

Purdue University

Agricultural Safety and Health Program

2017 Indiana Farm Fatality Summary with Historical Overview¹

Compiled by the Purdue University Agricultural Safety and Health Program

Agricultural and Biological Engineering Department
225 S University St.
West Lafayette, IN 47907

For additional information contact:

Yuan-Hsin Cheng, Ph.D. at cheng140@purdue.edu
Dr. Bill Field at (765) 494-1191 or field@purdue.edu

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 was published in 1966 in which 76 fatalities were reported during 1963.² This database, though recognized as not being comprehensive of all farm-related deaths, provides a unique capacity to explore trends that have occurred over several decades during which agricultural production has 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 cause of identifiable deaths was livestock, primarily horses and bulls. These animal-related causes of injury and death have been replaced, at a much lower frequency, with tractors and machinery. The fatality data shows a general downward trend that closely parallels the decline in the number of farm operations as shown in Figure 1, which has contributed more to the reduction in farm-related fatalities than any other single factor.

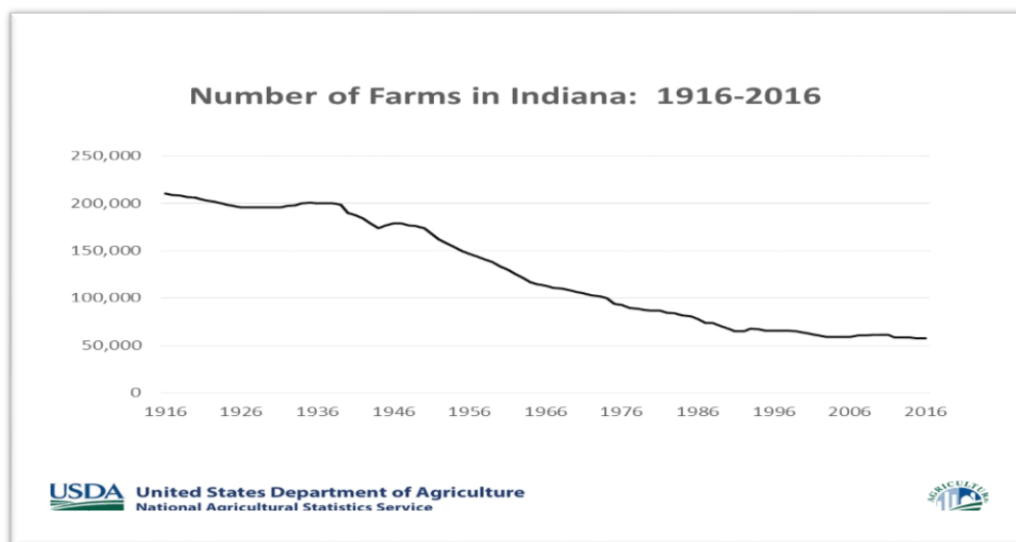


Figure 1. Number of Farms in Indiana: 1916-2016³

¹ Appreciation is extended to Executive Director Kenneth Boucher, BLS Coordinator Joseph Black and Survey Assistant Stacy Wart 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 <https://www.hoosieragtoday.com/indiana-farm-numbers-drop-while-farm-size-increases/>

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 36 documented cases in 2017 reflects a continuing pattern over the past four years of a significant increase above the 10-year average of 26.4 fatalities per year. The 36 cases represents the ninth highest number documented over the past 48 years. Of great concern, were the four fatalities involving children and youth under the age of 18 which represented a significant reversal in the downward trend in the frequency of child-related fatalities. An additional 22 were over the age of 55 including 14 over the age of 70. Incidents involving those over 60 now account for nearly half of all documented cases over the past five years, including 18, or 50% in 2017. 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 Roll Over Protection Structures (ROPS) have been standard equipment on new tractors since 1985. In 2017, there were 13 documented fatalities that involved tractors, of which 5 (38%) were related to an overturn and three involved a tractor run over. Findings suggest that the diversity of agents involved in farm-related fatalities is increasing, the problem remains male centric with the average age of 57.4, which is above the average age of Indiana farmers of 55.8.⁴ An unusually high number, five, female fatalities were documented in 2017, two of which were over the age of 60. Though not all incidents are included in this report, the 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 extra riders on equipment. Findings are being used to aid in allocation of injury prevention resources.

