of data combines farming, fishing, forestry, and hunting fatalities, and often exclude incidents on smaller farm operations, children involved in farm-related activities, or unpaid family workers.

It should be noted that several other Midwestern states no longer have the capacity to document and report on these incidents beyond the limited data available from the Census of Fatal Occupational Injuries, which has historically underreported farm-related fatalities. Some key agricultural states have eliminated or diminished their land grant university-based farm safety efforts and, due to prohibitions in federal appropriation language, federal and state OSHAs have generally maintained a hands-off approach to most agricultural production sites.

There were slight differences in reporting of fatalities between Purdue and the Indiana Department of Labor due to variances in how workers and events are classified. For example, the Purdue summary has traditionally excluded most motor vehicle crashes which do not involve transport of agricultural equipment or crops. Children involved in farm work have also been historically included in the Purdue report, where as they may not be in the Department of Labor summary due to their classification as non-employees. As noted by the annual Census of Fatal Occupational Injuries, deaths on Indiana farms have had a long history of representing a disproportionate share of the state's workplace fatalities. The Indiana Department of Labor documented 28 fatalities in 2017 and classified agriculture as the state's second most hazardous industry.⁶

Description of 2018 Farm-related Fatalities

Description, dates, and locations of the 34 fatalities documented as agricultural workplace incidents are provided in Table 1. Again, it should be noted that the list may not be comprehensive due to the lack of consistent reporting requirements, Indiana residents dying at medical facilities in neighboring states, and

⁴ Data from Indiana State Department of Agriculture <https://www.in.gov/isda/3555.htm>

⁵ Differences may be found in reporting of prior years due to the addition of previously unidentified cases to the database.

⁶ <https://www.in.gov/dol/files/2017%20CFOI%20-%20DRAFT%204.pdf>

victims dying after the injury event due to related medical complications. The list does not include fatalities to farmers due to motor vehicle crashes involving farm trucks, conditions such as heart attacks or heat stress that were not directly attributed to work activities, or medical complications from workplace health hazards such as chronic pesticide exposure. Little or no data exists on the impact these agents, including agricultural chemicals, have on Indiana farmers and farm workers.

Table 1. Description of Documented 2018 Farm-Related Fatalities

Date	County	Age	Sex	Description
2/1	Hendricks	58	M	Heart attack while working
2/15	Jay	74	M	Bull attack
2/26	Daviess	45	M	Pinned between hydraulic loader boom and tire
3/16	LaGrange	18	M	Panels fell on victim
3/18	Washington	72	M	Skid-steer loader crashed into ravine
3/26	Daviess	69	M	Pinned between farm wagon and off-road vehicle
4/12	Elkhart	19	M	Crushed by lift arms of skid steer loader
4/19	Jasper	50	M	Tractor runover
5/7	Adams	62	M	Tractor overturn
5/15	Boone	66	M	Tractor-truck collision
5/15	Knox	45	M	Electrocution in irrigation system
5/15	St. Joseph	3	F	Tractor runover
6/3	Adams	85	M	Fall from tractor
6/16	Posey	66	M	Heat exhaustion inside grain bin
6/18	Bartholomew	38	M	Tractor overturn
6/30	LaGrange	61	F	Bull attack
7/4	Owen	66	M	Tractor overturn
7/6	Shelby	52	M	Crop dusting helicopter crashed
7/14	Dearborn	51	M	Tractor overturn
7/15	Wells	13	M	Auger entanglement in grain wagon
7/30	Noble	4	F	Struck by farm equipment
7/30	Randolph	64	M	Farm related incident
8/3	LaPorte	66	M	Fall in barn
8/15	Huntington	54	M	Pinned under tractor
8/18	Morgan	48	M	Fall from tractor
9/20	DeKalb	1	M	Tractor runover
9/21	Washington	27	M	Tractor overturn
10/2	Montgomery	66	M	Semi-truck runover in field
10/5	Lawrence	68	M	Runover by pickup truck left in gear
10/24	Daviess	61	M	Fall from ladder
10/29	Wayne	27	M	Entangled in corn picker
11/5	Marion	67	F	Thrown by a horse
11/13	Sullivan	65	M	Tractor overturn
11/18	Randolph	23	F	Runover by trailer

Summary of Findings

A total of 34 farm-related fatalities were documented in Indiana during 2018. This is 18% higher than the average number of fatalities documented annually since 1970 (30.3). The lowest number ever documented in the last 48 years was 8 in 2006. The highest numbers documented in the last 48 years were 54 in 1981, 49 in 1990 and 44 in 2016. The numbers of fatalities in 2016, 2017, and 2018 represented an upward spike in the overall downward trend that has occurred over the past several decades. Though the total average number of annual fatalities continues to trend lower, the number in 2018 resulted in a 3-year average of 38.7 fatalities per year and a 10-year average of 27 fatalities per year.

