

# Purdue University

## *Agricultural Safety and Health Program*

## 2016 Indiana Farm Fatality Summary with Historical Overview

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 over 55 years. The earliest identified summary of cases was published in 1960. 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 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.

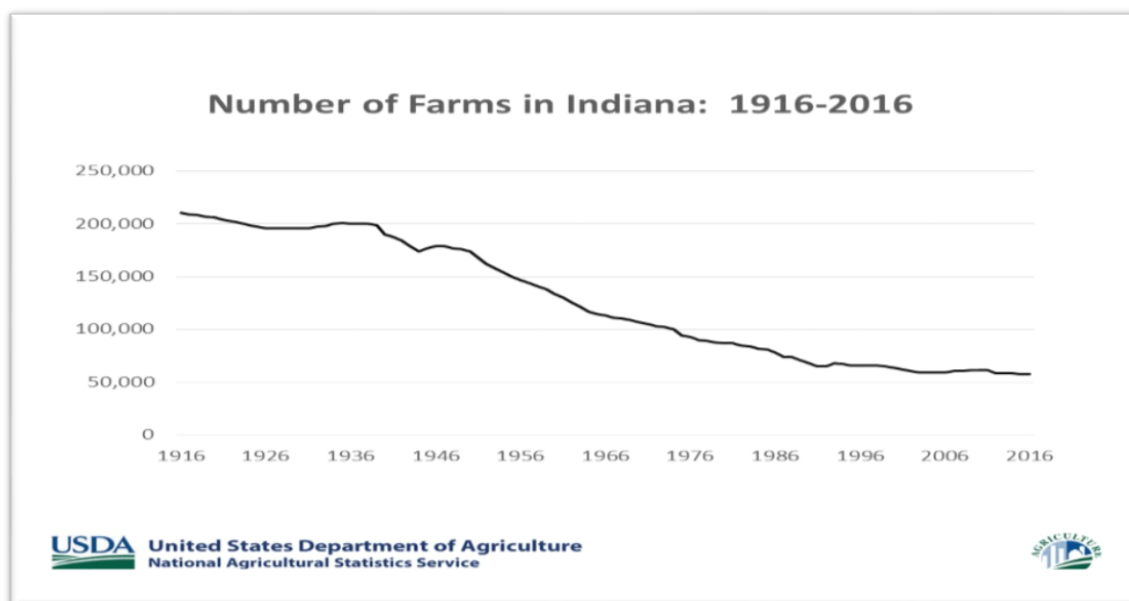


Figure 1. Number of Farms in Indiana: 1916-2016 <sup>1</sup>

<sup>1</sup> <https://www.hoosieragtoday.com/indiana-farm-numbers-drop-while-farm-size-increases/>

The 44 documented cases in 2016 represents the third year with an increase in number of cases and represents a significant jump above the 10-year average of 25.3 fatalities per year. The 44 cases was the third highest number documented over the past 47 years. As expectations placed on children have changed on farms, the number of fatalities involving children and youth aged 1-17 have also continued to decline; however, there were four such cases in 2016. Incidents involving those over 60 now account for nearly half of all documented cases over the past five years, including 15, or 33% in 2016. An additional 8 were between the age of 55 and 59. 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 large category of farm-related deaths, even considering that Roll Over Protective Structures (ROPS) have been standard equipment on new tractors since 1985. In 2016, there were 16 documented fatalities involved tractors, of which 25% were related to an overturn. Findings suggest that the diversity of agents involved in farm-related fatalities is increasing, the problem remains male centric with the average age of 50, which is substantially below the average age of Indiana farmers of 55.8.<sup>2</sup> Four female fatalities were documented in 2016. Two were over the age of 60 and two were under the age of 10. 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-Rollover Protective Structure (ROPS) equipped tractors, 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 2016 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 individuals, 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. Findings were compared with findings by the Indiana Department of Labor and adjusted to reflect differences due to data interpretation and data collection sources.<sup>3</sup> There is no claim made that the presented data are comprehensive but rather represent the best assessment currently available.<sup>4</sup>

As has been the case for the past 55 years, there remains no mandatory requirement to report farm-related injuries or fatalities to a central location, as is mandated for most other industry classifications. Currently, there are no known efforts being made nationally to enhance the quality of 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 data combines farming, fishing, forestry, and hunting fatalities, and often excludes incidents on smaller farm operations.

## Summary

A total of 44 farm-related fatalities were documented in Indiana during 2016. This is 47% higher than the average number of fatalities documented annually since 1970 (29.9). The total reflects approximately 57% increase from the 2015 total of 28. The lowest number ever documented in the last 47 years was 8 in 2006. The highest number documented in the last 47 years was 54 in 1981, 49 in 1990 and 44 in 2016. The increase in 2016 represents an upward spike in the downward trend that has occurred over the last two decades. Though there has been a continued decrease in fatal incidents, the increase in 2016 results in a 3-year average of 32.3 fatalities per year and a 10-year average of 25.2 fatalities per year. The data also shows an overall decline in the frequency of farm-related fatalities involving children and youth under the age of 18, which historically 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 2016, there are 4 child-related fatalities that included a motor

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<sup>2</sup> [https://www.nass.usda.gov/Quick\\_Stats/Ag\\_Overview/stateOverview.php?state=INDIANA](https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA)

<sup>3</sup> 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.

