FATAL FARM INJURIES IN SASKATCHEWAN 1990 TO 2019 (30 years)

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Office of the Chief Coroner, Ministry of Justice, Government of Saskatchewan
Occupational Health and Safety Division, Ministry of Labor Relations and Work place Safety, Government of Saskatchewan

Methods

1.1 Database Management

The procedures used to conduct this project were approved by the Biomedical Research Ethics Board at the University of Saskatchewan (BIO #04-204) and an MOU between the Provincial Coroner's Office, Ministry of Justice, Government of Saskatchewan and the University of Saskatchewan. All data collected as part of the Saskatchewan Farm Injury Surveillance project are de-identified and maintained in strict confidence. In the case of fatal farm injury data, personal identifiers are not collected by the researchers. Electronic data files are encrypted and stored on a secure sever at the University of Saskatchewan. Documents pertaining to these data are kept in locked filing cabinets also located in locked rooms at CCHSA at the University of Saskatchewan.

1.2 Identification of Individual Cases

All reports of patterns of injury contained in this report are based on analyses of group data only. No individual cases are presented. Where stratified analyses by factors of interest resulted in a group size of less than five cases, the results are aggregated to the "other" category or, in the case of fatality data, are reported as a proportion of the total.

2. Overview of Data Sets

2.1 Identification of Farm Fatalities

The process used in the identification of fatalities on Saskatchewan farms is described below:

1. The two sources of farm fatality data were the Occupational Health and Safety Division, Ministry of Labor Relations and Workplace Safety, Government of Saskatchewan and the Provincial Coroner's Office, Ministry of Justice, Government of Saskatchewan .
2. A comprehensive list of all potential, farm-related fatalities was assembled within each agency.
3. Once cases were identified, detailed case reports were sought for review and data abstraction. The main sources of information were the coroner's reports and the Occupational Health and Safety Division's accident investigation reports. The definitive source of information was the coroner's investigation report.
4. Data abstraction and entry were completed on each eligible case. This was done in a consistent manner using a standard data abstraction form and a database program that was developed using the Canadian Agricultural Injury Reporting CAIR) program template. All data is de-identified.
5. Ineligible cases were excluded using the decision rules developed by the CAIR collaborators.
6. Cases were stratified into two categories: a) work-related farm fatalities, and b) farm fatalities that were not work-related but were caused by a hazard of the farm environment. The result is the final, provincial registry of farm fatalities.

2.2 Calculation of Rates

In this report, some rates of injury are provided. These describe ratios of the number of fatal farm injuries, to the number of persons at risk of experiencing a farm injury over a time period of interest (usually one year). Calculation of rates on a per capita basis allows the frequency of an outcome to be compared, after accounting for differences in population size or period of study.

It is very important to recognize that the rates that are reported here are far from perfect. The best population information available in Canada to describe the persons at risk of experiencing a farm injury is population counts from the Canada Census of Agriculture and Population Census. These counts do not include hired workers who do not live in the households of farmers or visitors to the farm who do not live on farms. We suspect that some of the injured persons counted among those experiencing farm injuries are in these latter groups. The effect of including in the numerator persons who are not also counted in the denominator is that the estimated rate will be higher than the true rate.

In spite of the limitations described above, the authors felt that the estimated rates reported in this document provide some useful information concerning the frequency of these events when comparing age groups or when comparing other health outcomes of interest for this population. However, given the limitations described above, the rates which are reported should be viewed with caution.

2.3 Data Quality Limitations

These data are collected retrospectively. Case identification in real time involves the Occupational Health and Safety Division and the Chief Coroner's Office. When cases are identified retrospectively from the databases it is possible for cases to be missed. Hypothetically we believe that this was possible in the case of a farm work related fatality that occurred off the farm such as when a farmer was hauling bales on the highway and was in a traffic collision. There was same possibility to miss fatal injury events that did not involve farm work but resulted from exposure to a hazard of the farm environment such as drowning in the farm dugout. In spite of these limitations the authors felt that the database provides valuable information about the frequency and patterns of injury on Saskatchewan farms.

2.4 Definitions

For the purposes of this report we have used the following definitions:

Farm Population – persons living in the households of farm operators plus temporary foreign workers as provided by Statistics Canada

Fatal Farm Injury – Any unintentional injury resulting in death that occurred during activities related to the operation of a farm or ranch including deaths that occurred away from the farm location such as during transport of machinery or produce **and** any unintentional injury resulting in death that involved any hazard of a farm or ranch environment such as dugouts or lagoons. Deaths where the victims were killed because a third party was engaged in agricultural work are also included. Fatal injuries that took place in the farm residence due to non-farm activities were not included.

Work-related farm injury – These are deaths that occurred while farm work was being conducted. This included deaths that occurred at off-farm work locations and those that involved motor vehicles that were being used for farm work. Deaths where the victim(s) were killed by a third party who was engaged in farm work are also included.

Not work related farm injury – This category included those deaths that, while occurring on a farm or caused by some aspect of the farm environment, were not directly related to farm-work. For the purposes of clarity, they are analyzed separately from the work-related farm fatalities. Examples of these include drownings in farm water sources, deaths on farm vehicles being used for recreational purposes and deaths from exposure.

Machinery related farm injury – These are deaths that occurred in events where the source of energy that caused the injury was a machine or part of a machine, and/or the location of the injury was a machine (e.g. fall from a machine)

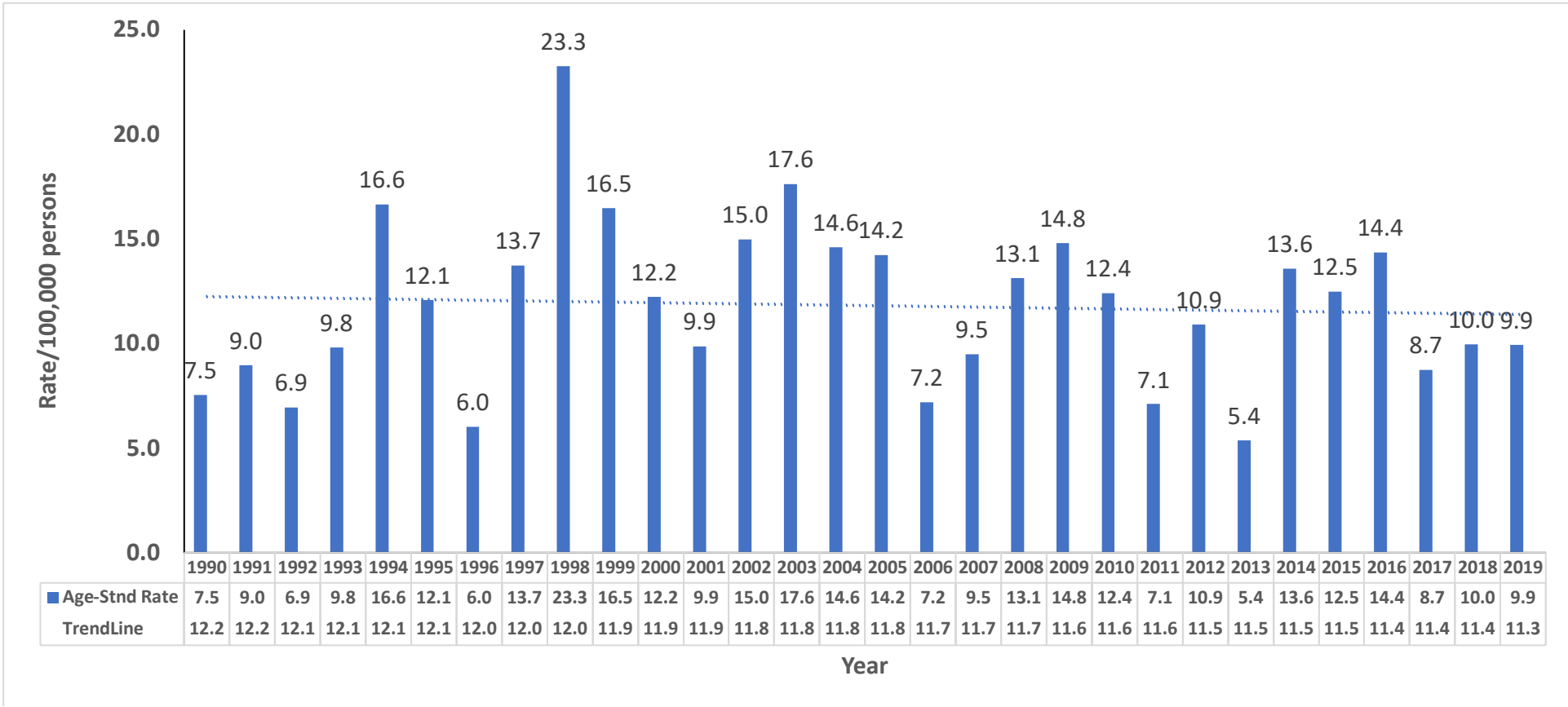
Mechanisms of injury – This describes the most immediate cause, closest in time to the actual occurrence of the injury. See *Appendix A* for a detailed description of each mechanism of injury used in this report.

Table 1: Leading mechanism of fatal injury by age group, 1990-2019 (506 deaths)

0-14 years (n=57)	15-39 years (n=107)	40-59 years (n=138)	60+ years (204)
Machinery rollover (n = 14)	Machinery rollover (n = 18)	Entangled in moving machinery parts (n = 19)	Dismounted machinery operator runover by machine (n = 25)
Passenger fell from machine then runover (n = 9)	Machinery vs traffic collision (n = 15)	Machinery vs traffic collision (n = 17)	Machinery rollover (n = 19)
Machinery runover of bystander (n = 9)	Pinned or struck by machine component (n = 14)	Machinery rollover (n = 16)	Operator fell from machine then runover (n = 14)
Drowning (n = 6)	Contact with toxic substance (n = 8)	Dismounted machinery operator runover by machine (n = 11)	Animal related (n = 14)
Animal related (n = 5)	Entangled in moving machinery parts (n = 6)	Pinned/struck by machinery component (n = 11)	Machinery runover of bystander (n = 14)
All other codes (n = 14)	All other codes (n = 46)	All other codes (n = 64)	All other codes (n = 118)

- The color bars in the table show that the leading mechanisms of injury vary by age group. This reflects the changing farm work assignments as people age and gain more experience in the work place.
- Machine rollover events are among the leading mechanisms of injury in all age groups.
- When run over event categories are combined they are by far the most common fatal event among the youngest and oldest age groups. There are distinct differences in patterns of run over events. The most common are characterized by: 1) machine operator dismounts a powered machine and is subsequently runover when the machines rolls forward/backward over the operator; 2) a bystander is run over as they are standing near a moving machine; and 3) a passenger or operator falls from a moving machine and is runover by the machine.