Figure 1 provides a historical look at the frequency of documented fatalities since 1970. The frequency of these events has been rather erratic over the years, but there has been an overall decline in the average annual number of fatal incidents. It should be noted that during early years incidents were less likely to be documented, making the decline even more notable.

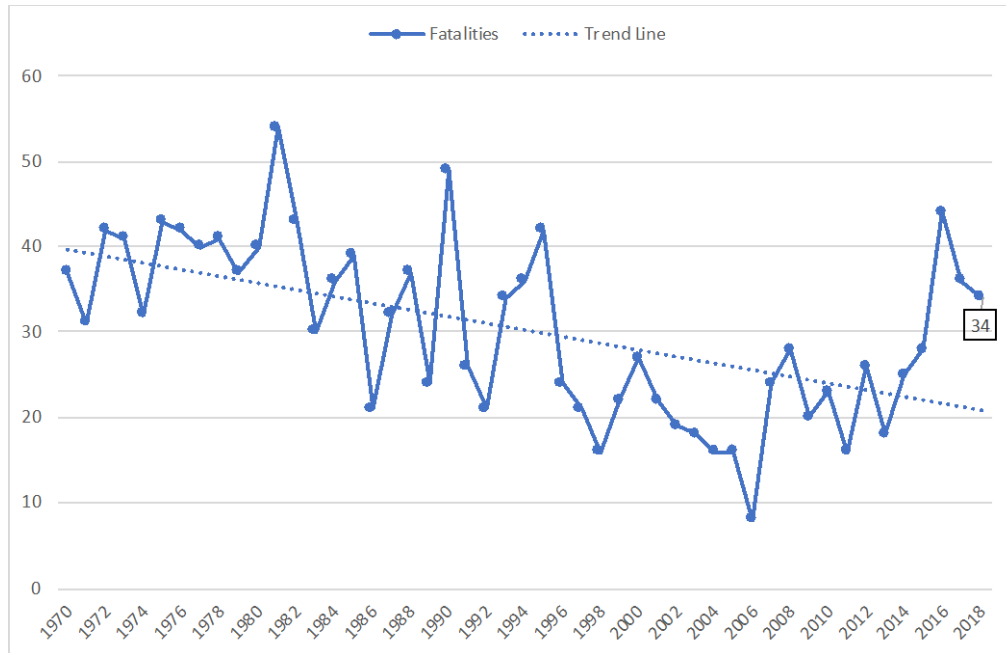


Figure 1. Annual summary of farm-related fatalities: 1970-2018

No specific factor(s) has been identified that has contributed to the reoccurring spikes in frequency. Other than incidents involving tractors and farm machinery, agents of injury have varied widely. This lack of consistency makes targeting limited prevention resources difficult, except for tractor-related incidents where a greater focus on the value of Rollover Protection Structures (ROPS) - especially on tractors used for mowing - could prove beneficial. The continued occurrence of children and youth involved in fatal incidents in 2018 indicates a need to revisit prevention activities that target those under the age of 18.

The age of the victims in 2018 ranged from 1 to 85 and averaged 48.6, which is lower than the average age of Indiana farmers, currently at 55.5. Historically, farmers over the age of 60 have accounted for a disproportionate number of farm-related injuries, including many who work only part time. Figure 2 shows an upward trend in the average age of fatality victims compared to the previous years.