<sup>4</sup> Differences may be found in reporting of prior years due to the addition of previously unidentified cases to the database.

vehicle crash into piece of farm equipment, an ATV incident, suffocation in a grain trailer and being crushed under a falling gate.

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, 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-work related. 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 23 fatalities in 2015 and classified agriculture as the second most hazardous industry.<sup>5</sup>

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 2016 at 36%. Approximately 9% of all documented fatalities in 2016 involved an overturned tractor.

Even with the substantial increase in fatalities in 2016, there continues to be a slight downward trend in the annual frequency since 1970. Contributing factors to this trend include the decline in the number of Indiana residents who live and work on farms, advancements in machinery safety, durability, and increased productivity of agricultural equipment which reduces 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 following: 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.

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 44 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 activities, or medical complications from workplace health hazards. Little or no data exists on the impact these agents have on Indiana farmers and farm workers.

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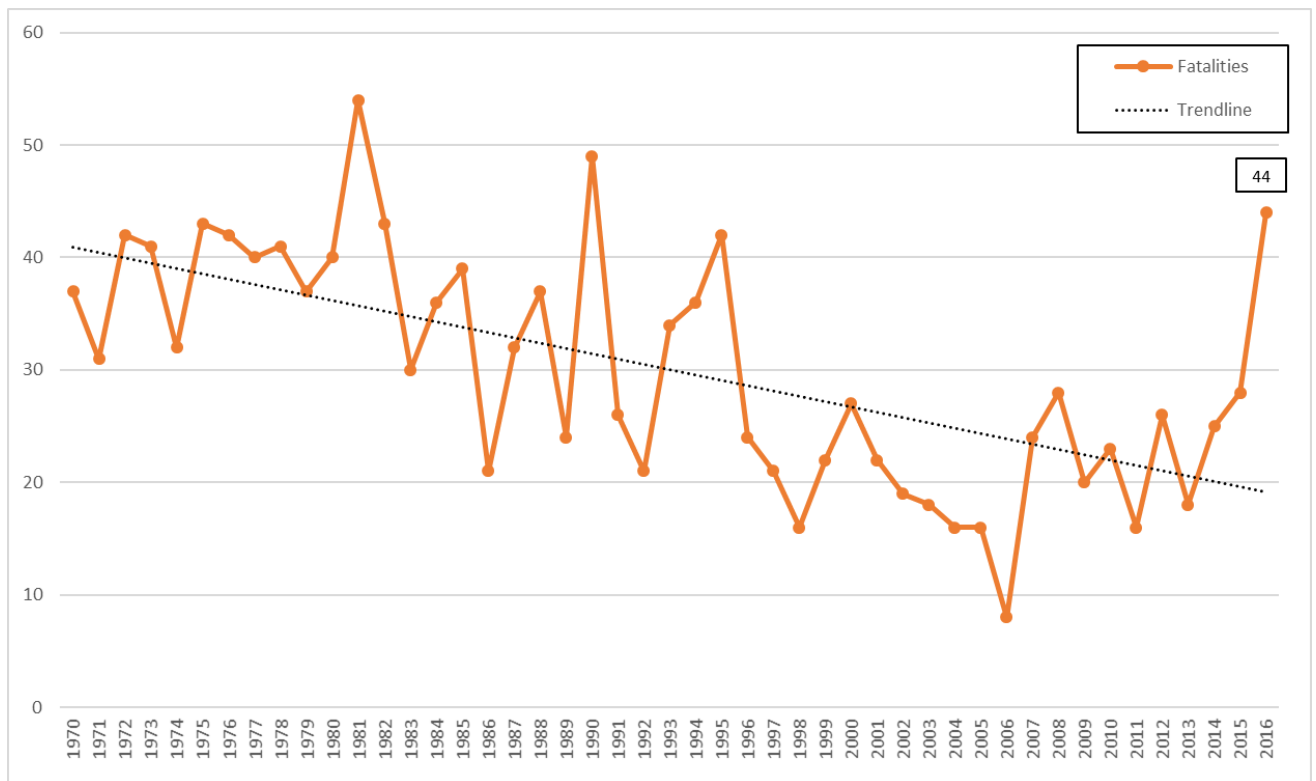
<sup>5</sup> <https://www.in.gov/dol/files/CFOI%20Report%202016.pdf>