Figure 1: Age-standardized annual rate of work-related fatalities by year 1990-2019 (424 deaths)

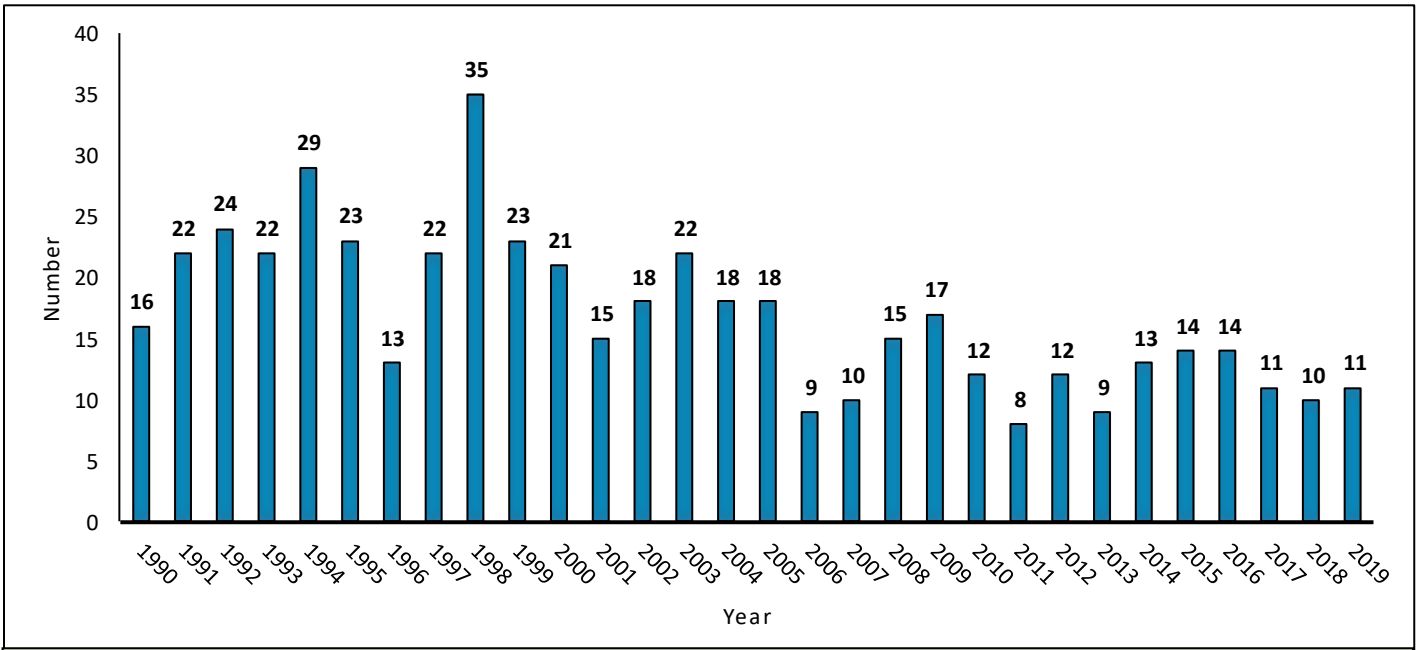


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Age-Stnd Rate	7.5	9.0	6.9	9.8	16.6	12.1	6.0	13.7	23.3	16.5	12.2	9.9	15.0	17.6	14.6	14.2	7.2	9.5	13.1	14.8	12.4	7.1	10.9	5.4	13.6	12.5	14.4	8.7	10.0	9.9
TrendLine	12.2	12.2	12.1	12.1	12.1	12.1	12.0	12.0	12.0	11.9	11.9	11.9	11.8	11.8	11.8	11.8	11.7	11.7	11.7	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.4	11.4	11.4	11.3

*Farm population, 1996, 2001, 2006 Population Census and Census of Agriculture, Statistics Canada. Note: The population covered by the Agriculture–National Household Survey Linkage database and the estimates derived from it also changed in two ways in 2011. First, the definition of the farming population changed. In the years prior to 2011, only operators and their families who resided on the farm at any time in the previous 12 months were included in the farming population. In 2011, the on-farm restriction was removed. Operators and their families not residing on a farm are also included. Second, residents of collective dwellings were not eligible to receive the National Household Survey and, thus, are not represented in the Agriculture–National Household Survey Linkage database.
Reference Canadian population 2016 used to calculate the these rates.

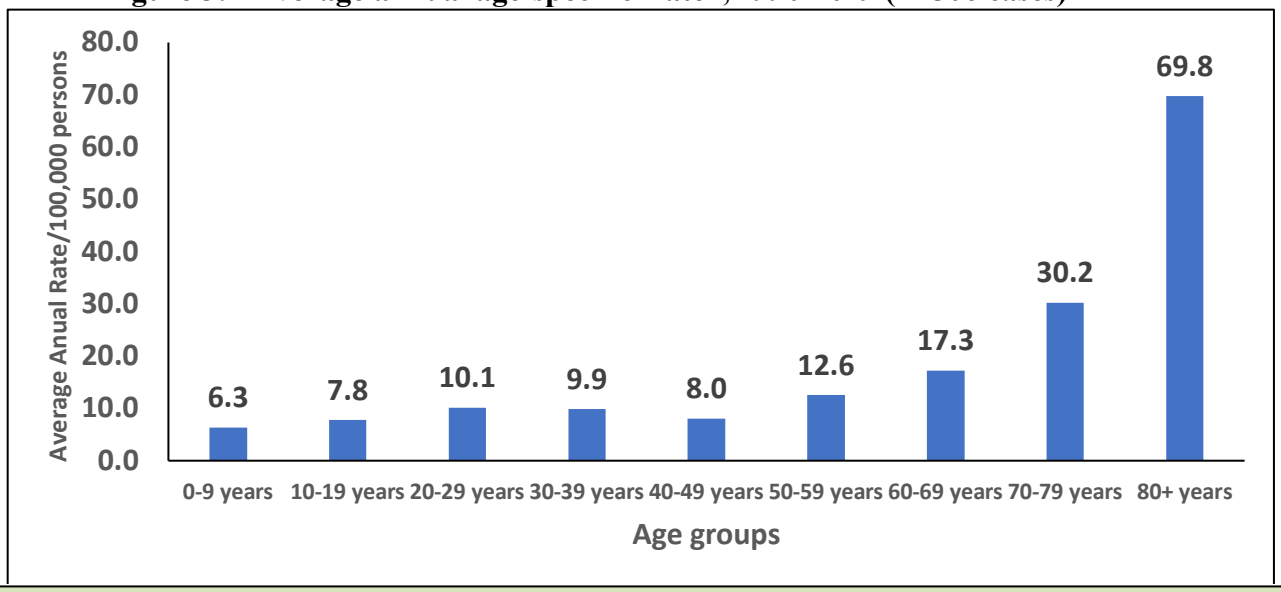
- Rates should be viewed with caution due to the small number of fatalities per year.
- Rates ranged from a high of 23.3 per 100,000 farm population in 1998 to a low of 5.4 per 100,000 farm population in 2013.
- There is a small but not statistically significant decreasing trend in farm work-related fatalities during the period.

Figure 2: Number of Fatal Farm Injuries by Calendar Year 1990 – 2019 (506 deaths)



- The numbers of fatal farm injuries per year have decreased as the farm population has decreased. However when the absolute numbers are adjusted for the decline in the farm population there has been no change in the rate of fatal injuries as demonstrated in Figure 1.
- The average annual number of fatal injuries for the period from 1990 to 2009 was 19.6 compared to 11.4 for the last ten year period from 2010-2019.

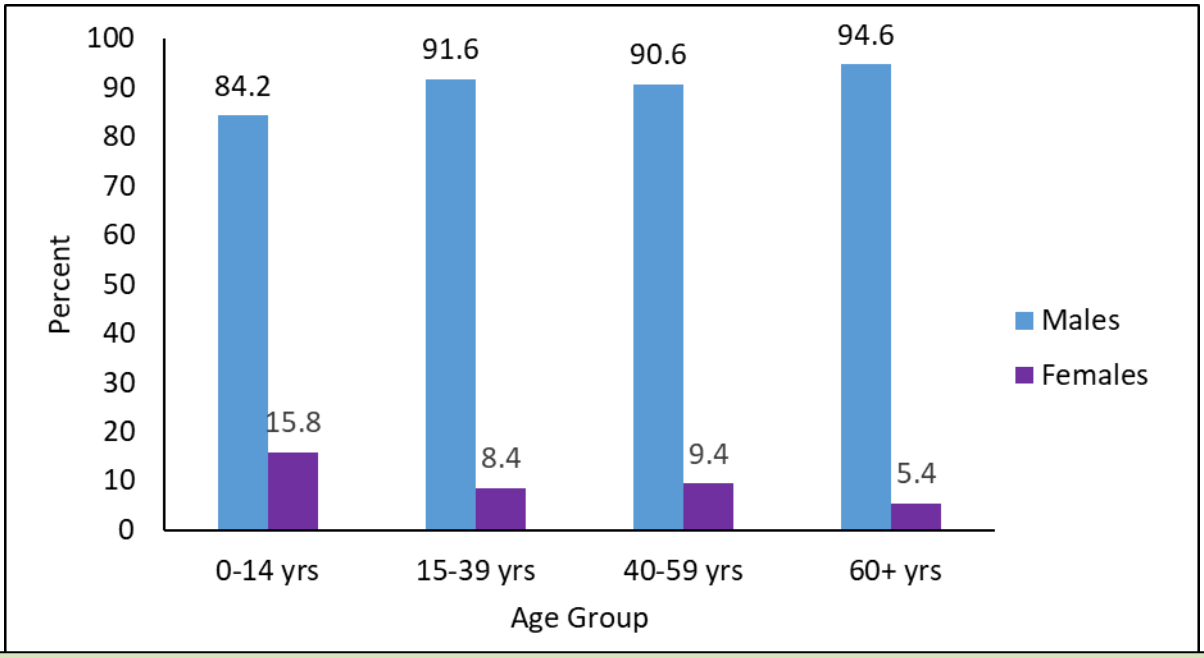
Figure 3: Average annual age-specific Rate*, 1990-2019 (n=506 cases)



*Average Annual Age-specific Rate per 100,000 Farm Population, *Farm population, 1996, 2001, 2006, 2011, 2016 Population Census and Census of Agriculture, Statistics Canada.

