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Agricultural Fatalities in New York State from 2009-2018: Trends from the past Decade Gathered from Media Reports

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ABSTRACT

Objectives: Agriculture remains one of the most dangerous industries in the United States. Fatal injury reports influence outreach and education training topics and assist in prioritizing research efforts and federal funding priorities. News stories of agricultural fatalities are routinely collected and cataloged by the New York Center for Agricultural Medicine and Health (NYCAMH). Methods: The database was queried for agricultural fatalities in New York State between January 1, 2009 and December 31, 2018. Descriptive statistics were calculated based on a variety of factors including age, gender, geographic location, type of event, and source of injury. The 2017 Census of Agriculture data was used to calculate denominator data for persons at risk. Results: Over the ten-year period from 2009 to 2018, one hundred sixty-nine (169) people were killed in agricultural injury events in New York. The most frequent cause of fatality was tractor related incidents, comprising nearly half of all fatalities (44%). There were 14 deaths of children nine and younger and an additional 11 deaths of adolescents between 10–19 years old. Steuben County had the highest rate of fatal injury at 20.9/100,000 FTE, followed by Jefferson County at 19.4/100,000 FTE. Conclusions: While the rates of workers killed on the job have dramatically dropped in many industries, agricultural fatalities remain stubbornly elevated above the all-worker fatality rate of 3.5/100,000 FTE. These data, along with non-fatal injury data, should be used to guide prevention and intervention activities. Such loss of life should underscore the tremendous stress the agricultural community is under, and serve to funnel resources to strengthen these communities, businesses and workers.

KEYWORDS

Agriculture; occupational fatality; New York; news clippings; media reports

Introduction

Agriculture remains one of the most dangerous industries in the United States. Nationally, the fatality rate for farmers, ranchers, and other agricultural managers is nearly seven times the all-worker fatal injury rate.[1] In the United States, young workers are 44.8 times more likely to be killed working in agriculture when compared to all other industries combined (28.21 per 100,000 FTE vs 0.63 per 100,000 FTE).[2]

While there are fewer farmers today than in years past, the economic importance and rate of injury in the industry warrants attention. Today, the U.S. agricultural industry accounts for $132.8 billion dollars of the Gross Domestic Product (GDP). In New York, agriculture remains vital to the economy of the state, generating over $4.8 billion in revenue and contributing almost $2.4 billion to New York's GDP.[3] Nearly seven million acres of land are under agricultural operation, spread across 33,400 farms around the state.[4] Small farms have struggled to stay in business and between 2012 and 2017, more than 2,000 farms ceased operation in New York.[5] For farms remaining in business, the average age of farmers has continued to grow older, now exceeding 57 years old for the principal operator.[4]

Farming is one of the few industries where many people personally know someone who has been injured or killed on the job.[6] Fatal injuries are indicative of a widespread issue of agricultural morbidity. These deaths signify not only a tragic workplace injury incident, but also a cascade of grief, mourning, and economic hardship for the farm and family. Such incidents in small

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communities often ripple beyond the farm itself to community and surrounding businesses.

Gathering fatality statistics can provide detailed information regarding the type of event and source of fatal injuries, which is critical to improving agricultural injury prevention. Tracking fatal occupational injury occurs via various federal and state-based systems. The Census of Fatal Occupational Injuries (CFOI) is designed to capture all fatalities regardless of the size of the business.[1] This system captures fatal incidents involving agriculture even if the victim was a volunteer worker (unpaid help). This system does not however capture child agricultural fatalities if the child was not working. Agricultural fatalities among children is an ongoing public health issue,[7–11] and quality data is one of the mechanisms to influence change. News clipping services can inform CFOI or supplement other injury surveillance systems.[12,13] AgInjuryNews is one such system, developed by researchers at the National Farm Medicine Center, Marshfield Clinic Research Institute.[14] These news clippings often provide detail which is helpful for intervention planning. News clippings have been a critical component of injury surveillance activities at the Central States Center for Agricultural Health and Safety, as well.[15] Information gleaned from news clippings can provide valuable insight into causes of farm related injury, and can be helpful to understand issues within a certain target demographic, such as older adults, for example.[16]

Fatality reports have been routinely collected by the New York Center for Agricultural Medicine and Health (NYCAMH) for several decades, as part of our legislative mandate to track agricultural injuries. Fatal injury reports influence outreach and education training topics and assist in prioritizing research efforts for the New York Center for Agricultural Medicine and Health. This report summarizes ten years of fatal agricultural injury in New York State, from 2009 to 2018.