<b>Date</b>	<b>County</b>	<b>Age</b>	<b>Sex</b>	<b>Description</b>
1/10	Allen	59	M	Kicked by a horse while at residence
1/13	Rush	53	M	Grain bin entrapment
1/18	St. Joseph	60	M	Entangled in PTO of farm equipment
1/20	Gibson	59	M	Crushed under tree, asphyxiation
1/31	Franklin	68	M	Pushed by cow into concrete structure
2/18	LaPorte	41	M	Snowmobile/semitrailer crash
2/22	Hendricks	71	M	Tractor runover
2/26	Newton	65	F	Tractor runover
3/7	Elkhart	64	M	Crushed under bucket/arms of skid steer loader
3/28	Huntington	6	M	Vehicle crashed with farm implement
4/8	Vigo	80	M	Tractor overturn
4/11	Fulton	55	M	Crushed under tree, asphyxiation
4/19	Wells	N/A	M	Operator thrown from tractor struck by semi-truck
5/14	Blackford	18	M	Entangled in stump grinder
5/27	Dearborn	46	M	Tractor overturn in pond
6/6	Jefferson	45	M	Thrown from tractor and ran over
6/9	Lake	55	M	Thrown from tractor
6/10	Whitley	20	M	Tractor overturn
6/10	Daviess	41	M	Runover by horse drawn grain drill
6/16	Brown	65	M	Struck by limb while operating tractor
6/29	Owen	69	M	On a tractor when he fell from the seat and was run over
7/2	Dearborn	21	M	ATV in farm drainage ditch
7/12	Allen	88	F	UTV roll over into a ditch
7/23	Jennings	88	M	Driving lawn tractor on farm when it went over a river bank
7/25	Elkhart	11	M	ATV crashed/ farm equipment
7/27	Parke	29	M	Operator thrown from tractor struck by semi-truck
8/3	Miami	40	M	Electrocuted when operating sprayer next to power lines
8/4	St. Joseph	58	M	Struck by exploding implement tire
8/6	White	62	M	Fell from tractor and ran over
8/11	Ripley	33	M	Struck by falling tree
9/5	Hancock	70	M	Cutting wood on farm when a tree split and landed on him
9/26	Pulaski	57	M	Grain dust explosion
9/26	Pulaski	67	M	Grain dust explosion
10/3	Morgan	N/A	M	Crushed by log
10/15	Randolph	88	M	Farm-related incident in a field
10/16	Clay	56	M	Working in a wooded area when a tree fell on his head
10/18	Washington	44	M	Struck by falling tree
10/18	Decatur	22	M	Crushed by overturn UTV
10/28	Jay	32	M	Operating a tractor when he fell off while leaning backward
10/31	Wabash	57	M	ATV hit tree

11/5	Union	4	F	Grain wagon entrapment
11/22	Dekalb	93	M	Welding on farm when pants caught on fire
12/26	Ripley	65	M	Operator thrown from tractor struck by vehicle
12/28	St. Joseph	9	F	Crushed under falling gate

**Table 1. Description of Documented 2016 Farm-Related Fatalities**

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.