Introduction

The 2017 Indiana Farm Fatality summary was compiled by Purdue's Agricultural Safety and Health Program through a variety of sources, including published news reports, web searches, voluntary reporting from Extension educators and victims, and personal interviews. 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 remains no mandatory 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.

Summary

A total of 36% farm-related fatalities were documented in Indiana during 2017. This is 20% higher than the average number of fatalities documented annually since 1970 (30.1). The total reflects an approximately 18% decrease from the 2016 total of 44. 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 increases in 2016 and 2017 represented an upward spike in the downward trend that has occurred over the last

⁴ https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA

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

two decades. Though there has been a continued decrease in the average number of fatal incidents, the increase in 2017 resulted in a 3-year average of 36 fatalities per year and a 10-year average of 26.4 fatalities per year. 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 including some early years in which nearly one third of fatalities were children and youth. In 2017, there were 4 child-related fatalities that represented an unexpected upturn.

Even with the continued high number of fatalities in 2017, there continues to be a slight downward trend in the annual frequency since 1970. Contributing factors to this encouraging trend include the decline in the number of Indiana residents who live and work on farms, advancements in machinery safety, increased durability and productivity of agricultural equipment which reduces the number of workers needed, reduced dependency on child and youth labor, increasing expectations for safer and healthier workplaces and continued efforts to enhance the level of awareness of the importance of managing risks in agriculture to reduce the economic impact of deaths, injuries, property losses, and failure to comply with applicable regulations. Advancements in medical science and emergency medical services, such as improved access to medical air transport in rural areas of the state, have also made major contributions towards reducing the fatality rates by increasing the probability of surviving injuries once considered to be most likely fatal. Achieving zero incidents may be an unattainable goal, but the record shows that the problem is diminishing, however slowly, and that many tragic incidents have been prevented during the same time as Indiana farmers have become more productive and efficient than at any time in history.

There were slight differences in reporting of fatalities between Purdue and the Indiana Department of Labor due to differences in how workers and events are classified. For example, the Purdue summary has traditionally not included most motor vehicle crashes which do not involve transport of agricultural equipment or crops, nor has it included fatalities due to heart attacks or heat stress while working as farm-related, but records them separately. 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 33 fatalities in 2016 and classified agriculture as the second most hazardous industry.⁶

As has been the trend for the last 50 plus years, tractors and farm machinery remained as the most frequently identified agents of fatal injuries during 2017 representing approximately 67% of all fatalities. Five (14%) of all documented fatalities in 2017 involved an overturned tractor.

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 that has historically underreported farm-related fatalities. Some key agricultural states have done away with 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.

Findings

Description, dates, and locations of the 36 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 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, heart attacks or heat stress occurring during work

⁶ https://www.in.gov/dol/files/CFOI_2016.pdf

activities, or medical complications from workplace health hazards. 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 2017 Farm-Related Fatalities

Date	County	Age	Sex	Description
1/28	St. Joseph	79	M	Fall on farm
4/15	Delaware	75	M	Fall from tractor
4/28	Whitely	82	M	Farming-related incident
5/3	Vigo	38	M	Field sprayer-train collision
5/4	Henry	64	M	Crushed by a bull
5/23	Dubois	85	M	Fall from tractor
5/28	Carroll	68	M	Heart attack while removing dead pig
5/31	Hendricks	75	M	Tractor-truck collision
6/1	Dubois	59	M	Tractor overturn in to pond
6/10	Wayne	56	F	Motorcycle-farm equipment collision
6/12	Warren	71	F	Combine-vehicle collision
6/13	Gibson	11	M	UTV rollover
7/3	Franklin	49	M	Heat exhaustion
7/11	LaPorte	58	M	Fall from horse
7/13	Henry	66	M	Crushed under mower
7/26	Hancock	N/A	M	Ag sprayer-truck collision
7/27	Kosciusko	68	F	Mower incident
7/31	Whitely	N/A	M	Farm machinery-vehicle collision
9/2	Porter	80	M	Fall following heart attack
9/13	Ripley	78	M	Tractor rollover
9/18	Owen	84	M	Tractor runover
9/20	Daviess	88	M	Tractor rollover
9/22	Marshall	79	M	Tractor runover
9/27	Lake	72	M	Tractor runover
9/28	Dearborn	74	M	Lawn mower/tractor overturn
10/17	Parke	14	M	Struck by hay bale conveyor
10/21	Benton	37	M	Machinery entanglement
10/22	Owen	37	M	Tractor overturned
11/7	Clinton	70	M	Farm-related incident
11/17	LaGrange	11	M	Struck by passing motor vehicle
11/17	Dubois	84	M	Fall from ladder
11/20	Gibson	11	F	Falling tree limb
11/22	Gibson	N/A	M	Falling tree
11/24	St. Joseph	N/A	M	Pinned under hydraulic press
11/28	Tipton	45	F	Tractor-vehicle collision
11/28	Harrison	52	M	Crushed under truck bed