Methods

News stories of agricultural fatalities are routinely collected by NYCAMH using an online press clipping service. The press clipping service provides NYCAMH notice of agricultural fatalities in the Northeast region of the United States, which are identified through keywords and human visual inspection. Included are fatalities that occur to farmers, farmworkers, children or bystanders on the farm due to agricultural sources. In addition, agricultural roadway fatalities are included. However, non-worker victims of a public roadway collision are not included in this database. These reports are routinely emailed to NYCAMH staff, and also available through an online portal. When a news report of an agricultural fatality is identified, the NYCAMH information specialist adds it into a customized Microsoft Access database, after verifying that the case was not already captured, filling out a variety of variables on the incident (Table 1). Though the Occupational Injury and Illness Classification System (OIICS) is not used to code these data, the OIICS general rules regarding primary and secondary source of injury coding are used.[17] The account of the fatal injury is also cross-referenced to several other sources of agricultural injury, such as the AgInjuryNews database and the state's Census of Fatal Occupational Injuries program to gather information regarding the specific commodity and as a quality check between the other existing systems.

The database was queried for agricultural fatalities in New York State between January 1, 2009 and December 31, 2018. Descriptive statistics were calculated based on a variety of factors including age, gender, geographic location, type of event, and source of injury. The 2017 Census of Agriculture data was used to calculate denominator data for persons at risk. These data were chosen as the most recent source of agricultural worker numbers available. The denominator included values by county for

Table 1. Variables available in fatality database.

Information Source	Incident Date	Incident Time
County	Town	State
Hospital Transport?	Age	Sex
Type of Injury	Source of Injury (Primary & Secondary)	On-Site Location of Incident
Was the Victim Working?	NAICS Code	SOC Code
Preceding Events Related to Injury	Activity at Time of Incident	Cause of Injury
Narrative	Intentionality	FAIC Code
Part of Body Injured	Number of Victims in Incident	Hospital?

hired labor, unpaid workers, and producers [the new term for "operators"]. County fatality rates were calculated by dividing the number of fatalities in a given county by 10 [years] and then dividing by the denominator [population at risk] and multiplying by the commonly used factor of 100,000 workers.

All analysis were conducted using Microsoft Excel. This project is exempt from Institutional Review Board (IRB) review since it involves publically available data on deceased persons.

Results

Over the ten-year period from 2009 to 2018, one hundred sixty-nine (169) people were killed in agricultural injury events in New York (rate of 8.2 deaths per 100,000 workers). Fatality numbers varied year to year, with a high of 24 in 2011, and a low of 11 in 2012. Rolling averages show a slight decrease in the average number of deaths over the decade (Figure 1). Of those killed, ninety-two percent were male and only one victim, a young child, did not have their gender identified in any news reports.

Fatalities occurred in most New York Counties, with notable exceptions in areas of the Adirondack Park, Catskill Park, and greater Metropolitan New York and New York City. Steuben County had the highest number of fatalities with 16 over the ten-year period. This was followed by Cayuga County with nine over the same period. Steuben County also had the highest rate of fatal injury at 20.9/100,000 workers, followed by Jefferson County at 19.4/100,000 FTE. Figures 2 and 3 show the rates and counts of fatalities by county.