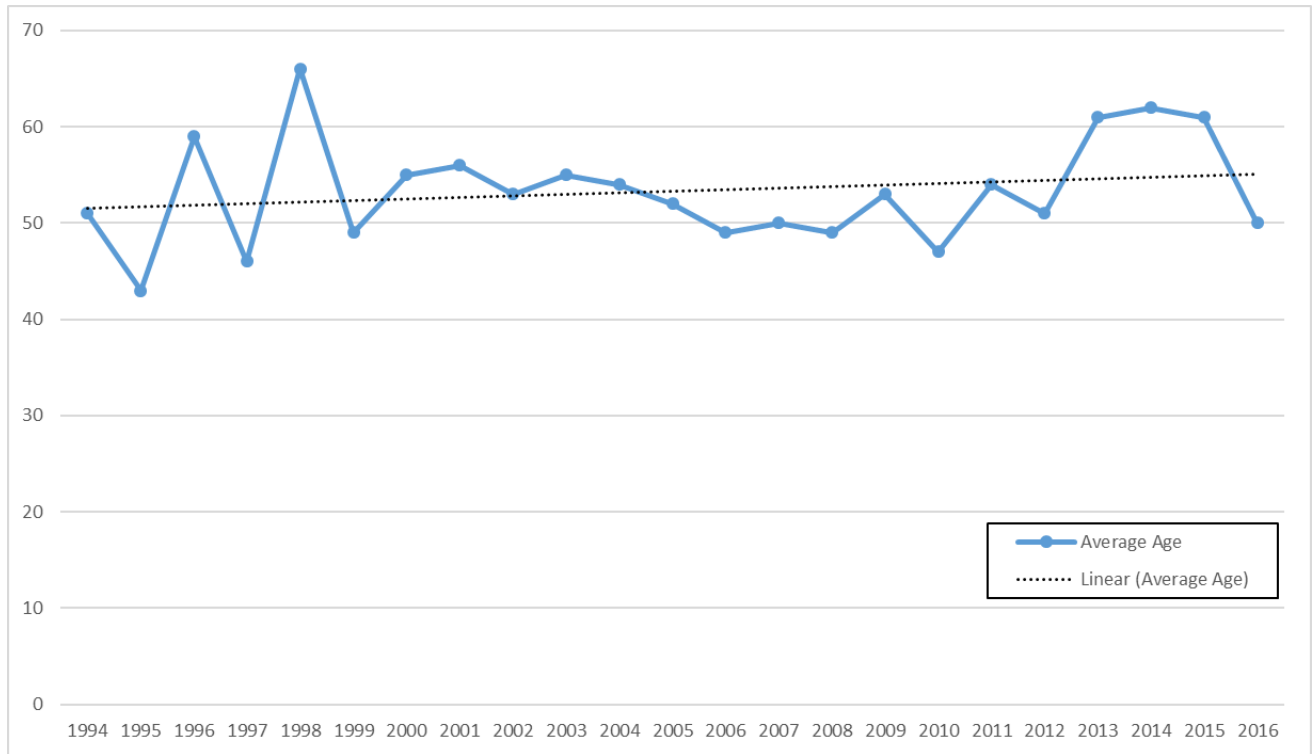


**Figure 2. Annual summary of farm-related fatalities: 1970-2016**

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 Protective Structures (ROPS), especially on tractors used for mowing, could prove to be beneficial.

The age of the victims in 2016 ranged from 4 to 93 and averaged 50, which is lower than the average age of Indiana farmers, currently at 55.8 and reflects the second year with a drop in average age of victims. 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 a drop in the average age compared to the previous

three years. The average age of victims continues to increase slightly reflecting the increasing average age of farmers and fewer fatalities involving children and youth.<sup>6</sup>



**Figure 3. Average Age of farm-related fatalities 1994-2016**

The overall decline in the number of children and young adults being reported as dying in agricultural work places is an extremely positive trend. 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 as the result of considerable educational efforts that have targeted secondary agricultural education students over the past decade. 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 2016 with respect to youth and those over 60. During those 23 years, there were no fewer than 539 fatalities of which 59 were under the age of 18 and 257 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 2016, these two age groups accounted for 42% 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.

<sup>6</sup> [https://www.nass.usda.gov/Quick\\_Stats/Ag\\_Overview/stateOverview.php?state=INDIANA](https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA)

Year	Deaths	Youth Deaths as % of Total	Deaths	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
	Ages		Age					
	1-17		60+					
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
<b>Total/Average</b>	<b>59</b>	<b>11%</b>	<b>257</b>	<b>48%</b>	<b>316</b>	<b>59%</b>	<b>53</b>	<b>539</b>

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

Table 3 summarizes over 20 years of tractor-related fatality data. During these years, tractors accounted for 242 or 45% of the total of all Indiana fatalities. The 17 fatalities in 2016 represented the second highest annual number for the past 23 years. The most frequent incident involved falling from the tractor and being run over followed by tractor upsets or overturns. Only one fatality involving a tractor overturn was known to have involved a tractor equipped with a Rollover Protective Structure (ROPS), with all other past incidents occurring on tractors not equipped with ROPS.

<b>Year</b>	<b>Number of Tractor-Related Fatalities</b>	<b>Number of All Farm Fatalities</b>	<b>Percent of Tractor Related Fatalities in Total Fatalities</b>
<b>2016</b>	<b>16</b>	<b>44</b>	<b>36%</b>
<b>2015</b>	7	28	25%
<b>2014</b>	13	25	52%
<b>2013</b>	6	18	33%
<b>2012</b>	12	26	46%
<b>2011</b>	6	16	38%
<b>2010</b>	11	23	48%
<b>2009</b>	11	20	55%
<b>2008</b>	12	28	43%
<b>2007</b>	7	24	29%
<b>2006</b>	2	8	25%
<b>2005</b>	6	16	38%
<b>2004</b>	10	16	63%
<b>2003</b>	10	18	56%
<b>2002</b>	10	19	53%
<b>2001</b>	13	22	59%
<b>2000</b>	16	27	59%
<b>1999</b>	8	22	37%
<b>1998</b>	12	16	75%
<b>1997</b>	8	21	38%
<b>1996</b>	11	24	46%
<b>1995</b>	19	42	45%
<b>1994</b>	15	36	42%
<b>1994-2016</b>	<b>241</b>	<b>539</b>	<b>45%</b>

**Table 3. History of Indiana tractor-related fatalities**

With approximately 57,500 productive farms in Indiana with sales of over \$11 billion it was estimated for 2016 that one out of every 1,307 farms experienced a farm-related fatality.<sup>7</sup> Using a population of 143,000 operators and hired workers on farms in Indiana, the death rate was approximately 30.8 per 100,000 farm workers.<sup>8</sup> 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 in Indiana (Indiana Department of Labor, 2015).

The estimated fatality rate of 30.8 per 100,000 Indiana farm workers in 2016 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.<sup>9</sup>

<sup>7</sup> Estimated number of farms from the final report of the USDA/NASS 2016 State Agriculture Overview for Indiana.