Figure 2 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 annual number of fatal incidents. It should be noted that during early years the likelihood of incidents not being documented was higher making the decline even more notable.

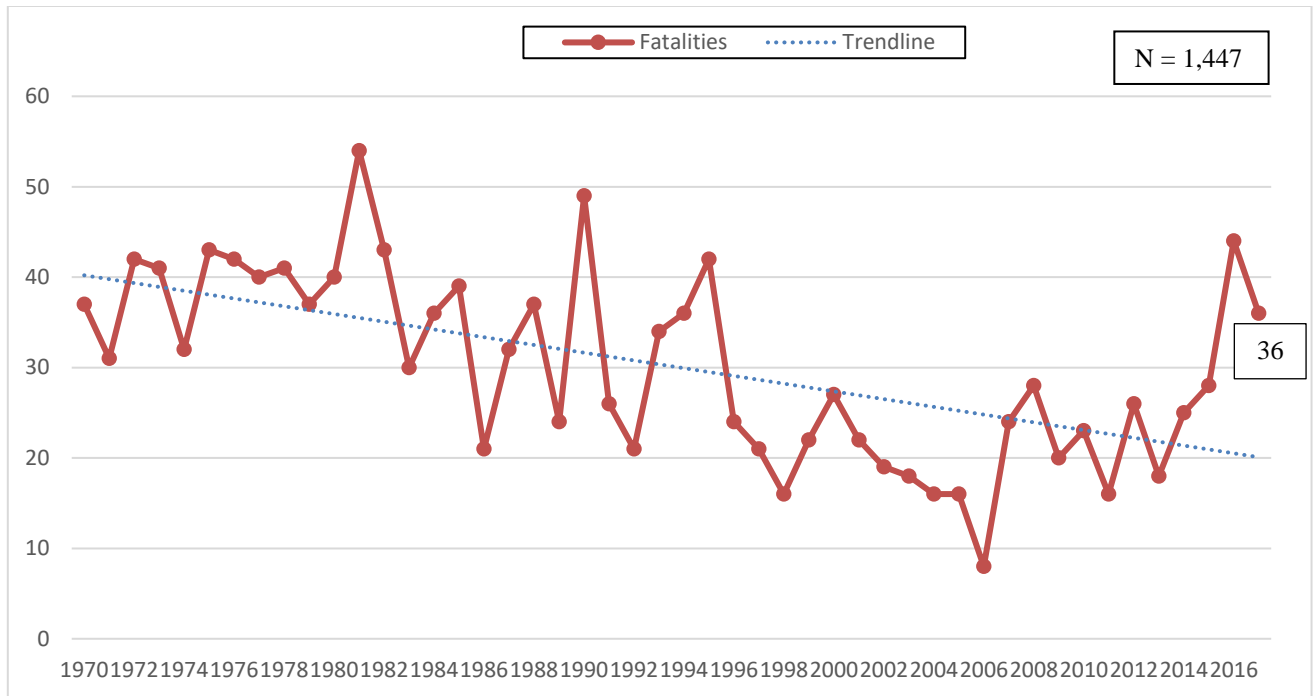


Figure 2. Annual summary of farm-related fatalities: 1970-2017

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 the targeting of limited prevention resources difficult, with the exception of tractor-related incidents where a greater focus on the value of Rollover Protection Structures (ROPS), especially on tractors used for mowing, could prove to be beneficial. The continued occurrence of children and youth involved in fatal incidents in 2017 indicates a need to revisit prevention activities that target those under the age of 18.