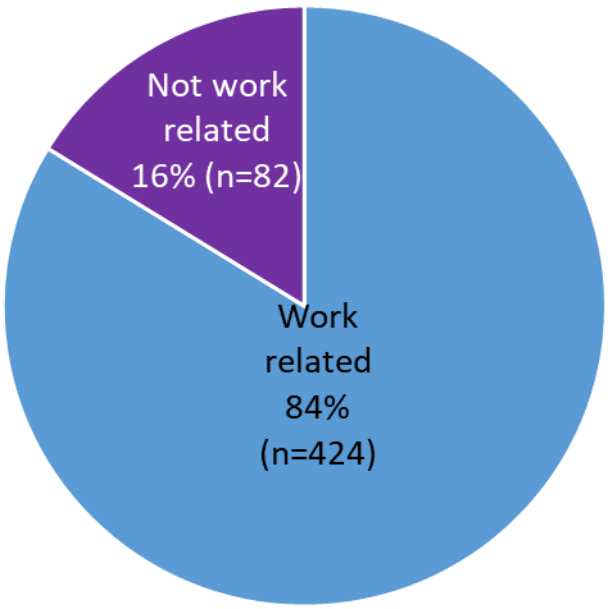
- The average annual rate of fatal farm injuries increases with increasing age. There is a sharp increase observed for persons 70+ years old.

Figure 4: Distribution of fatal farm injuries by age group and sex, 1990-2019 (506 cases)



- Fatal farm injuries occur primarily among males.
- The overall male to female ratio is 12 males to 1 female. The ratio is lowest among the youngest age groups (5:1) and highest in the oldest age group (18:1)

Figure 5: Distribution of fatal farm injuries by work status, 1990-2019 (506 cases)



- Work related injuries are those that occurred during farm work activities on or off the farm.
- Not work related injuries are those that occurred as a consequence of exposure to a hazard of the farm environment.

Figure 6: Distribution of fatal work related injuries by major mechanisms, 1990-2019 (424 deaths)

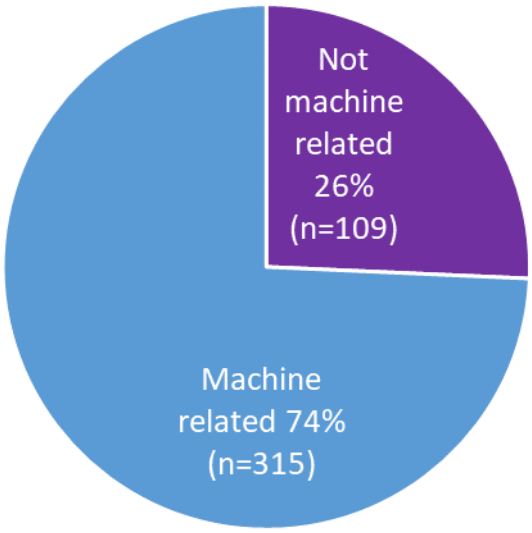
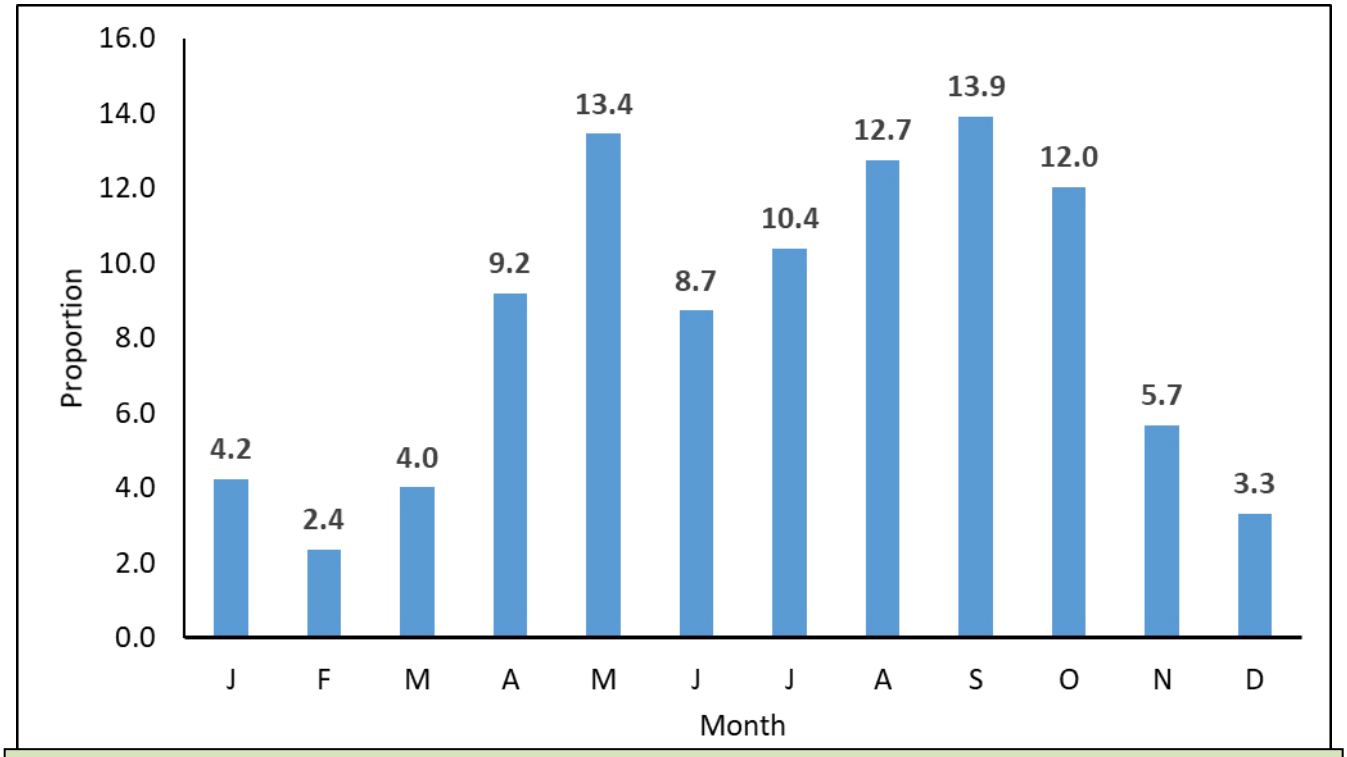


Figure 7: Fatal work related injuries by month of the year, 1990-2019 (424 deaths)

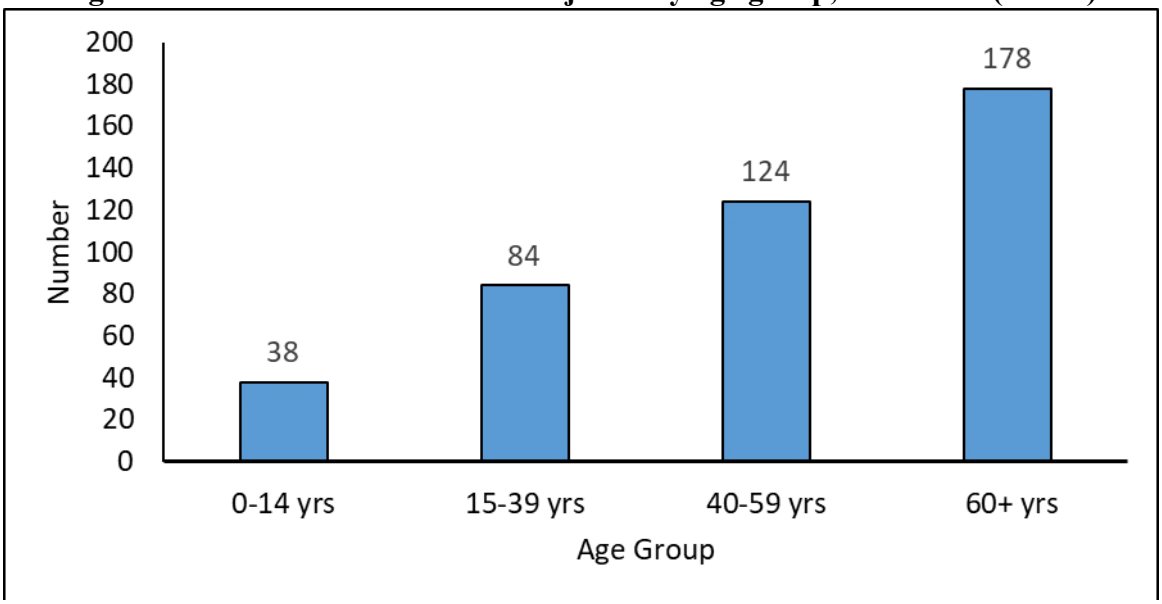


- 80% of farm work related fatalities occurred during the growing season from April to October with peaks during seeding and harvest activities.