<sup>8</sup> 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.

<sup>9</sup> Estimated death rates from the U.S. Bureau of Labor Statistics (2014). <https://www.bls.gov/iif/oshwc/foi/cfch0014.pdf>



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, this group of older farmers, many of whom are unpaid family members, accounted for 46% of the reported fatalities in 2016. Furthermore, the National Safety Council data and the Census of Fatal Occupational Injuries have not historically included children under 16 in their calculation of rates, while Purdue's Agricultural Safety and Health Program reports fatalities 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 37 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 are as follows:

- Elkhart-32
- LaGrange-28
- Greene-23
- St. Joseph-21
- Dubois-19
- Franklin-18
- Adams-17
- Allen-16
- Dearborn-16

### **Case Studies**

In January a 60-year-old male was moving corn or feed from a wagon to a silo. He was killed when an article of clothing he was wearing got caught in an unshielded power take off shaft. The conveyer was an older model that did not have a protective shield to keep objects from getting caught in the fast moving shaft. Family members turned off the machine fairly quickly, but the shaft turns with such torque that injury and death can occur almost instantly.

In April an 80-year-old male was working alone pulling logs from a wooded area on his property with a tractor. The log chain got caught in a large grape vine and caused the tractor to flip over backward on top of the man, causing fatal injuries. This can happen when a chain is hitched to the tractor above the drawbar. Authorities say the incident happened between 12pm and 5:30pm.

A 20-year-old man was killed in June when the tractor he was riding flipped over on top of him. The man was working for a local farm when the tractor broke down. The tractor was then towed behind a pickup truck with the 20-year-old driving the tractor. The person driving the truck drove around three people walking along the side of the road and when the truck and tractor moved back into their lane the tractor's front wheel left the roadway. The tractor went down an embankment, causing it to hit a utility pole and flip over on top of the man.

An 11-year-old boy died of injuries he sustained in an off road vehicle crash in July. The boy was operating an ATV after milking cows and hit some old farm equipment in the tall grass he was driving through. This caused the ATV to overturn and he became trapped under the four wheeler. The boy was not wearing a helmet at the time of the crash.