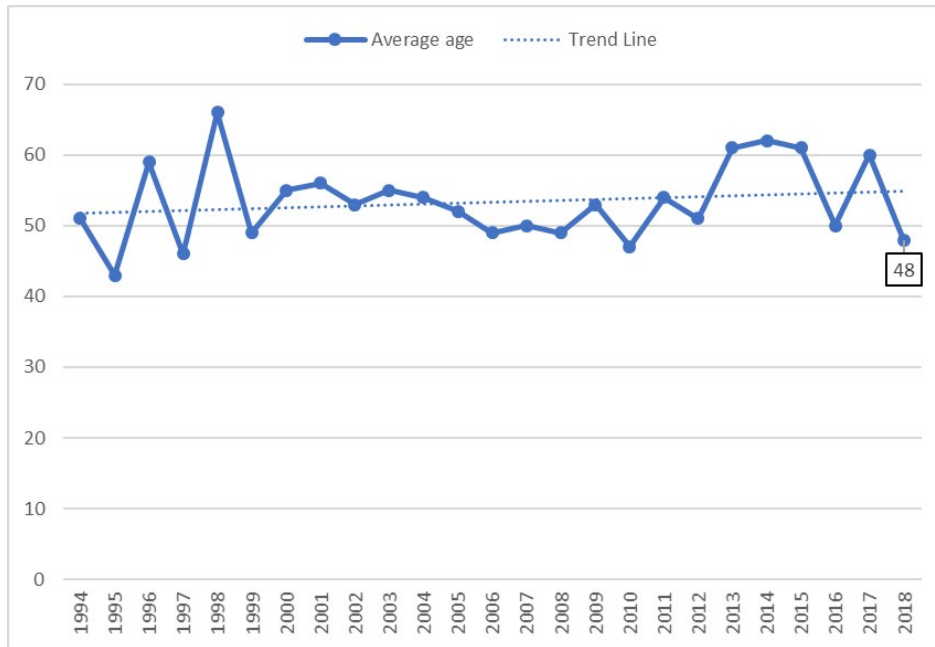


Figure 2. Average Age of farm-related fatalities 1994-2018

The four fatalities involving children and youth accounted for 12% of the total fatalities and contributed to the lower average age of victims in 2018. Overall, the average age of victims continues to trend slightly older, reflecting the increasing average age of farmers and generally fewer fatalities involving children and youth.⁷

The historical data also show an overall decline in the frequency of farm-related fatalities involving children and youth under the age of 18, which have accounted for a disproportionate share of total farm deaths. In some early years nearly one third of fatalities were children and youth.

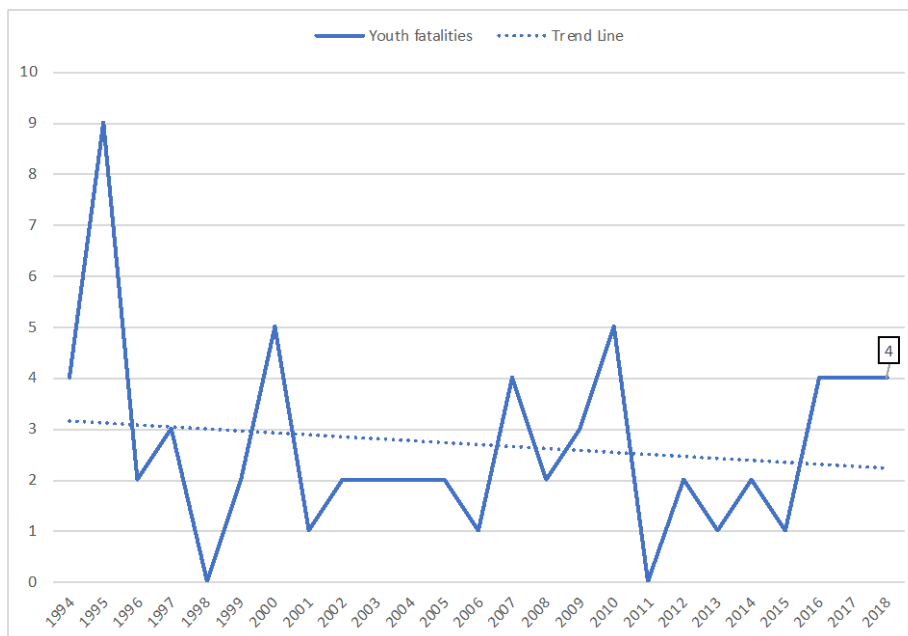


Figure 3. Summary of youth farm-related fatalities: 1970-2018

⁷ https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA

The overall historical decline in the number of children being reported as dying in agricultural workplaces is extremely encouraging. As such, it is hoped that the slight increase in the number of younger victims for the past three years is a statistical outlier. It is believed that the changing expectations of parents and the general public towards having children and youth employed in some types of farm work considered especially hazardous has had a significant influence on the continuing downward trend in fatalities involving this group. There may also be greater compliance with child safety related regulations, including the Hazardous Occupations Order for Agriculture. The introduction of larger, more complex and expensive equipment has also made many producers less comfortable using young or inexperienced workers to operate it.