The age of the victims in 2017 ranged from 11 to 88 and averaged 60, which is higher than the average age of Indiana farmers, currently at 55.8. 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 3 shows an increase in the average age compared to the previous years. This increase is attributed to the large portion of victims over the age of 60. If the four fatalities involving children and youth were removed from the list, the average age of victims would have been 66, or ten years older than the average age of farmers. Overall, the average age of victims continues to increase slightly reflecting the increasing average age of farmers and fewer fatalities involving children and youth.⁷

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

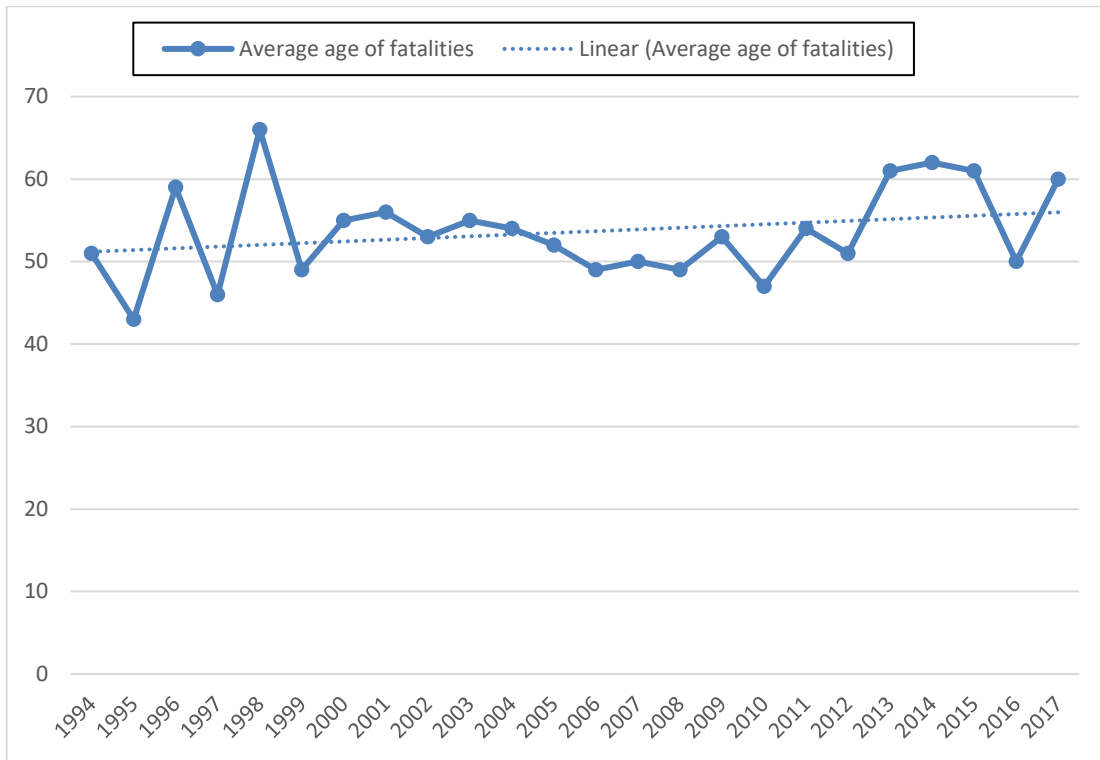


Figure 3. Average Age of farm-related fatalities 1994-2017

It is hoped that the slight increase in the number of younger victims in 2017 is a statistical outlier. However, the overall historical decline in the number of children and young adults being reported as dying in agricultural work places is extremely encouraging. 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. The outstanding exception are incidents involving youth exposed to skid steer loaders.

Table 2 summarizes documented incidents during the period 1994 to 2017 with respect to youth and those over 60. During those 24 years, there were no fewer than 575 fatalities of which 63 were under the age of 18 and 275 were over the age of 60. Again, these two groups have historically represented a disproportional share of the total deaths, accounting for nearly 59% of the total. In 2017, these two age groups accounted for 61% of documented fatalities. There has been little change over the past two decades with the exception that more of the victims are over 60, including victims in their 80s and 90s.