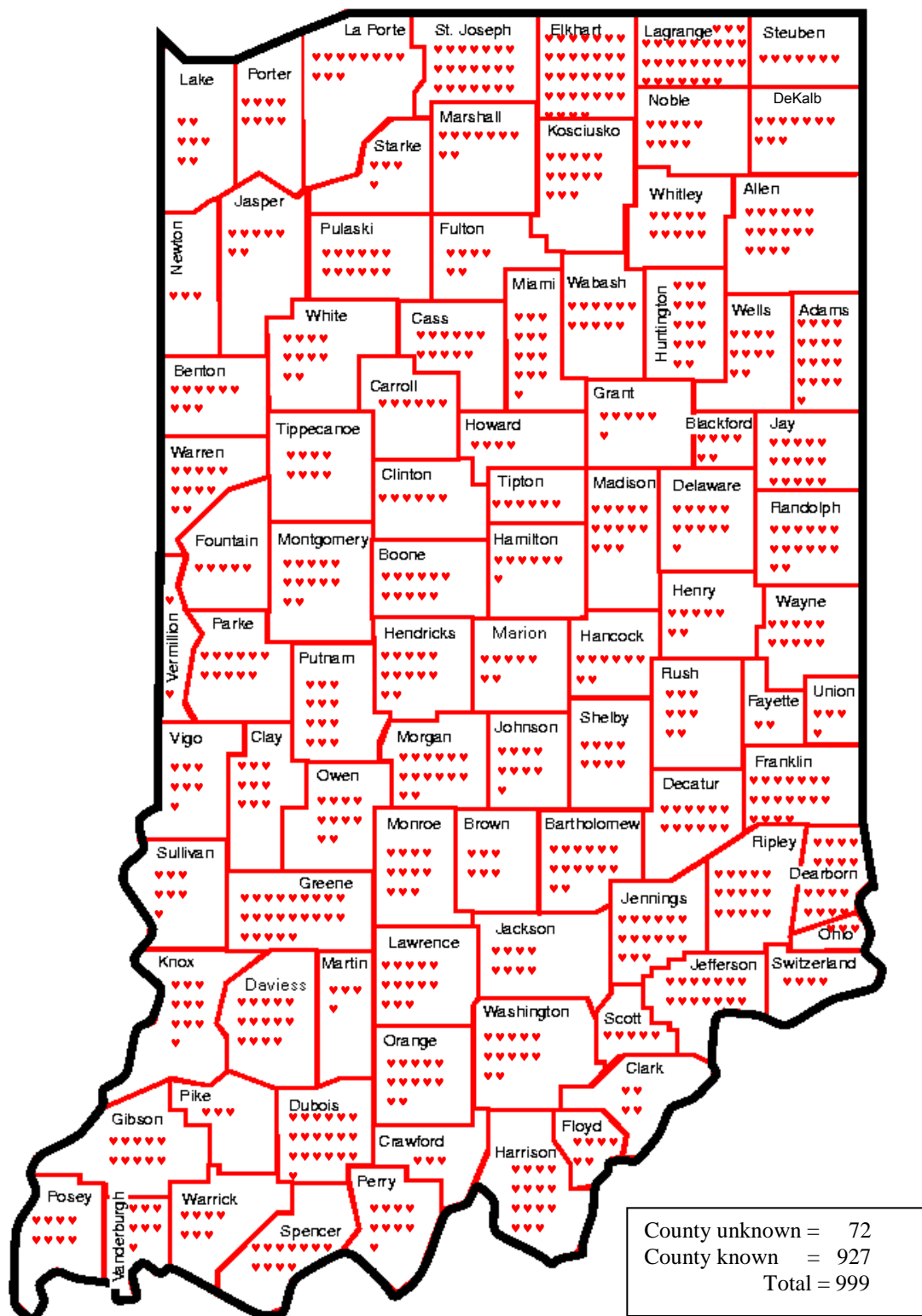


Figure 4. Geographic distribution by county of Indiana’s farm-related fatalities from 1980 through 2016

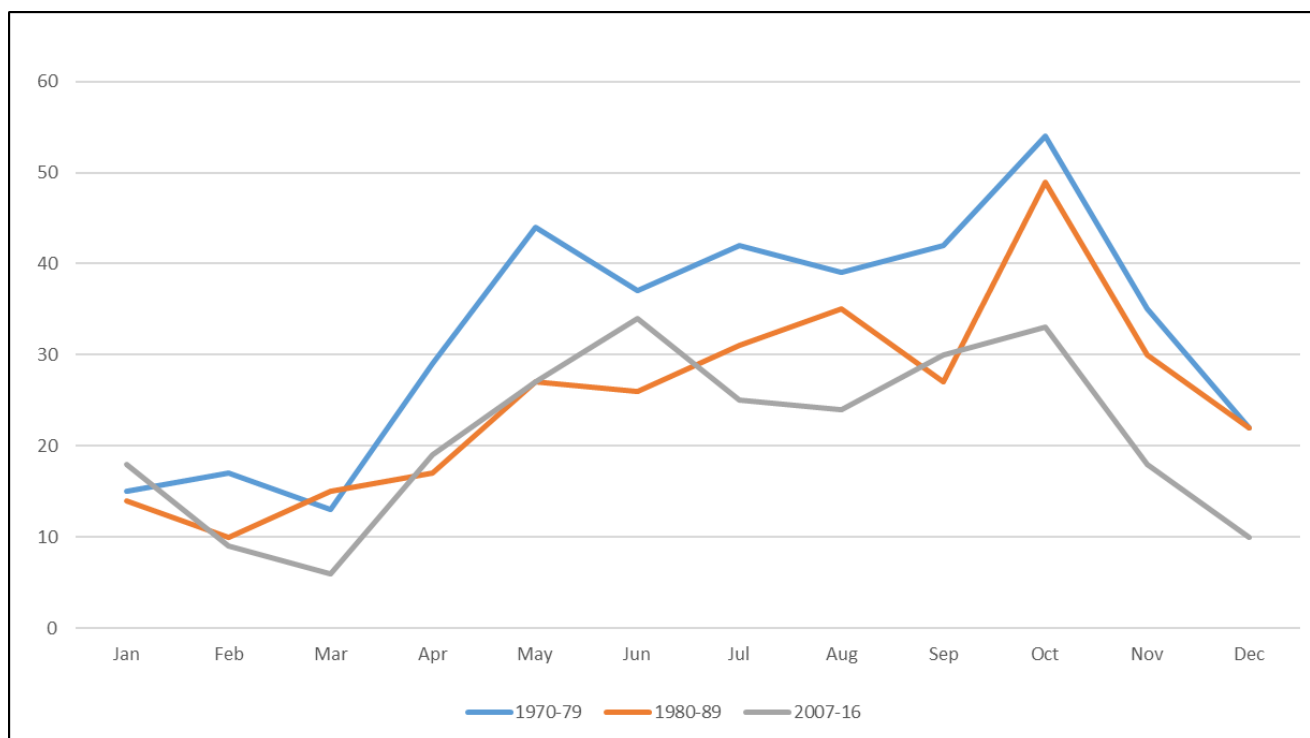
Two men were killed as the result of a dust explosion at a grain elevator in September. A 57-year-old man was unloading his grain truck at the time of the explosion and died from burn injuries. A 67-year-old male employee of the elevator was also injured and died from his burns following the incident. The state fire marshal investigator determined the explosion was the result of a failed piece of equipment in one of the unloading pits, leading to a spark which ignited suspended grain dust. Grain dust explosions can occur where any dispersed powdered combustible material is present in high enough concentrations in the atmosphere.