Table 2: Leading mechanisms of fatal work related injury by age group, 1990-2019 (424 deaths)

0-14 years (n=38)	15-39 years (n=84)	40-59 years (n=124)	60+ years (n = 178)
Machine Rollover (n = 9)	Machinery Rollover (n =15)	Entangled in moving machinery parts (n = 19)	Dismounted machinery operator runover by machine (n = 23)
Passenger fell from machine then runover (n = 9)	Pinned or struck by machine component (n = 11)	Machinery rollover (n = 15)	Machinery Rollover (n = 18)
Machinery runover of bystander (n = 8)	Machinery vs traffic collision (n = 11)	Machinery vs traffic collision (n = 13)	Machinery runover of bystander (n = 13)
Other machinery related causes (n = 6)	Other machinery related causes (n = 27)	Other machinery related causes (n = 48)	Other machinery related causes (n = 70)
Other non machinery causes (n = 6)	Other non machinery causes (n = 20)	Other non machinery causes (n = 29)	Other non machinery causes (n = 54)

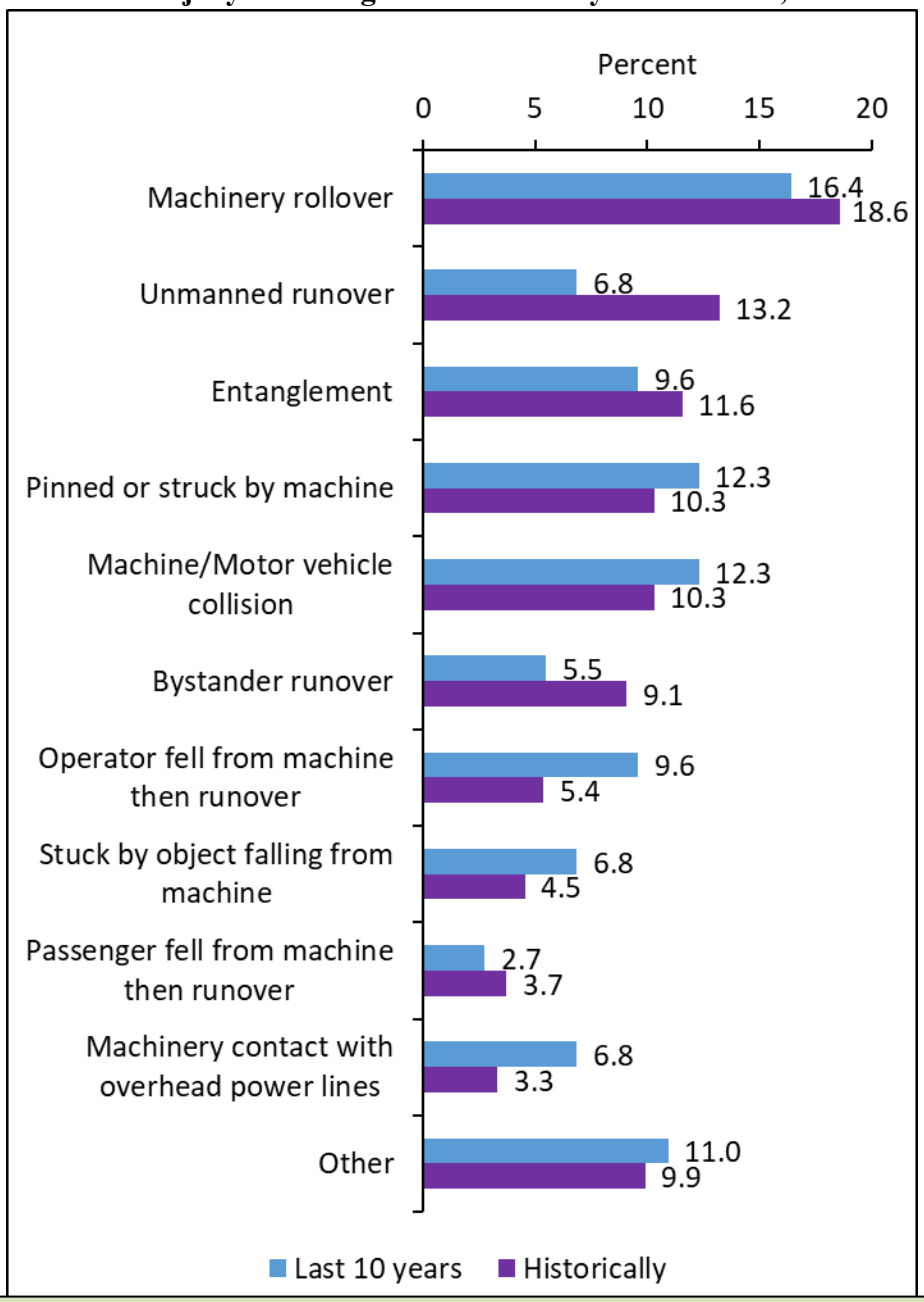
Figure 8: Work related fatal farm injuries by age group, 1990-2019 (n=424)



- In the 0 to 14 year age group, 55 % of the children were younger than 10 years old. These children were not working but were present in the work place during farm work activities.
- In the oldest age category 18% were of age 80 years or older.

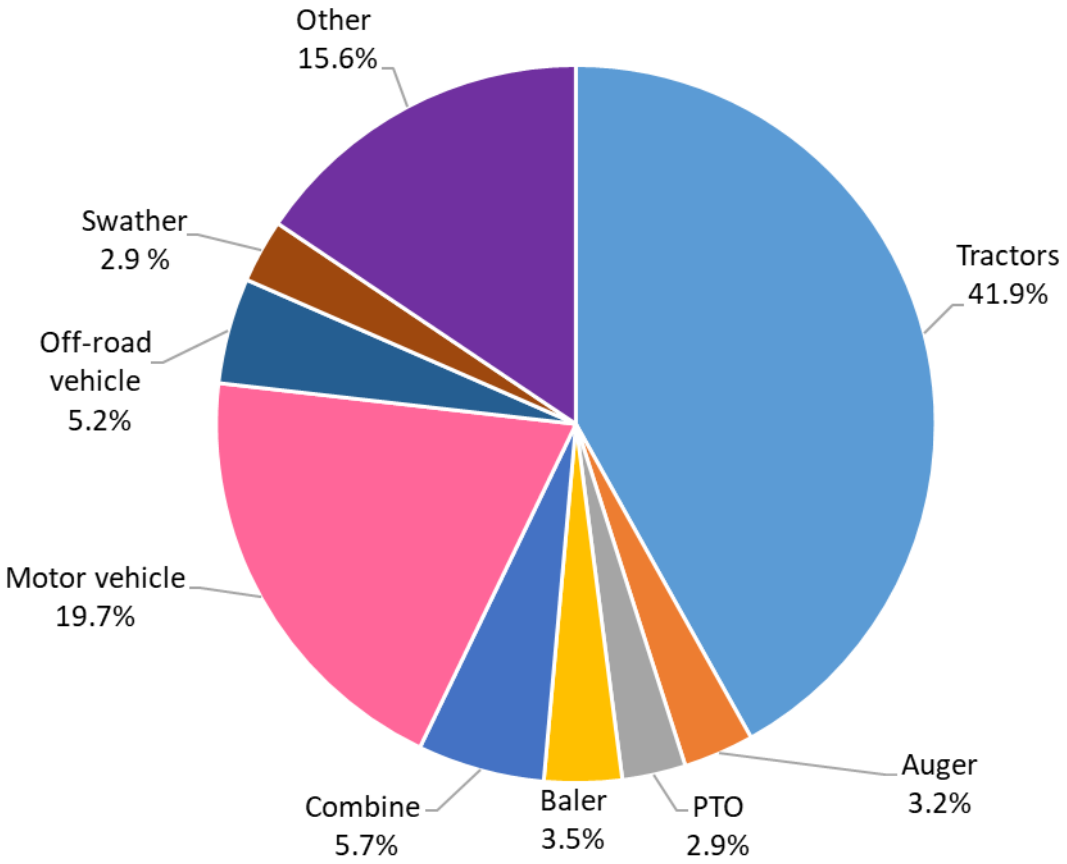
FATAL FARM WORK INJURIES INVOLVING MACHINES, 1990-2019

Figure 9: Mechanisms of fatal injury involving farm machinery and vehicles, 1990-2019 (n=315 deaths)



- Machinery rollover events continue to be the most prevalent mechanisms of injury. These primarily involved tractors during transport, off-road vehicles (ATVs) and grain trucks during transport.
- Run over of bystanders most frequently involved children younger than 6 years of age and persons older than 60 years of age.
- Machinery entanglements occurred most frequently among persons ages 20 to 59. The machines most frequently involved were balers, power take offs and combines.
- There has been no significant change in the patterns of machine related events when the historical data is compared to data from the last 10 years.

Figure 10: Types of machines involved in fatal injury events, 1990-2019 (315 deaths)



- The category of tractors includes bobcats, skid steers and tractors with front-end loaders. Events involving tractors account for almost half of all fatal machine events.
- Motor vehicles were primarily grain trucks including semitrailer trucks, 3-ton trucks and half-ton trucks. Off-road vehicles were dirt bikes, ATV's and snowmobiles.