Table 2. Analysis of “youth” and “over 60” fatalities as percent of total farm-related fatalities – 1994-2017

Year	Deaths Ages 1-17	Youth Deaths as % of Total	Deaths Age 60+	Over 60 Deaths as % of Total	Deaths of Both Youth & Over 60	Percent of Both Youth and Over 60 Deaths	Average Age of Victim	Total Farm-Related Fatalities
2017	4	9%	18	50%	22	61%	60	36
2016	4	9%	15	33%	19	42%	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
2007	4	17%	10	42%	14	58%	50	24
2006	1	13%	3	38%	4	50%	49	8
2005	2	13%	5	31%	7	44%	52	16
2004	2	13%	9	56%	11	69%	54	16
2003	2	11%	8	44%	10	56%	55	18
2002	2	11%	9	47%	11	58%	53	19
2001	1	5%	11	50%	12	55%	56	22
2000	5	19%	16	59%	21	78%	55	27
1999	2	9%	6	27%	8	36%	49	22
1998	0	6%	11	69%	11	75%	66	16
1997	3	14%	18	86%	21	100%	46	21
1996	2	8%	13	54%	15	63%	59	24
1995	9	21%	12	29%	21	50%	43	42
1994	4	11%	19	53%	23	64%	52	36
Total/ Average	63	11%	275	48%	338	59%	54	575

Table 3 summarizes over 20 years of tractor-related fatality data. During these years, tractors accounted for 258 or 45% of the total of all Indiana fatalities. The 13 fatalities in 2017 represented the fourth highest annual number for the past 24 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
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%
2008	12	28	43%
2007	7	24	29%
2006	2	8	25%
2005	6	16	38%
2004	10	16	63%
2003	10	18	56%
2002	10	19	53%
2001	13	22	59%
2000	16	27	59%
1999	8	22	37%
1998	12	16	75%
1997	8	21	38%
1996	11	24	46%
1995	19	42	45%
1994	15	36	42%
1994-2017	258	575	45%

With approximately 57,500 productive farms in Indiana with sales of over \$11 billion it was estimated for 2017 that one out of every 1,597 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 25.2 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

⁸ Estimated number of farms from the final report of the USDA/NASS 2016 State Agriculture Overview for Indiana.

⁹ Estimated farm population of operators and hired workers on farms from the final report of the 2012 U.S. Census of Agriculture. This number does not include unpaid family labor such as retired family members and children.

(Indiana Department of Labor, 2016). The estimated fatality rate of 25.2 per 100,000 Indiana farm workers in 2017 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 over 65 accounted for 50% of the reported fatalities in 2017. Furthermore, the National Safety Council data and the Census of Fatal Occupational Injuries have historically 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.

Figure 4 shows the distribution of all farm-related fatalities over the past 38 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.

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. Counties with the highest number of documented cases over the past 38 years are as follows:

- Elkhart-32
- LaGrange-29
- Greene-23
- St. Joseph-23
- Dubois-22
- Franklin-19
- Adams-17
- Dearborn-17
- Harrison-16