Table 2 summarizes documented incidents during the period 1994 to 2018 involving youth and those 60 and older. During those 25 years, there were no fewer than 609 fatalities of which 67 were under the age of 18 and 292 were age 60 and older. Again, these two groups have historically represented a disproportional share of the total deaths, accounting for nearly 59% of the total. In 2018, these two age groups also accounted for 59% of documented fatalities.

Table 2. Analysis of "youth" and "60 and older" fatalities as percent of total farm-related fatalities

Year	Deaths Ages 1-17	Youth Deaths as % of Total	Deaths Age 60≥	60≥ Deaths as % of Total	Deaths of Both Youth & 60 ≥	Percent of Both Youth and 60≥ Deaths	Average Age of Victim	Total Farm-Related Fatalities
2018	4	12%	16	47%	20	59%	48	34
2017	4	9%	18	50%	22	61%	60	36
2016	4	11%	16	36%	20	45%	50	44
2015	1	4%	16	57%	17	61%	61	28
2014	2	8%	17	38%	19	76%	62	25
2013	1	6%	10	56%	11	61%	61	18
2012	2	8%	9	35%	11	42%	51	26
2011	0	0%	8	50%	8	50%	54	16
2010	5	22%	9	39%	14	61%	47	23
2009	3	15%	12	60%	15	75%	53	20
2008	2	7%	11	39%	13	46%	49	28
1994-2007	39	17%	150	42%	189	58%	53	311
Total/Average	67	11%	292	48%	359	59%	54	609

Table 3 highlights 25 years of tractor-related fatality data. During these years, tractors accounted for 271 or 44% of the total of all Indiana fatalities. The 15 fatalities in 2018 represented the fourth highest annual number for the past 25 years. The most frequent incident involved tractor upsets or overturns followed by runovers.

Table 3. History of Indiana tractor-related fatalities

Year	Number of Tractor-Related Fatalities	Number of All Farm Fatalities	Percent of Tractor Related Fatalities in Total Fatalities
2018	15	34	44%
2017	13	36	36%
2016	16	44	36%
2015	11	28	39%
2014	13	25	52%
2013	6	18	33%
2012	12	26	46%
2011	6	16	38%
2010	11	23	48%
2009	11	20	55%
1994-2008	159	339	47%
Total	273	609	44%

With approximately 56,100 productive farms in Indiana it was estimated that in 2018 one out of every 1,650 farms experienced a farm-related fatality.⁸ Using a population of 143,000 operators and hired workers on farms in Indiana, the death rate was approximately 23.8 per 100,000 farm workers, which is generally consistent with rates published from other states.⁹ Indiana is often referred to as an agricultural state, although less than 1% of the workforce is employed in production agriculture. However, the agriculture industry has traditionally been responsible for one of the highest number of work-related fatalities (Indiana Department of Labor, 2018). The estimated fatality rate of 23.8 per 100,000 Indiana farm workers in 2018 compares to an estimated national death rate of 3.4 per 100,000 for workers in all industries and 22.8 per 100,000 for those engaged in agricultural production nationwide.¹⁰

It is believed, however, that the Indiana and national agricultural farm-related fatality rates would be lower if unpaid family laborers were included in the population classified as being exposed to farm hazards on a regular basis. For example, older family members may still be engaged in farm work but are not considered as employed labor in order to meet Social Security eligibility requirements. As noted, those 60 and older accounted for 47% of the reported fatalities in 2018. Furthermore, the National Safety Council data and the Census of Fatal Occupational Injuries historically have not included children under 16 in their calculation of rates, while Purdue’s Agricultural Safety and Health Program does if the child was involved with or exposed to farm-work activities.

⁸ Estimated number of farms from the final report of the USDA/NASS 2018 State Agriculture Overview for Indiana.

⁹ Estimated farm population of operators and hired workers on farms from the final report of the 2017 U.S. Census of Agriculture. This number does not include unpaid family labor such as retired family members and children.