Figure 11: Work related Machine fatalities by age group, 1990-2019 (315 deaths)

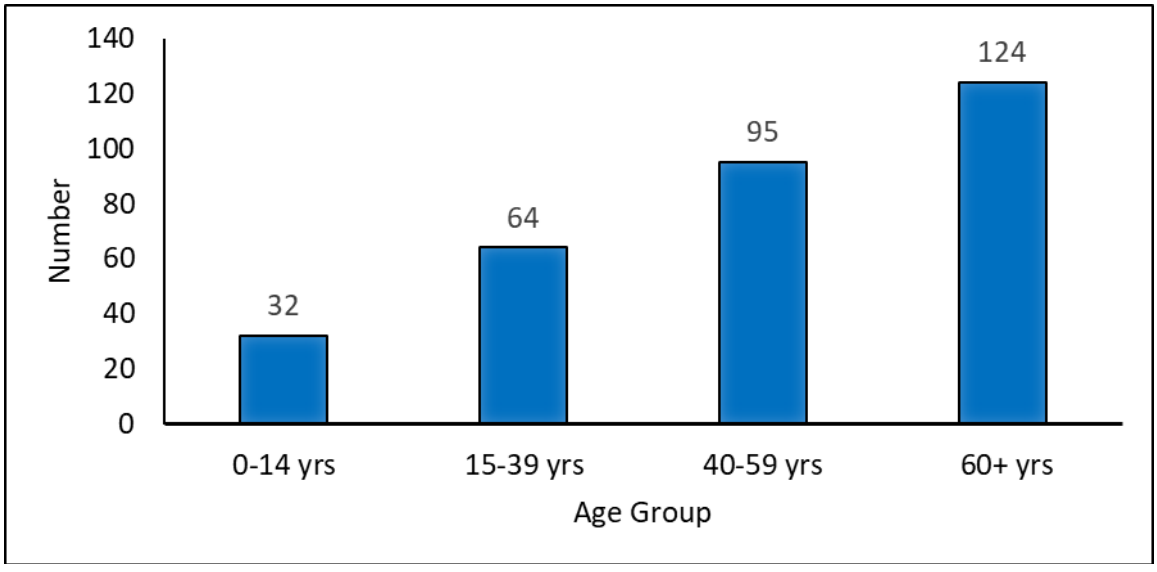
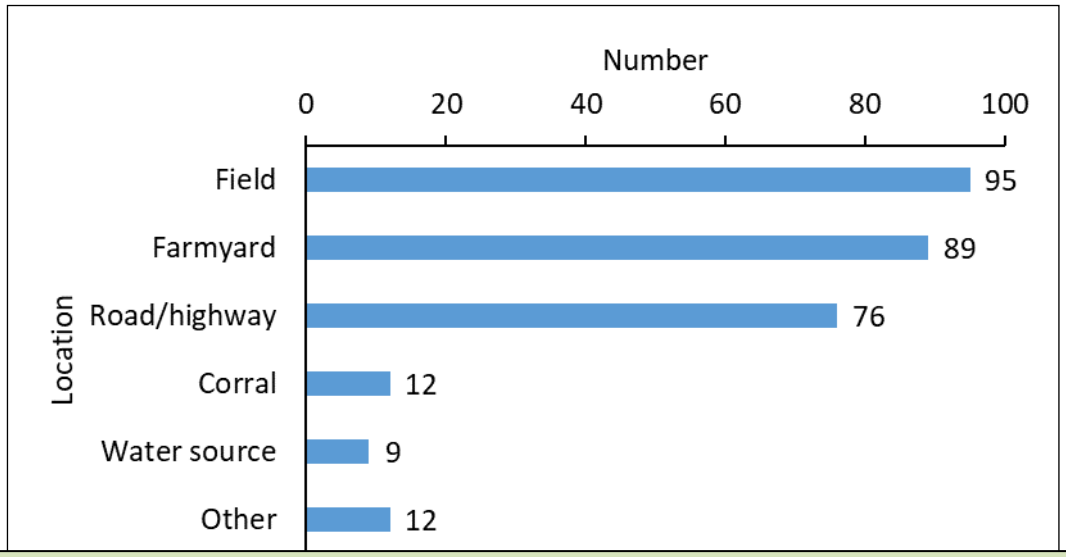
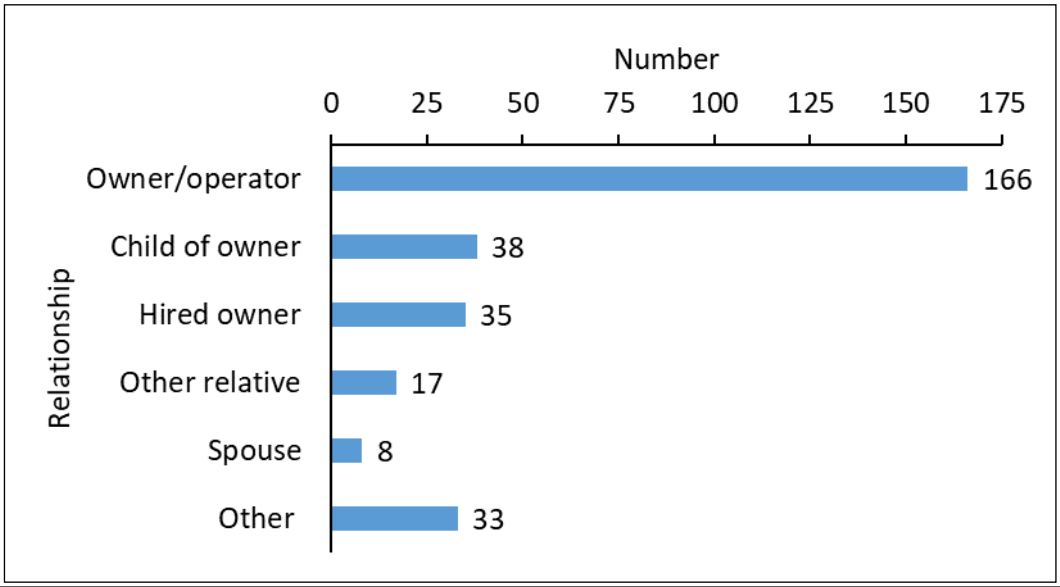


Figure 12: Work related machine fatalities by location, 1990-2019 (293/315 deaths)



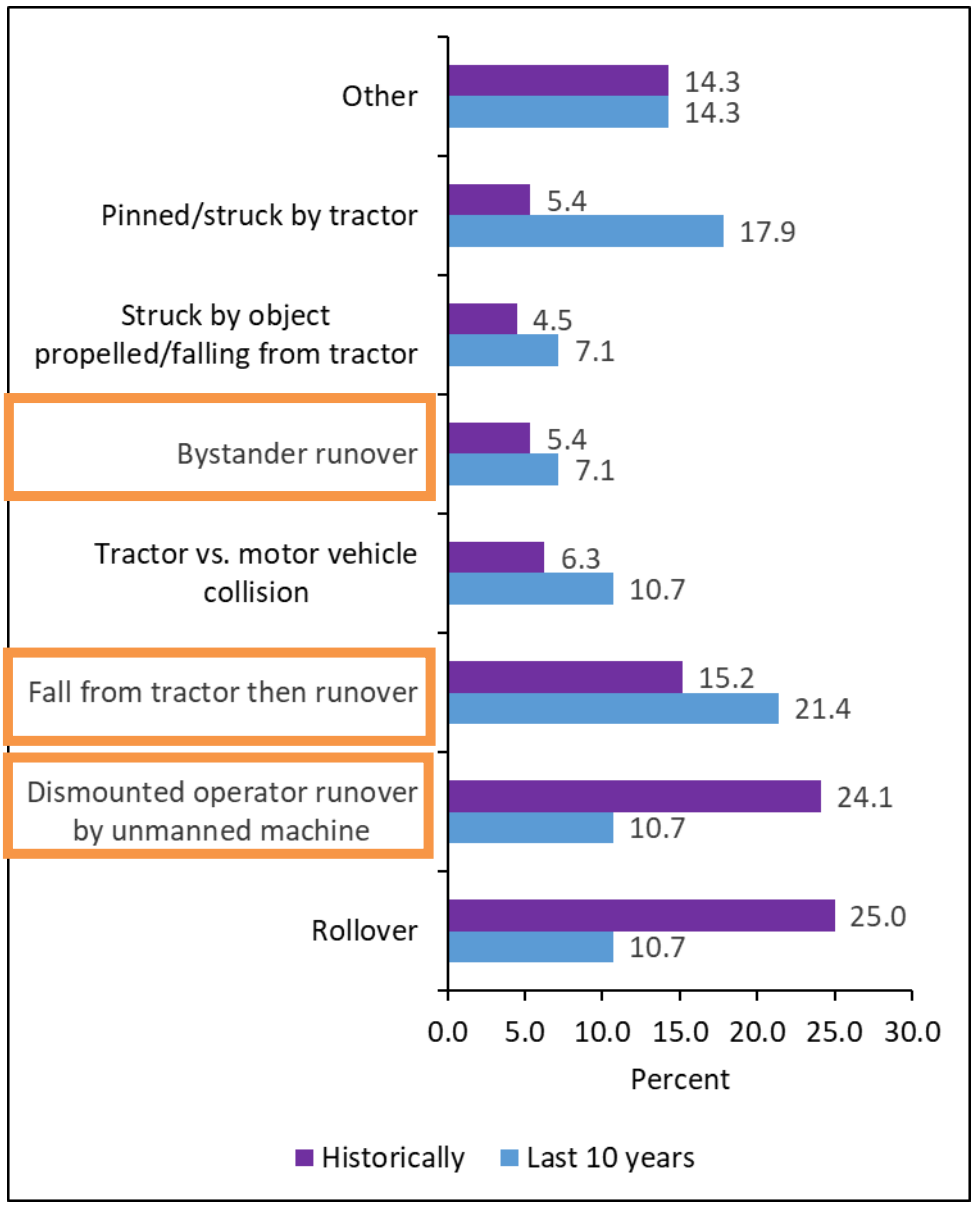
- 63% of work related fatal machinery injuries occur in the farmyard and the field.
- Fatal events occurring on the roads and highways are the third most common location. These include collisions between farm machinery and trucks and traffic. Many rollover events occur on rural roads during transport of farm machinery (particularly tractors) and grain trucks.