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

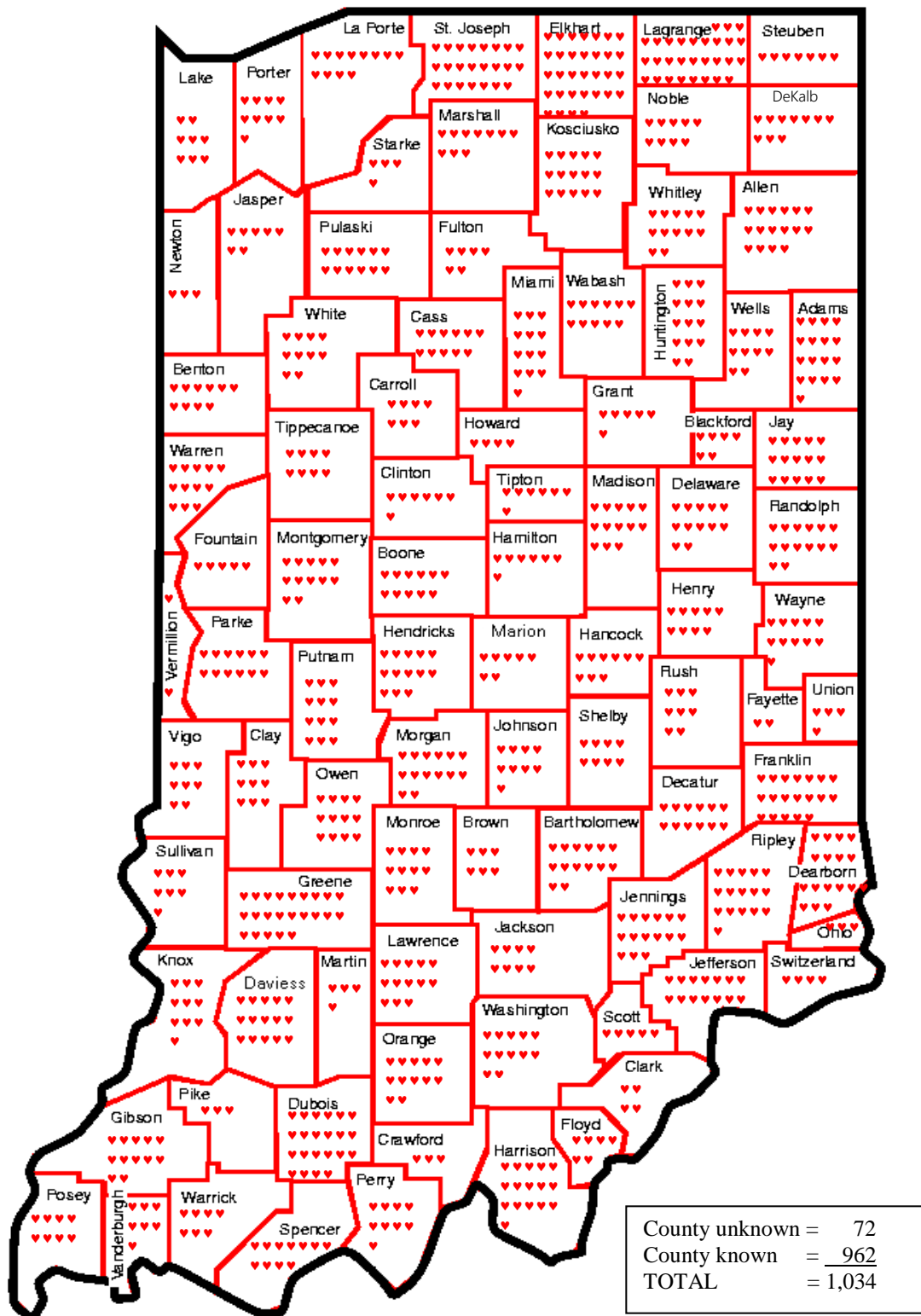


Figure 4. Geographic distribution by county of Indiana’s farm-related fatalities from 1980 through 2017

Youth Case Studies

The following provides a brief summary of the four children and youth who died as the result of exposure to farm work-related activities.

In June an 11-year-old boy was assisting in a farm operation while operating a UTV side-by-side. As he tried to make a turn, he flipped the UTV and was thrown out and pinned under the vehicle. He was not wearing a helmet or safety belt. After the incident, he was taken to the hospital and pronounced dead.

In October a 14-year-old teen was working at a dairy farm where a hay bale conveyor was being moved when a bolt broke causing the conveyor to collapse onto him. The victim suffered severe head and neck injuries and was pronounced dead at the scene.

An 11-year-old farm family member was hit by a cargo van while he was pulling a wagon along the side of a two-lane county road during the early morning hours in November. He was pronounced dead at the scene.

In November an 11-year-old girl was killed on a family farm when she was struck by a falling tree limb and died.

Monthly Distribution of Farm Fatalities

A historical view of the farm work-related fatalities by month for the past 48 years by 10 year increments is shown in Figure 5. The graph shows a clear peak in the frequency of farm fatalities in October during the 1970's (54 fatalities) and 1980's (49 fatalities).¹¹ During the 2007-2017 period, there is more of a flattening of the distribution of fatalities with a range between 24 and 45 from May through October. The highest number of incidents during the past ten years were in September with 45 fatalities. 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.