Note: While the Purdue summary has traditionally not included most motor vehicle crashes which do not involve transport of agricultural equipment it should be noted that there were five such incidents in 2016 resulting in two deaths and multiple injuries. The following case study is a common scenario.

A 70-year-old man was killed when he failed to stop at an intersection and was ejected from his vehicle after colliding with a farm truck filled with grain. The driver of the farm truck was airlifted to the hospital in serious condition.

### Monthly Distribution of Farm Fatalities

A historical view of the farm work-related fatalities by month for the 1970's, 1980's, and 2007-2016 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).<sup>10</sup> During the 2007-2016 period, there is more of a flattening of the monthly distribution of fatalities with a range between 24 and 34 from May through October. The month with the highest incidents between 2007 and 2016 was June with 34 fatalities. This is a shift from the trend during the 1970's and 1980's where there were dramatic peaks in fatalities during harvest.



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

<sup>10</sup> 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 2016 as part of the fatality surveillance efforts, were generally severe.

Several of the incidents resulted in loss of a limb, head trauma, and spinal cord 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 and grain bins requiring a large number of emergency rescue personnel. See Table 4 for examples of the types of documented incidents.

Date	County	Age	Sex	Description
1/25	White	60	M	Thrown from tractor
1/25	White	20	F	Vehicle/tractor crashed
2/4	Vanderburgh	N/A	M	Vehicle/grain truck crashed
2/4	Vanderburgh	N/A	M	Vehicle/grain truck crashed
3/28	Posey	N/A	M	Grain bin entrapment
4/30	Marion	N/A	M	Mulch auger entanglement
5/17	DeKalb	78	M	Tractor overturn
5/17	Fayette	20	M	Vehicle/grain truck crashed
5/31	Noble	N/A	M	Tractor roll over
6/27	Wayne	58	M	Grain auger entanglement
6/28	Jasper	80	M	Tractor roll into a ditch
6/29	Allen	N/A	M	Grain bin entrapment
7/12	Allen	89	M	UTV roll over into a ditch
7/27	Parke	43	M	Operator thrown from tractor struck by semi-truck
9/12	Kosciusko	74	M	Operator thrown from pickup struck by grain truck
10/3	LaGrange	N/A	M	Struck by hay bale
10/18	Madison	49	M	ATV/ hay ride wagon crashed
10/18	Madison	12	F	ATV/ hay ride wagon crashed
10/18	Decatur	24	M	Crushed by overturn UTV
11/4	Hancock	N/A	M	Lower limb injury/combine
12/26	Ripley	41	M	Vehicle/tractor crashed

**Table 4. Representative example of 2016 farm-related non-fatal incidents**

It is estimated, based upon prior research, approximately one out of every nine 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 2016 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 2016. 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 <sup>11</sup>would 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 44 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 now 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. For example, one documented three-hour visit to the emergency room to be treated for dehydration and heat stress resulted in a cost of over \$8,900. This is especially problematic considering that a disproportionate number of farm families and part-time farm workers can only afford health insurance policies with very high deductibles. A single serious injury can result in an almost insurmountable financial disaster for an otherwise successful farm family. The longer-term impact of the Affordable Health Care Act and uncertainty concerning its possible repeal and replacement, results in continued uncertainty regarding the future of healthcare for farm families.

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 are 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](http://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.

### **Farm-related Injuries in the Amish/Old Order Communities**

Amish are a part of the Old Order Anabaptist subculture, and Indiana is home to the third largest Amish population in North America and is the top Amish inhabited state by percentage of population.<sup>12</sup> This group is closely associated with agriculture, has a larger than average number of children per household, and their population is doubling approximately every 20-22 years. In 1996, one third of all documented farm-related fatalities in Indiana occurred in Amish communities. Elkhart, LaGrange, Adams, and Allen counties, home to some of the largest Amish communities, continue to have the highest number of reported farm-related fatalities.

There are several contributing factors to the higher number of cases being historically reported from these communities. These include the widespread use of horses and horse drawn vehicles on public road ways, more labor intensive farm practices, greater use of children in completing farm work, and the recent acceptance of skid loaders and certain hybrid equipment that is engine powered yet still horse drawn.

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<sup>11</sup> Estimated cost per injury based upon research conducted at the University of Illinois.

<sup>12</sup> <http://www.incontext.indiana.edu/2012/nov-dec/article2.asp>

### Summary of Amish/Old Order Buggy-related Incidents Involving Agricultural Equipment

Table 5 provides a description of documented incidents involving collisions between Amish buggies and motor vehicles. There were 14 documented incidents involving 36 individuals in 2016. These incidents resulted in five fatalities with three fatalities occurring in one incident. There were ten incidents involving more than one injury with four incidents resulting in four or more people being injured. The documented ages involved in these incidents range from 1.5 months to 65 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.