Figure 13: Work related machine fatalities by relationship to farm owner, 1990-2019 (297/315 deaths)



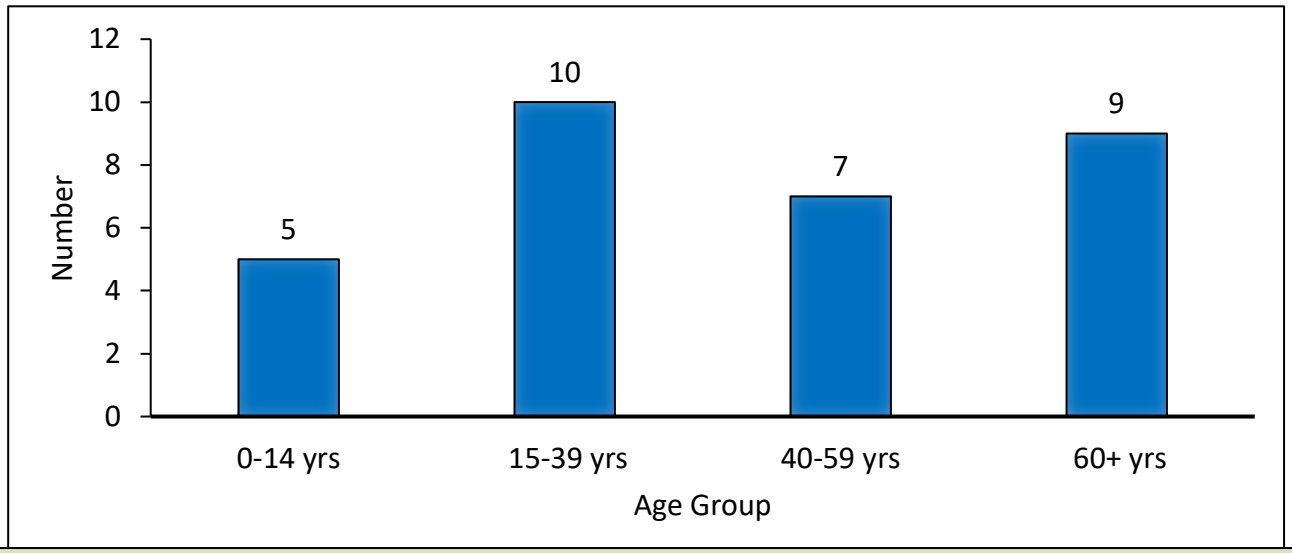
- Of those who are killed in work-related machine fatalities 56% are the farm operator.
- Children of the farm operator account for 13% of those killed (these also included adult children).
- Hired workers account for 12% of those killed (this also included workers employed by custom services being provided on farms)

Figure 14: Work related tractor fatalities by mechanism of injury, 1990-2019 (132 deaths)



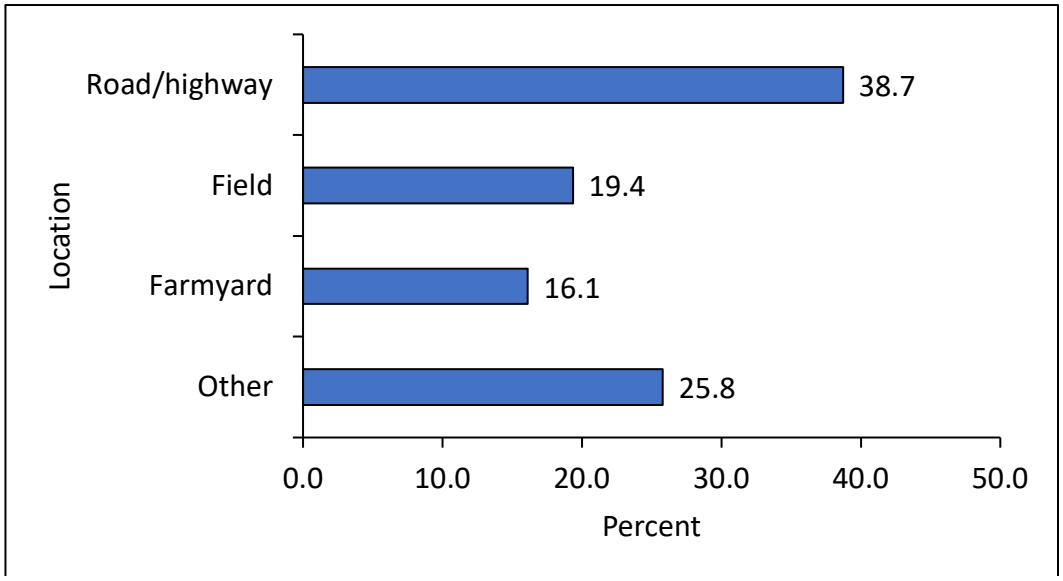
- There are no significant differences in the patterns of tractor related injury events when historical patterns are compared to the patterns of the last 10 years except for pinned/struck by tractor. There is a significant increase in pinned/struck by tractor for last 10 years.
- Rollover and runover events are the by far the most common mechanisms of injury when tractors are involved.
- When all runover mechanisms (orange boxes) are combined they account for 46% of all

Figure 15: Work related tractor rollover fatalities by age group 1990-2019 (31 deaths)



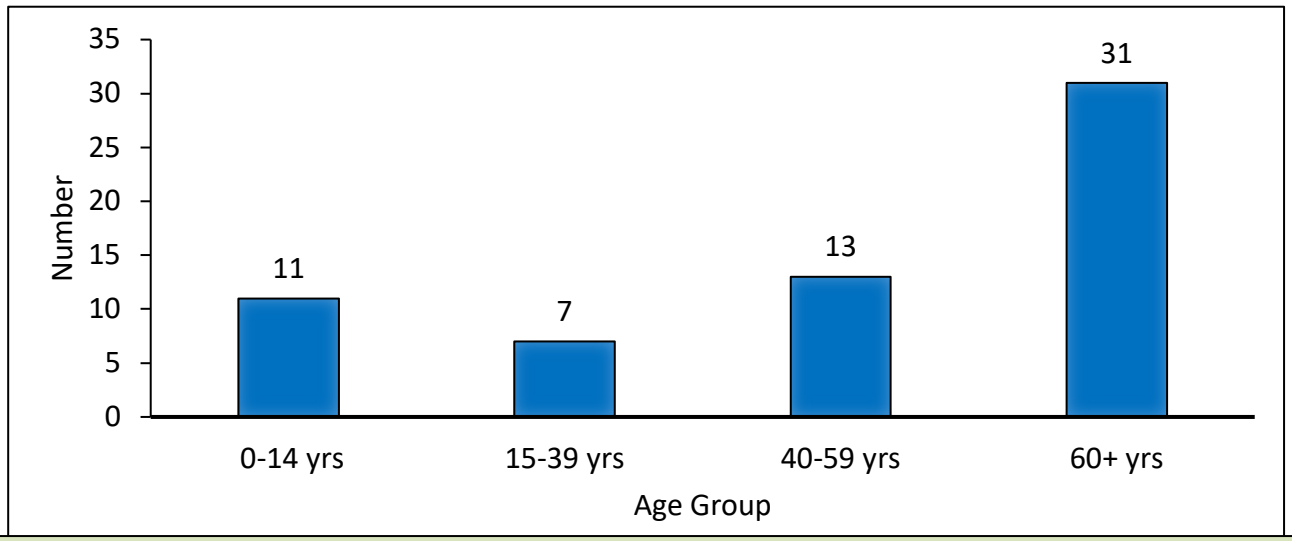
- Among those killed in tractor rollover events 32% were in the 15-39 years age group and 29% were in the 60 years and older age group.

Figure 16: Work related tractor rollover fatalities by location of rollover event 1990-2019 (31 deaths)



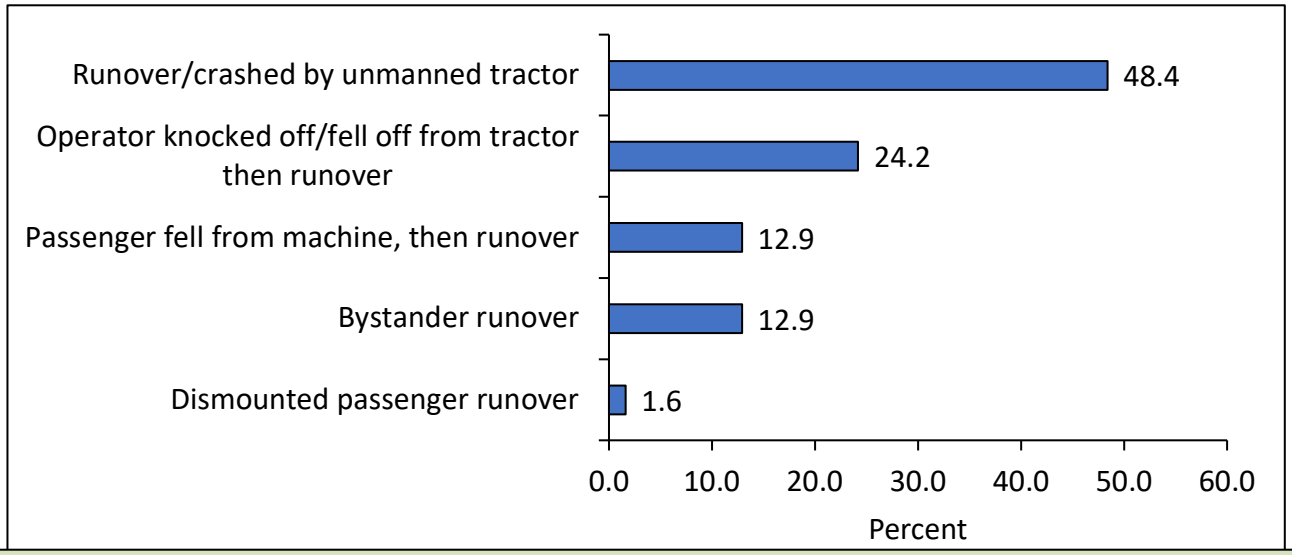
- The most frequent type of rollover events were sideways rollovers.
- These occurred primarily along roadways and ditches during transport of the tractor from one location to another.
- Of those killed in tractor rollovers on roadways, 50% (6/12) were operators between the ages of 13 and 19 years old.