The average age of victims was 49 years old; however, nine victims were eighty or older (Figure 4). There were 14 deaths of youth nine and younger and an additional 11 deaths for adolescents between 10–19 years old. Conversely, there were nine victims that were 80 or older. Five of the youth were noted as working at the time of their death. By removing non-work child agriculture fatalities (n = 20), the fatality rate fell to 7.5 per 100,000 workers. By far, the most frequent cause of fatality was tractor related incidents, comprising nearly half of all fatalities (44%). Of the tractor related incidents, 57% were rollovers, and another 22% were run overs. The next most frequent cause of fatality was trucks and automobiles on the farm, contributing to 21 deaths. Of these incidents, 76% were caused by the victim being struck by the vehicle, most in roadway crashes. Maintenance of vehicles was a factor in three deaths. Field machines were the third most frequent cause of fatality with 11 incidents, seven of which were entanglements, involving power-take off shafts, manure spreaders, and round balers. A variety of sources and types of events made up subsequent categories listed in Table 2.

Deaths involving youth (19 and younger) were most frequently attributed to tractors (seven cases), all-terrain vehicles (three cases), and farm machinery (three cases). Falls contributed to an additional two deaths of youth.

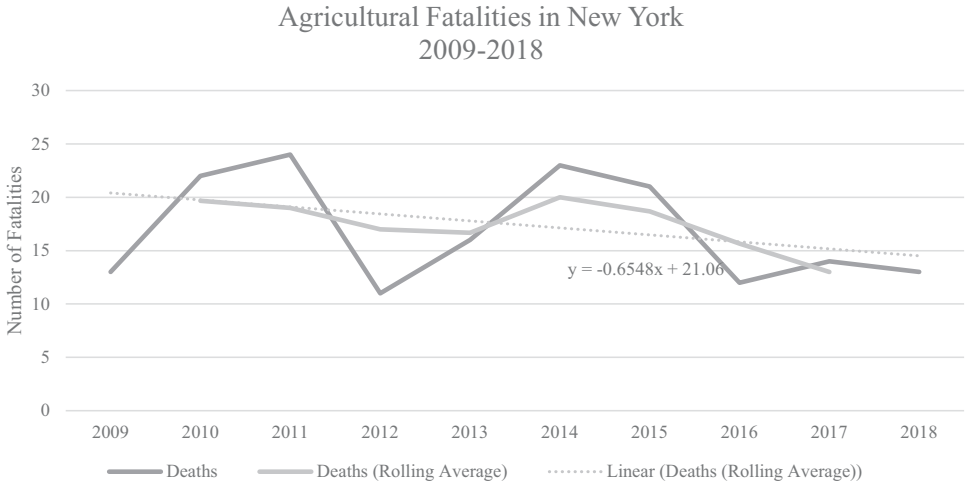

Figure 1. Agricultural fatalities in New York by year.