Date	County	Age	Sex	Description	Fatal
1/4	Elkhart	N/A	N/A	Two buggies collision	N
4/18	Elkhart	20	M	Vehicle/buggy collision	N
5/6	Wayne	17	M	Vehicle/buggy collision	Y
5/29	Elkhart	1.5 month	N/A	Vehicle/buggy collision	N
5/29	Elkhart	N/A	N/A	Vehicle/buggy collision	N
5/29	Elkhart	N/A	N/A	Vehicle/buggy collision	N
5/29	Elkhart	N/A	N/A	Vehicle/buggy collision	N
6/4	Elkhart	37	F	Vehicle/buggy collision	N
6/4	Elkhart	4	M	Vehicle/buggy collision	N
6/28	Marshall	N/A	N/A	Vehicle/buggy collision	N
6/28	Marshall	N/A	N/A	Vehicle/buggy collision	N
6/28	Marshall	N/A	N/A	Vehicle/buggy collision	N
6/28	Marshall	N/A	N/A	Vehicle/buggy collision	N
6/28	Marshall	N/A	N/A	Vehicle/buggy collision	N
7/1	Allen	N/A	N/A	Vehicle/buggy collision	N
7/1	Allen	N/A	N/A	Vehicle/buggy collision	N
7/1	Allen	N/A	N/A	Vehicle/buggy collision	N
7/1	Allen	N/A	N/A	Vehicle/buggy collision	N
7/5	Adams	N/A	M	Vehicle/buggy collision	N
7/5	Adams	N/A	M	Vehicle/buggy collision	Y
7/22	La Grange	N/A	N/A	Vehicle/buggy collision	N
7/22	La Grange	N/A	N/A	Vehicle/buggy collision	N
9/2	Madison	65	F	Truck/buggy collision	N
9/2	Madison	18	M	Truck/buggy collision	N
9/19	La Grange	N/A	N/A	Vehicle/buggy collision	N
9/19	La Grange	N/A	N/A	Vehicle/buggy collision	N
9/19	La Grange	N/A	N/A	Vehicle/buggy collision	N
9/19	La Grange	N/A	N/A	Vehicle/buggy collision	N
9/19	La Grange	N/A	N/A	Vehicle/buggy collision	N
10/23	Wayne	N/A	M	Vehicle/buggy collision then went into ditch	N
10/23	Wayne	N/A	F	Vehicle/buggy collision then went into ditch	N
10/30	Elkhart	55	M	Vehicle/buggy collision then went into ditch	N
11/20	Allen	19	M	Vehicle/buggy collision	Y
11/20	Allen	18	F	Vehicle/buggy collision	Y
11/20	Allen	16	F	Vehicle/buggy collision	Y
11/20	Allen	N/A	N/A	Vehicle/buggy collision	N

Table 5. Description of 2016 Amish buggy-related incidents

## **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 estimated 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 or providing temporary housing, is approaching 1,000. It is assumed that this number will continue to increase 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 quietly, 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.

Based upon the most recent agricultural census data, 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 increase in the number of women dying or being injured as the result of farm work. Historically over 95% of all farm workplace fatalities have been male. Considering that there are an estimated 5,700<sup>13</sup> 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. Of the 113 documented fatalities over the previous five years only three were female. There were four female fatalities in 2016, two were under the age of ten and the other two were adults who experienced an injury while working. One explanation is that perhaps the average age of women identified as owner/operators of Indiana farms are older and less likely to participate in activities recognized as hazardous.

## **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](http://www.agconfinedspaces.org).

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<sup>13</sup> [https://www.nass.usda.gov/Quick\\_Stats/Ag\\_Overview/stateOverview.php?state=INDIANA](https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA)

Indiana ranks number one historically in the number of documented grain entrapments. In 2016 there was one documented fatality and 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 rather than the actual number of incidents that occur in other states.

### **Diminishing Resources**

As budgets have tightened and legislators at the state and federal levels have explored ways to reduce expenditures, farm safety efforts have not gone untouched. In Indiana, reduced travel budgets for Extension staff have made coordination and participation in local safety initiatives more difficult. Educational material that was once free and readily available is now expensive or largely restricted to on-line access. Most commercially available farm safety videos and DVDs have become so expensive that they are now out of reach to most public schools and groups such as 4-H and FFA. The Indiana Rural Safety and Health Council, the only non-profit group in the state with its sole mission being to promote agricultural safety and health, was dissolved in 2017 due to limited resources and declining support.

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 1403 Indiana farm families who experienced the loss of a family member since 1970, including the 44 in 2016, 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](http://www.farmsafety.org).

Other online resources that may be helpful include:

- [www.agrability.org](http://www.agrability.org)
- [www.agconfinedspaces.org](http://www.agconfinedspaces.org)
- [www.youtube.com/USagCenters](http://www.youtube.com/USagCenters)
- [www.agsafety4youth.info](http://www.agsafety4youth.info)
- [www.eXtension.org](http://www.eXtension.org)
- [www.necasag.org](http://www.necasag.org)