Figure 17: Work-related tractor run over fatalities by age group 1990-2019 (62 deaths)



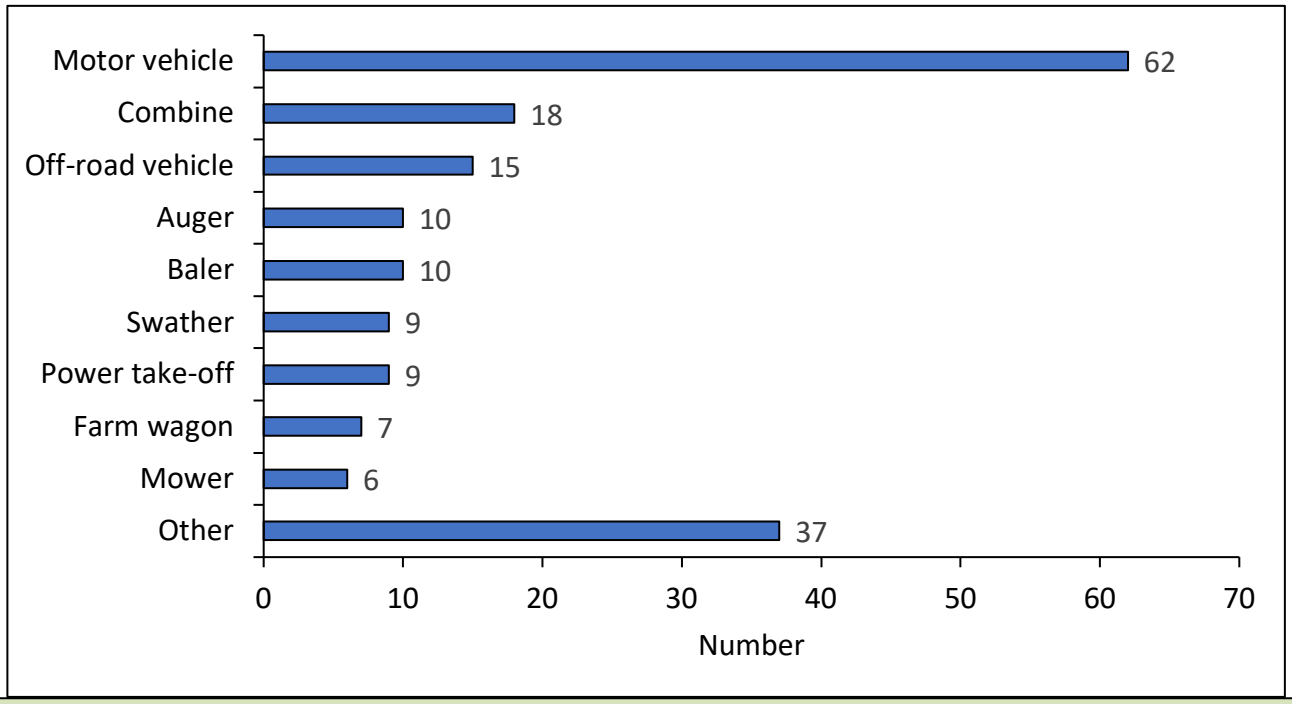
- Among those killed in tractor rollover events half, 50% were the 60+ age group.
- It is important to note that 18% of the total group were children 0 – 14 years of age and of these 73% were less than five year old.

Figure 18: Work related tractor run over fatalities by type 1990-2019 (62 deaths)



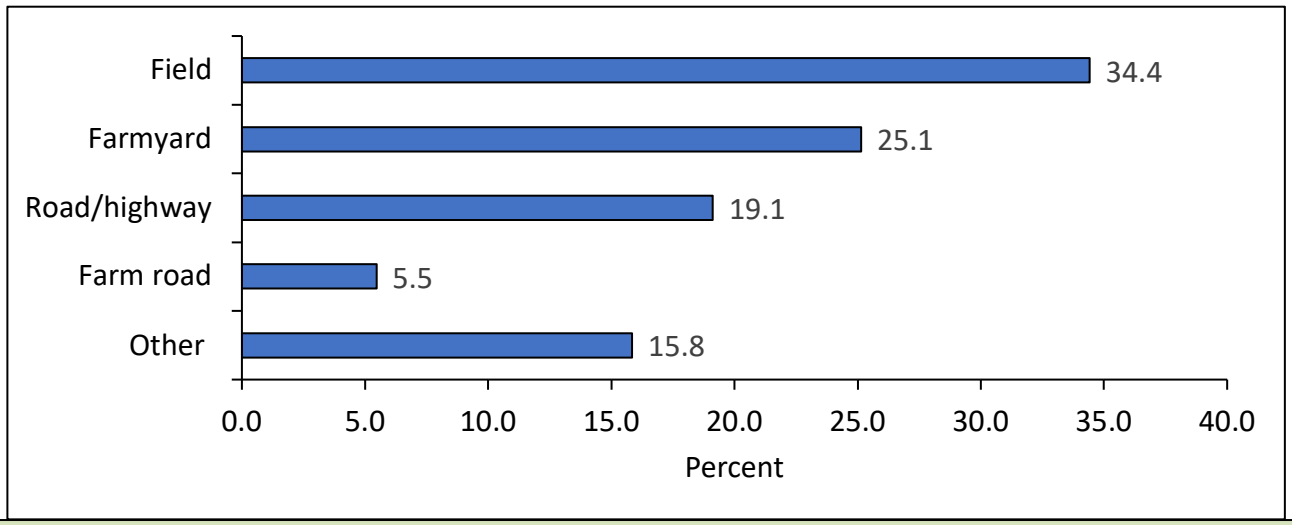
- There are distinct activities in tractor use that lead to run over fatalities. These are described in the figure above.
- The most common type occurs when the operator of a tractor gets out of the tractor cab while the tractor is running. Typically the tractor slips into gear or creeps forward or backward running over the operator or crushing him/her between the tractor and another stationary object.
- 88% of those killed when a passenger (extra riders) fell from a machine and was run over were children less than 15 years of age.
- Of those killed by unmanned tractor including jumpstarting or ground starting a tractor, 60% were older than 60 years of age.

Figure 19: Work-related non-tractor machine fatalities by machine type, 1990-2019 (183 deaths)



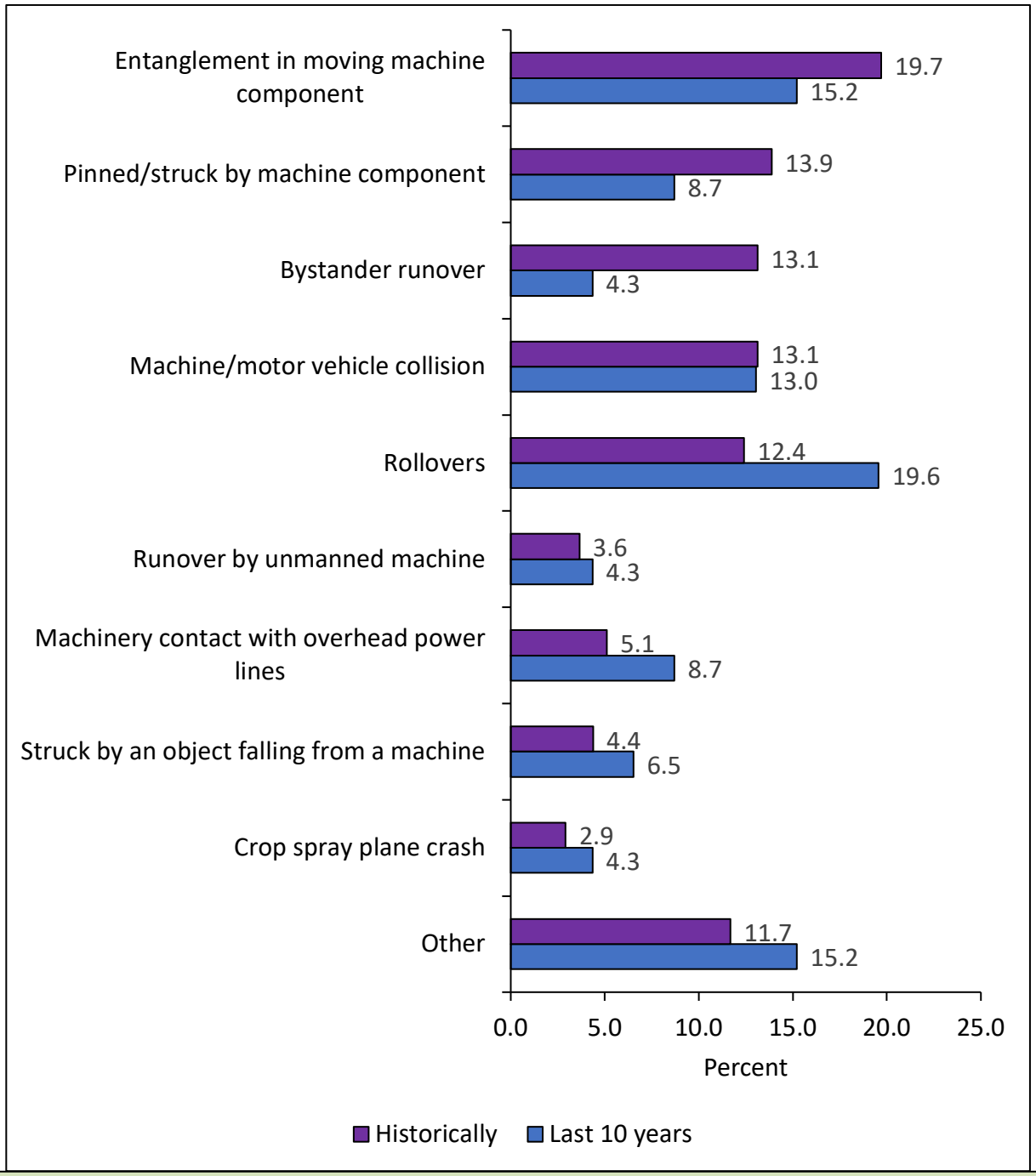
- In the group of non-tractor machines, motor vehicles were the machine most commonly involved.
- The group labelled "other" includes but is not limited to cultivators, power tools, chainsaws, aircraft, spraying equipment, harvester, bulldozer.