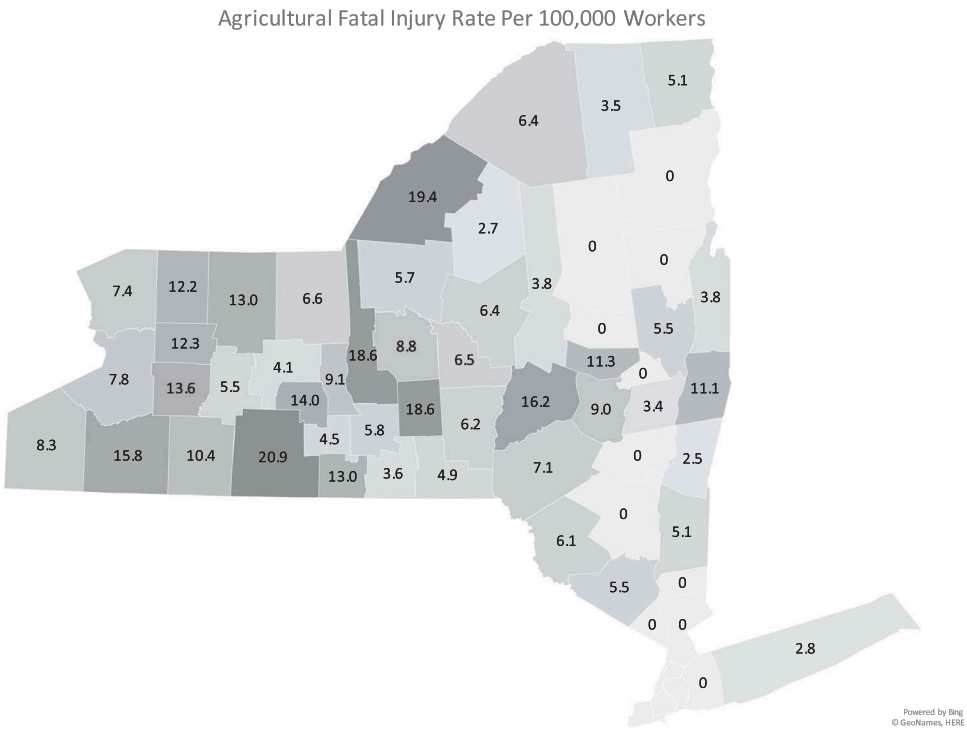

Figure 2. Map of agricultural fatality rate per 100,000 workers, 2009–2018.

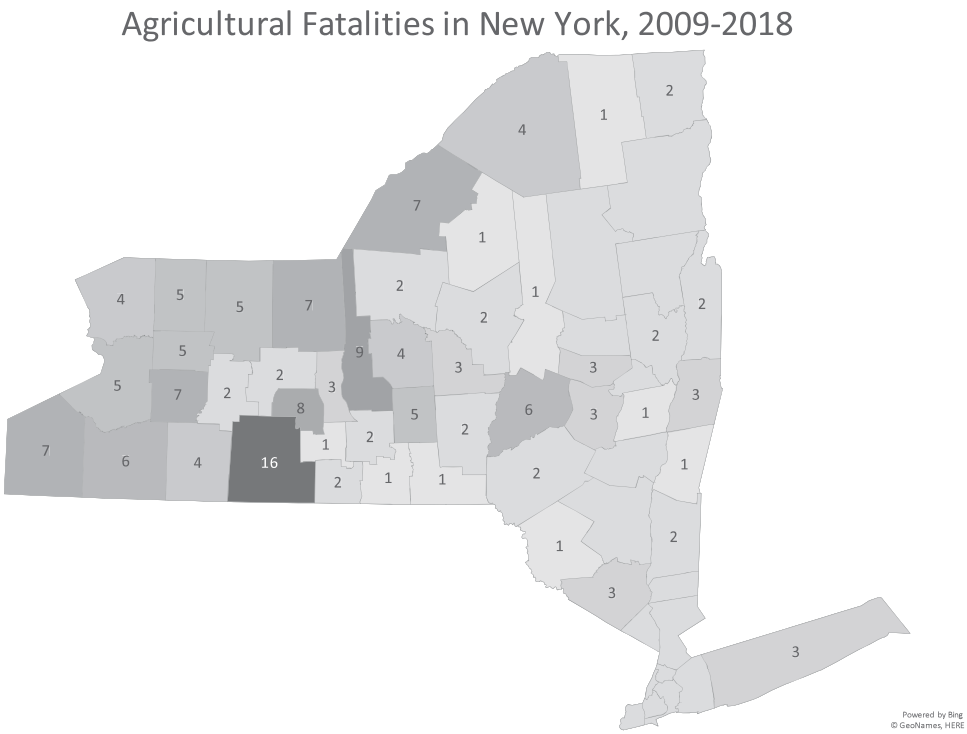

Figure 3. Map of agricultural fatality counts, 2009–2018.

Discussion

While the rates of workers killed on the job have dramatically dropped in many industries, agricultural fatalities remain stubbornly elevated above the all-worker fatality rate of 3.5/100,000 FTE. The fatality rate of 8.2 deaths per 100,000 workers is equivalent to nearly 17 New York