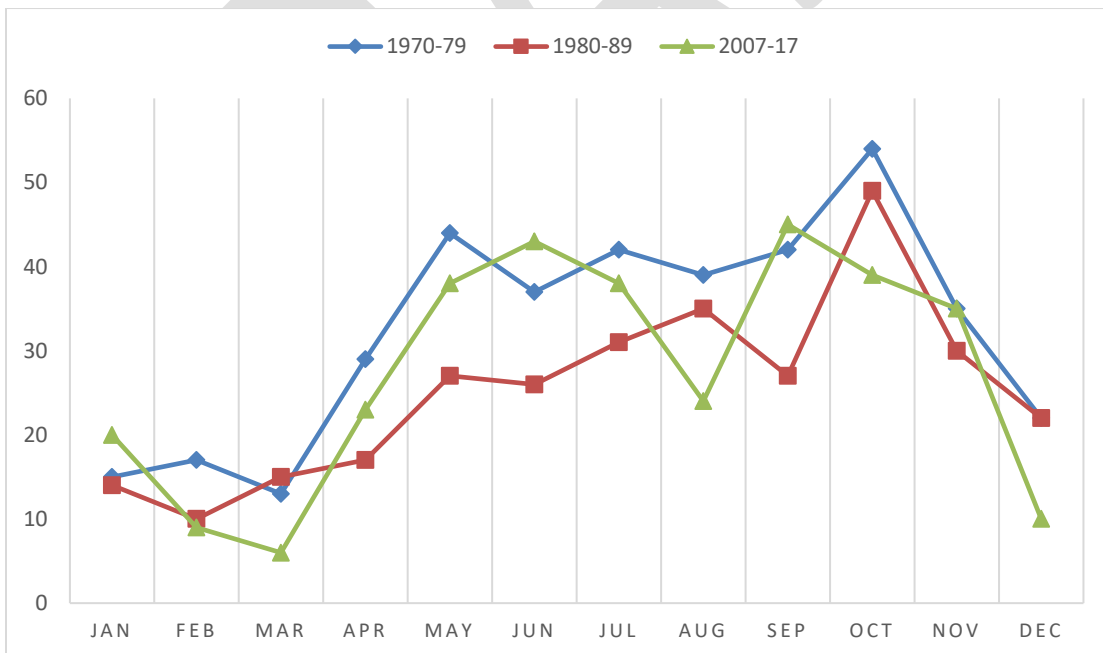


Figure 5. Historical comparison of farm-related fatalities by month

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

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

While the Purdue Agricultural Safety and Health Program’s surveillance of farm work-related fatalities attempts to be thorough, farm-related non-fatal injuries are not well documented by any source in the state; therefore, 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 2017 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 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. See Table 4 for examples of the types of documented incidents.

Table 4. Representative example of 2017 farm-related non-fatal incidents

Date	County	Age	Sex	Description
4/24	Johnson	N/A	M	Farm equipment-vehicle collision
6/21	LaPorte	3	M	Tractor rollover
6/26	Jackson	59	M	Tractor runover
7/26	Allen	44	M	ATV rollover while spraying
7/26	Hancock	N/A	M	Ag sprayer-truck collision
7/26	Hancock	N/A	M	Ag sprayer-truck collision
11/3	Decatur	16	M	Auger entanglement
11/28	Jasper	N/A	M	Tractor-vehicle collision
7/26	Hancock	N/A	M	Crop sprayer-truck collision
7/26	Hancock	N/A	M	Crop sprayer-truck collision

It is estimated, based upon prior research, approximately one out of every nine Indiana farms experiences annually a farm-work-related injury requiring medical attention. Based upon the estimated 57,500 farms in the state, it can be extrapolated that in 2017 there were approximately 6,389 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 128 such cases occurred in the state in 2017. 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 for a more comprehensive trauma registry, that includes farm-related injuries, remains and could be helpful in targeting prevention efforts at high risk activities.

To gain a perspective of the potential economic impact of non-fatal farm injuries to the state, a very conservative estimated cost of \$1,200 for medical treatment per injury ¹¹would result in over \$7,600,000 in economic losses, not including the costs of transportation to receive medical services, replacement labor, property damage, emergency services, and long-term rehabilitation services. This estimate, however, would be substantially increased if both the direct and indirect costs associated with the 41 fatalities and the approximate 128 permanent disabilities were included. For example, the estimated cost of medical and rehabilitation care for a person with permanent spinal cord damage exceeds \$1 million. Even though there has been a decline in the number of farm-related injuries, it is believed that the economic impact has been on the rise due to the significant increase in medical and rehabilitation costs. A single serious injury can result in an almost insurmountable financial disaster for an otherwise successful farm family.

¹¹ Estimated cost per injury based upon research conducted at the University of Illinois.

Another unknown cost to Indiana farmers is associated with chronic musculoskeletal injuries caused by overuse of joints. An estimated one third of all farm operators have symptoms of arthritis and prime candidates for joint replacement. Little attention has been given to reducing the risk of joint damage due to agricultural work practices. (For more information see www.agrability.org).