¹⁰ Estimated death rates from the U.S. Bureau of Labor Statistics (2014). <https://www.bls.gov/iif/oshwc/cfoi/cfch0014.pdf>

Figure 4 shows the distribution of all farm-related fatalities over the past 39 years when the county of location was known. It can be noted that no county has escaped a fatality and some counties have experienced an unusually high number. Counties with the highest number of documented cases are as follows:

- Elkhart-33
- LaGrange-31
- St. Joseph-24
- Greene-23
- Dubois-22
- Franklin-20
- Dearborn-19
- Adams-19
- Daviess-18

Elkhart and LaGrange counties are home to the state’s largest Amish/Old Order population that have historically accounted for a disproportionate share of farm-related fatalities. In one recent annual summary, this population accounted for approximately one-third of all documented fatalities.

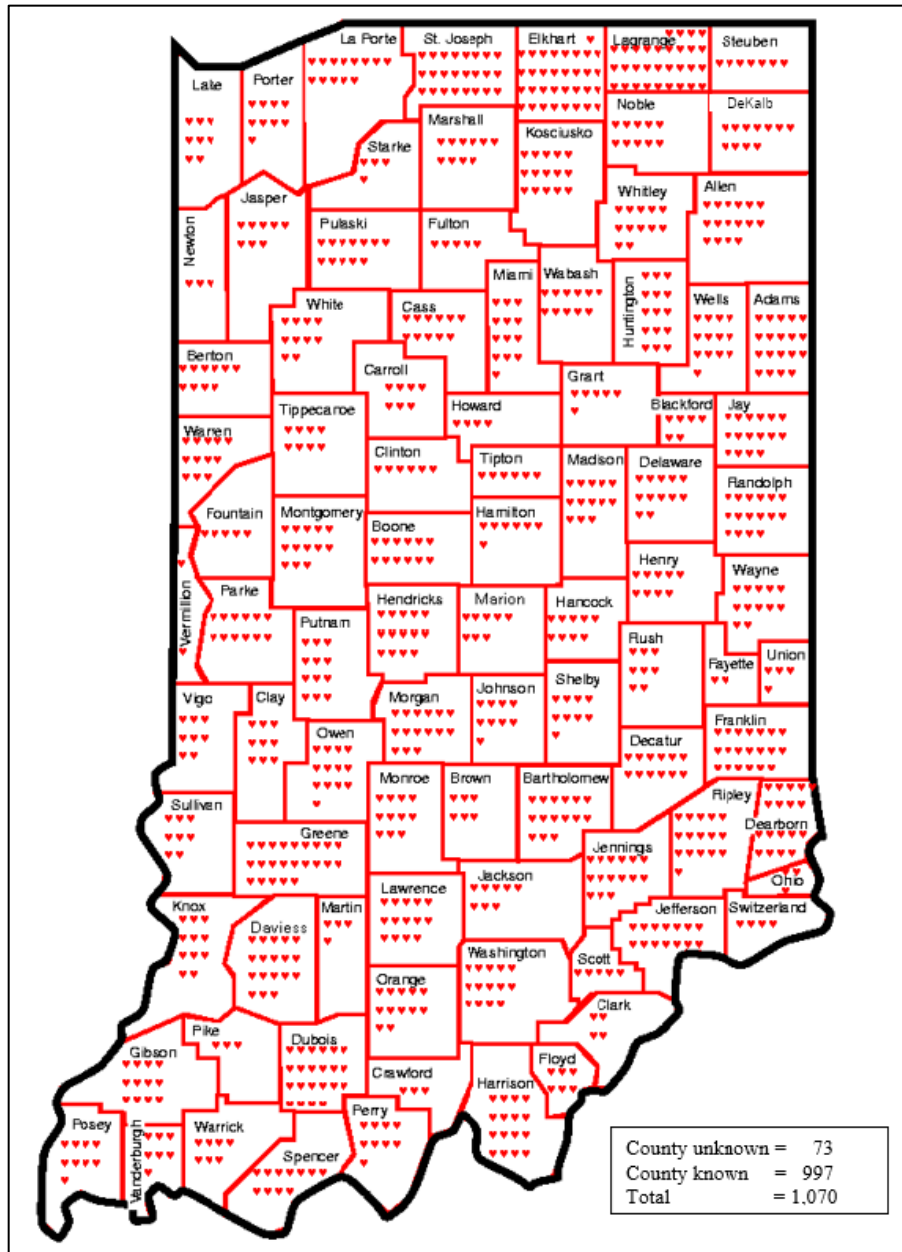


Figure 4. Geographic distribution by county of Indiana’s farm-related fatalities from 1980 through 2018

Monthly Distribution of Farm Fatalities

A historical view of the farm work-related fatalities by month for the past 49 years shows a clear peak in the frequency of farm fatalities in October during the 1970's (54 fatalities) and 1980's (49 fatalities).¹¹ More recently, there has been a flattening of the monthly distribution of fatalities. Throughout the past ten years, the months with the highest number of fatality incidents have been June and September, with 48 deaths. This is a shift from the trend during the 1970's and 1980's where there was a dramatic peak in fatalities later in harvest. It appears that the push for earlier harvest has resulted in an earlier peak in the number of fatalities.