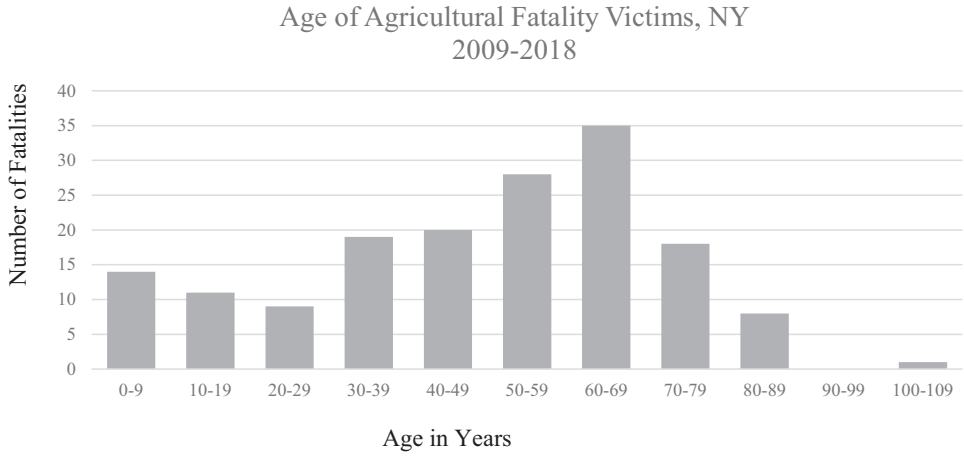

Figure 4. Age of agricultural fatality victims in NY 2009–2018.

farmers dying each year. To put this into perspective, in New York in a given year, over twice as many farmers die on the job as do police officers.[18]

With tractor related deaths comprising nearly half of all fatalities, renewed attention to the promotion of the National ROPS Rebate Program within New York State is warranted.[19,20] While this program has documented over ten lives saved and more than four million dollars in cost-savings to New York State, there is still significant progress to be made.[21] Researchers continue to explore the barriers and motivators of both farmers and stakeholders within this program.[22,23] Unfortunately, the current economics of farming is such that although farmers know what is safe and not safe, they are forced to prioritize other areas of their business over safety.[24] A similar pattern is also seen in healthcare seeking behaviors with some farmers avoiding healthcare due to monetary or time constraints.[25] In addition, research has shown that some farmers perceive dangers as an inherent part of agriculture, making changing to safer technologies or behaviors even more challenging.[8]

Another area of grave concern is the number of youth still being killed on New York's farms. Not all victims were of working age, but their death was inherently caused by exposure to a production agriculture worksite. Farms serve as a home and a business, with the line between the two blurred. Efforts have been, and continue to be, made in the area of child agricultural injury prevention both nationally and regionally, and these data further emphasize the need for this work.[7,9,14,26] Youth fatalities are not a phenomenon unique to New York State farms. A recent analysis by Weichelt et al. reported 178 fatal agricultural injuries among youth between 2015 and 2017 in a nationwide analysis of news reports.[14] Gorucu et al. found that youth under 15 years old were particularly at high risk of fatal farm injury.[27] Administrative changes could have a profound influence on the risk exposure, especially for youth. These could include a farm rules/safety contract that prohibit youth from certain areas of the farm (especially where the majority of machinery operation occurs), or creating special safe play spaces where youth are encouraged to play.[28] These changes could be implemented without creating additional costs for the farm.

With fatalities being relatively rare events, it is difficult to establish patterns. However, the higher rate of machinery-related incidents points to the continued need to push for safer equipment and adoption of newer safety technologies. In addition, retrofitting older machinery with low-cost safety features, such as ROPS and power-take off shields, can go a long way toward minimizing hazards associated with this equipment. The differences in fatality rates among New York Counties is alarming and we suspect this may have to do with differences in terrain, and the relative awareness of agricultural safety, and involvement in safety activities (trainings, retrofitting dangerous equipment, etc.). We have already begun targeted safety campaigns in the high risk counties but further exploration into fatality rate differences among New York counties is warranted to target specific safety interventions

Table 2. Fatal injury counts by source of injury and type of event.