Farm operators have also become more vulnerable to civil litigation due to incidents that result in economic loss to workers, neighbors or the environment. Recent settlements have, in some cases, exceeded the farm’s insurance coverage, placing farm assets at risk.

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.

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 5 provides a description of 11 documented incidents in 2017 involving collisions between Amish buggies and motor vehicles. These incidents resulted in no fewer than two fatalities and 15 injuries, several of which were life threatening. There were two incidents involving four injuries each. The documented ages involved in these incidents range from 4 to 82 years old. It should be noted that this type of incident is under reported or access to incident reports is difficult to achieve. There is a need to give more attention to both farm-related injuries and incidents involving Amish/Old Order vehicles on public roadways.

Table 5. Description of 2017 Amish buggy-related incidents

Date	County	Age	Sex	Description	Fatal
5/10	LaGrange	82	M	Buggy-vehicle collision	N
5/14	LaGrange	4	M	Fell from buggy	Y
5/24	Noble	69	F	Buggy-vehicle collision	N
5/25	Noble	50	M	Buggy-vehicle collision	N
5/26	Noble	38	M	Buggy-vehicle collision	N
5/27	Noble	N/A	N/A	Buggy-vehicle collision	N
8/14	Daviess	N/A	N/A	Buggy-vehicle collision	N
8/14	Daviess	N/A	N/A	Buggy-vehicle collision	N
8/14	Daviess	N/A	N/A	Buggy-vehicle collision	N
8/14	Daviess	N/A	N/A	Buggy-vehicle collision	N
8/16	Steuben	13	M	Buggy-vehicle collision	N
8/16	Steuben	22	M	Buggy-vehicle collision	N
8/16	Steuben	18	M	Buggy-vehicle collision	N
8/16	Steuben	23	M	Buggy-vehicle collision	N
10/17	Daviess	N/A	M	Buggy-vehicle collision	Y
10/18	LaGrange	47	M	Buggy-vehicle collision	N
12/5	Allen	N/A	M	Buggy-vehicle collision	N

The Changing Agricultural Workforce

Over the past 30 years, the agricultural workforce in Indiana has changed dramatically. In 1970, when the Occupational Safety and Health Act (OSH Act) was passed by Congress, the U.S. Census of Agriculture showed there were fewer than 100 farm operations in Indiana that were required to comply with certain workplace safety and health provisions of the Act due to their workforce exceeding 10 non-family member employees or providing seasonal/migrant worker housing. The number of current farm operations that could be interpreted as needing to be in compliance with certain OSHA provisions due to the number of employees, providing temporary housing is increasing. It is assumed that this number will continue to grow with additional farm consolidation and expansion into non-agricultural production enterprises that are not exempt from OSHA oversight such as commercial grain storage, processing facilities and trucking. Many farms have grown slowly and their owners may not even realize that they should be in compliance with certain provisions of the OSHA regulations.

Another major change has been the rapid growth in the number of Hispanics who are now employed in agricultural production operations on a full-time basis. This trend is especially notable on larger dairy, poultry, and hog operations. Many of these workers have limited English speaking skills and lower literacy levels that make traditional agricultural safety and health resources ineffective. To address the workplace safety and health needs of this workforce, attention must be given to developing new and innovative instructional materials and strategies that address the hazards of newer and more complex farm operations. Instructional materials need to be culturally sensitive and delivered in a format that can be interpreted by the target audience.

The increasing number of small farms is another 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 much as 25% of current incidents. 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 there are an estimated 5,700¹³ principal farm operators identified as female, it could be expected that there would be a larger number of fatalities or work-related injuries involving women, if these women were engaged in production-related activities. Of the 154 documented fatalities over the previous five years only 13 were female. However, there were four female fatalities in 2016 and 6 in 2017, which presents two 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. Approximately 1,967 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 2017 there was no documented fatalities and only two incidents requiring extrication from grain by emergency personnel. It is believed that the high national ranking for this type of fatality has more to do with the aggressive nature of Purdue’s surveillance efforts in Indiana over the past 40 years rather than the actual number of incidents that occur in other states.

¹³ https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA

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 experienced the loss of a family member since 1970, including the 36 in 2017, know personally the effect these events can have. In many cases, these effects 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.agsafety4youth.info
- www.eXtension.org
- www.necasag.org