Summary of Indiana's Farm-Related, Non-Fatal Incidents and Their Economic Impact

While the Purdue Agricultural Safety and Health Program attempts to be thorough in its surveillance of farm work-related fatalities, farm-related non-fatal injuries are not well documented by any source in the state. As a result, there is little data on the frequency and severity, and causes of injuries that occur annually during farm work. However, the relatively few Indiana non-fatal farm-related injuries that were identified in 2018 as part of the fatality surveillance efforts were generally severe. Several of the incidents resulted in loss of a limb, spinal cord or head injuries, and/or involved the use of medical helicopters for transport to a trauma center. In some cases, victims had to be extricated from entanglements in machinery or entrapments in grain bins requiring a large number of emergency rescue personnel.

It is estimated, based upon prior research, each year approximately one out of every nine Indiana farms experiences a farm-work-related injury that requires medical attention. Based upon the estimated 56,100 farms in the state, it can be extrapolated that in 2018 there were approximately 6233 treated injuries. Prior research by the National Safety Council indicated that 2% of reported farm injuries result in permanent disability. Applying the 2% estimate to Indiana's estimated 6,389 injuries, approximately 125 such cases occurred in the state in 2018. Many of these incidents, however, are not reported in the media, and there is no requirement to report such incidents, including severe injuries, to any official agency. The need remains for a more comprehensive trauma registry that includes farm-related injuries, and could be helpful in targeting prevention efforts at high-risk activities.

Another issue that can create significant hardships for both Indiana farm families and hired farm labor is that most are not covered by, nor can they afford, state workers compensation insurance programs that nearly all employees of other Indiana industries have available to them. Therefore, an on-the-job injury can result in both excessive personal debt due to medical costs and long-term loss of income. In some cases, the anticipated costs may discourage injured workers from seeking needed medical attention.

The lack of both affordable health care insurance and insurance for lost wages due to injury in the agricultural sector are complex public policy issues that still need attention to ensure that the economic impact of work-related injuries on the state's farm families and agricultural workforce is minimized.

Summary of Amish/Old Order Buggy-related Incidents

Table 4 provides descriptions of 11 documented collisions between Amish buggies and motor vehicles in 2018. These events resulted in no fewer than two fatalities and 40 injuries, several of which were life threatening. There were four incidents involving four or more injuries each. Individuals involved ranged from 4 to 82 years of age. It should be noted that this type of occurrence is under reported and access to incident reports may be difficult to obtain. There is a need to give more attention to incidents involving Amish/Old Order horse-drawn vehicles on public roadways, as well as farm work-related injuries among these populations.

¹¹ Summary of Indiana's Farm Work-Related Fatalities for 1980-1989 with Comparisons to 1970-1979, National Institute for Farm Safety presentation, June 17-21, 1990, Wilkinson and Field

Table 4. Description of 2018 Amish buggy-related incidents

Date	County	Description	Injury	Fatality
1/5	Lagrange	Vehicle-buggy collision	5	0
1/9	Daviess	Ambulance-buggy collision	2	0
4/6	Dearborn	Vehicle-buggy collision	3	0
5/6	Lagrange	Pickup truck-buggy collision	5	0
6/11	Lagrange	Vehicle-buggy collision	0	2
7/30	Lawrence	Vehicle-buggy collision	1	0
8/17	Allen	Vehicle-buggy collision	1	0
8/20	Elkhart	Vehicle-buggy collision	2	0
9/18	Daviess	Vehicle-buggy collision	7	0
9/24	DeKalb	Vehicle-buggy collision	2	0
9/26	Allen	Vehicle-buggy collision	3	0
10/11	Lagrange	Vehicle-buggy collision	4	0
10/28	Elkhart	Vehicle-buggy collision	2	0
11/10	Lagrange	Vehicle-buggy collision	1	0
11/13	Allen	Vehicle-buggy collision	2	0
		Total	40	2