Source of Injury, by Type of Event	Count	Percentage
ATV/MUV	**6**	3.6
Caught Under	2	1.2
Rollover	2	1.2
Struck By/Against	1	0.6
Unknown	1	0.6
Auger/Conveyer	**2**	1.2
Entanglement	2	1.2
Building Fire	**1**	0.6
Fire	1	0.6
Building/Structure	**1**	0.6
Struck By Falling Object	1	0.6
Bull	**3**	1.8
Gored by Bull	1	0.6
Struck By/Against	2	1.2
Corn	**1**	0.6
Suffocation	1	0.6
Electrical Wire	**1**	0.6
Electrocution	1	0.6
Fall	**6**	3.6
Fall Elevation	5	3.0
Struck By/Against	1	0.6
Farmstead Machinery	**7**	4.1
Caught Between	2	1.2
Fall	1	0.6
Run Over	1	0.6
Struck By Falling Object	2	1.2
Tractor Rollover	1	0.6
Field Machine	**11**	6.5
Caught Under	4	2.4
Entanglement	5	3.0
Run Over	2	1.2
Fire	**1**	0.6
Fire	1	0.6
Human	**1**	0.6
Violence	1	0.6
Manure Slurry	**1**	0.6
Unknown	1	0.6
Metal Gate	**1**	0.6
Struck By Falling Object	1	0.6
Methane Gas	**1**	0.6
Inhalation	1	0.6
Non-Powered Cart or Wagon	**4**	2.4
Caught Between	1	0.6
Caught Under	1	0.6
Run Over	1	0.6
Struck By Flying Object	1	0.6
Pond	**1**	0.6
Suffocation	1	0.6
PTO	**3**	1.8
Entanglement	3	1.8
Silage	**1**	0.6
Suffocation	1	0.6
Skidsteer	**7**	4.1
Caught Between	3	1.8
Caught In/By	1	0.6
Caught Under	1	0.6
Run Over	1	0.6
Struck By/Against	1	0.6
Snowmobile	**1**	0.6
Struck By/Against	1	0.6
Tire	**1**	0.6
Struck By Flying Object	1	0.6
Tractor	**74**	43.8
Caught Between	1	0.6
Caught Under	5	3.0
Ejected	1	0.6
Fall Elevation	1	0.6
Run Over	16	9.5
Struck By/Against	4	2.4
Tractor Rollover	42	24.9
Unknown	4	2.4
Tree	**6**	3.6
Caught In/By	1	0.6
Struck By Falling Object	5	3.0
Truck/Auto	**21**	12.4
Caught Under	3	1.8
Run Over	1	0.6
Struck By/Against	16	9.5
Suicide	1	0.6
Unknown	**3**	1.8
Unknown	3	1.8
Utility Pole	**1**	0.6
Struck By/Against	1	0.6
Water Trough	**1**	0.6
Drowning	1	0.6
Weather	**1**	0.6
Drowning	1	0.6
Grand Total	**169**	

for these high risk areas. Lastly, we hope to improve this data collection system by further delineating work and non-work related fatal injury events, as well as adopting the OIICS classification scheme to make these data consistent with non-fatal injury data analyzed by the Center.

Limitations

It is possible that some reports of agricultural fatalities would not be found by the news clipping service, AgInjuryNews, or through the CFOI data collection process Additionally, an agricultural fatality may not be reported in the news, or reported to authorities as a workplace fatality.

The denominator calculations for agricultural workers at risk in New York may not be exactly equivalent to the Bureau of Labor Statistics' Full Time Equivalents (FTE). While the agricultural denominator was calculated as the number of hired workers, unpaid workers, and producers, it is acknowledged that a 40-hour work week with two weeks of vacation is not typical for agricultural workers, as is assumed for the calculation of FTE.

In addition, it is unlikely that youth were counted as hired workers or unpaid workers, therefore the denominator is slightly skewed, as there would be

numbers in the numerator which are not represented in the denominator. Since youth 19 and under contributed less than 15 percent of the fatalities, it was felt that the denominator calculation is still reasonable, however the rate calculated for working agricultural fatalities was still elevated at 2.1 times the all-worker fatal injury rate.

Conclusions

The fatal injury rate in New York agriculture is over twice the 2017 national all-worker fatality rate. Four New York Counties have agriculture fatality rates over five times the national all-worker average. Tractor related incidents continue to be the leading cause of death. Programs addressing tractor safety should continue to be a top priority for New York. These data, along with non-fatal injury data, should be used to guide additional prevention and intervention activities. Such loss of life should underscore the tremendous stress the agricultural community is under, and serve to funnel resources to strengthen these communities, businesses and workers.

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Data availability statement

The data described in this article are openly available in the Open Science Framework at DOI:10.17605/OSF.IO/TPA6U.

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