Fatal Injuries Involving Wood Cutting on Farms

Farmers over 55 years of age are at high risk of both fatal and non-fatal injuries related to occasional wood cutting activities, such as trimming, cutting and removing of trees and tree limbs. From 1988 to 2017, there were 40 documented wood cutting related fatalities involving farmers 55 year or older, which represented 10.3% of all farm-related fatalities to individuals over 55 years old. 65% of wood cutting fatality victims were over 64 years old. All fatalities were male with the average age of 67.4. The majority of fatalities were caused by cutting and trimming of trees (27 cases or 67.6%) and operating tractors during wood cutting activities with 12 cases (30%). The most common specific cause of injury was being crushed by a tree or tree limb with 16 cases (40%). These types of incidents are preventable, and the role of aging should be considered as one of the most significant contributing factors. Prevention strategies should address: 1) the factors associated with aging, 2) the risks of tree felling, 3) the use of personal protective equipment, and 4) the hazards involved with operating tractors in wooded areas.

The Changing Agricultural Workforce

The increasing number of small farms is an important change occurring in rural communities. These audiences of part-time “hobby” or small highly diversified farmers have very different educational needs as compared to larger commercial operations. A review of fatality data over the last few years suggests that these smaller operations account for a disproportionate share of all documented fatalities, as compared with larger or full-time operations. A significant contributing factor is the use of older, less safe machinery on these smaller operations, especially older tractors without ROPS. In some cases, horses are being considered as a “greener” alternative to tractors without recognition that horses were once the leading cause of farm-related fatalities. It has been determined that one of the best ways to reach this population is through online resources.

The recent claims regarding the increasing numbers of women engaged as owner/operators of Indiana farms cannot be proven by any significant increase in the number of women dying or being injured as the result of being involved in farm work. Historically over 95% of all farm workplace fatalities have been male. Considering that an estimated 5,700¹² principal farm operators in Indiana are female, it could be expected that there would be a larger number of fatalities or work-related injuries involving women, if these women were

¹² https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA

engaged in production-related activities. Of the 167 total documented fatalities over the past five years only 16 (9.6%) were female. However, there were four female fatalities in 2016, 5 in 2017, and 5 in 2018 which presents three consecutive years of an unusually high number of incidents.

Incidents Involving Agricultural Confined Spaces

Since 1978, Purdue University has been documenting agricultural confined space incidents throughout the United States. Over 2,100 cases have been documented and entered into Purdue's Agricultural Confined Spaces Incident Database. For a summary of these incidents visit www.agconfinedspaces.org.

Indiana ranks number one historically in the number of documented grain entrapments. In 2018 there was no documented entrapment fatalities and one related to heat exhaustion inside a bin. It is believed that Indiana's high national ranking for this type of fatality has more to do with the aggressive nature of Purdue's surveillance efforts in the state over the past 40 years rather than the actual number of incidents that occur in other states.

Farmer Suicides

In recent years, there has been considerable media attention focused on the issue of farmer suicides. Given the precarious farm economy, especially in the crop and dairy sectors, many farm families are undoubtedly facing severe financial stress. However, no definitive data exist to indicate whether or not Indiana farm operators are at a significantly higher risk of suicide than the general population. The position taken by some media reports that farming is the most stressful of all occupations cannot be substantiated. A recent CDC study did indicate that workers in the farming, fishing, and forestry industries (as opposed to farm operators) do have an elevated suicide rate. However, this research was withdrawn due to statistical errors. Regardless, it is evident and appropriate that stress and/or behavioral health issues among the rural population are being recognized and addressed during this challenging time.

Conclusion

Farm safety and health is not, nor will it ever be, a topic that will make the front page of the paper, turn the heads of legislators, or generate an outpouring of public support. However, the no fewer than 1447 Indiana farm families who have experienced the loss of a family member since 1970, including the 34 in 2018, know personally the effects these events last a lifetime.

If you are interested in learning more or supporting the work of Purdue's Agricultural Safety and Health Program, please feel free to call 765-494-1191 or visit www.farmsafety.org.

Other online resources that may be helpful include:

- www.agrability.org
- www.agconfinedspaces.org
- www.youtube.com/USagCenters
- www.eXtension.org
- www.necasag.org
- www.inprepared.org