Figure 20: Work-related non-tractor machine fatalities by location of injury event, 1990-2019 (183 deaths)



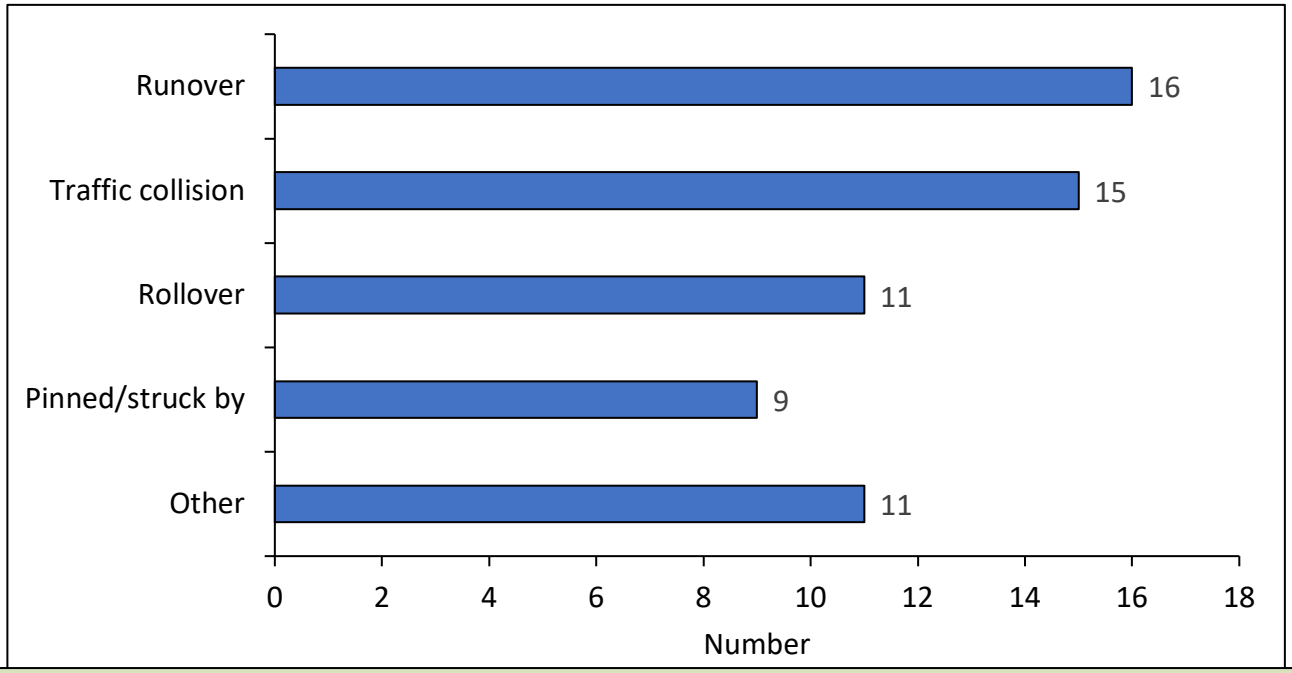
- The field and farmyard are the most frequent location of these fatal injury events. This pattern is different to that observed for tractors (see Figure 16)

Figure 21: Work related non-tractor machine fatalities by mechanisms of injury, 1990-2019 (183 deaths)



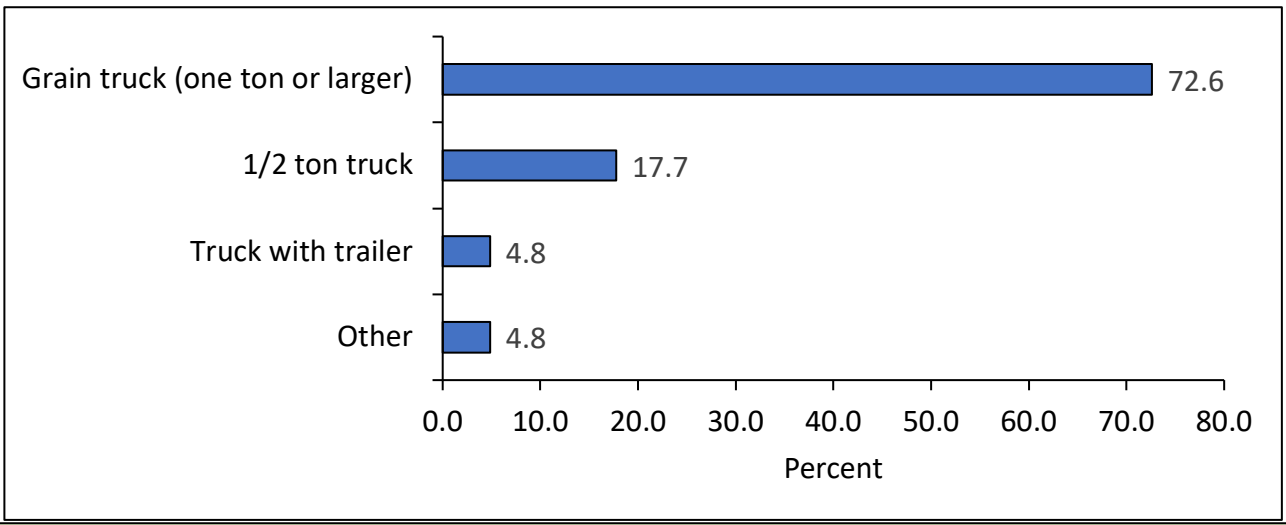
- There is no statistically significant increase in rollover events during the last 10 years when compared to historical data.
- Non-tractor rollover events involved grain trucks and ATVs.
- Overall machinery entanglements are the most common type of non-tractor injury event. The machines most commonly involved were power take offs and balers accounting for 51% of events.
- Machine/motor vehicle collisions occurred on public roads and most commonly involved the transport of large equipment or grain trucks. Often the victim was in the non-farm vehicle.

Figure 22: Work-related motor vehicle fatalities by mechanism of injury, 1990-2019 (62 deaths)



- The leading mechanisms of injury involving motor vehicles were run over of bystanders and traffic collisions.
- Rollovers accounted for 18% of the deaths. These occurred during transport of grain or bales in large trucks.
- The "other" category included entanglements, struck by object falling from machine, machine-related drowning, fell from a machine, carbon monoxide poisoning from machine and machines in contact with overhead powerline.

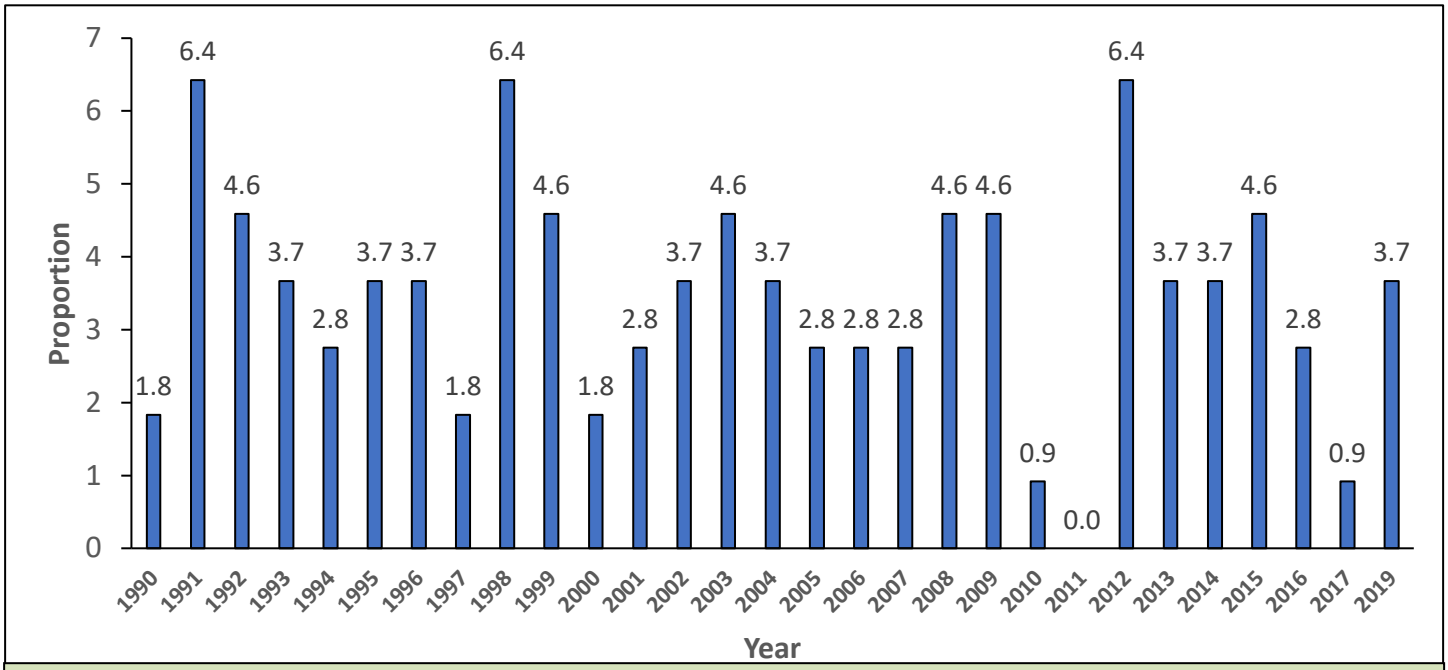
Figure 23: Work-related motor vehicle fatalities by type of vehicle, 1990-2019 (62 deaths)



- Grain trucks (including semi-trailers) were the most common type of truck involved in work-related farm fatalities.

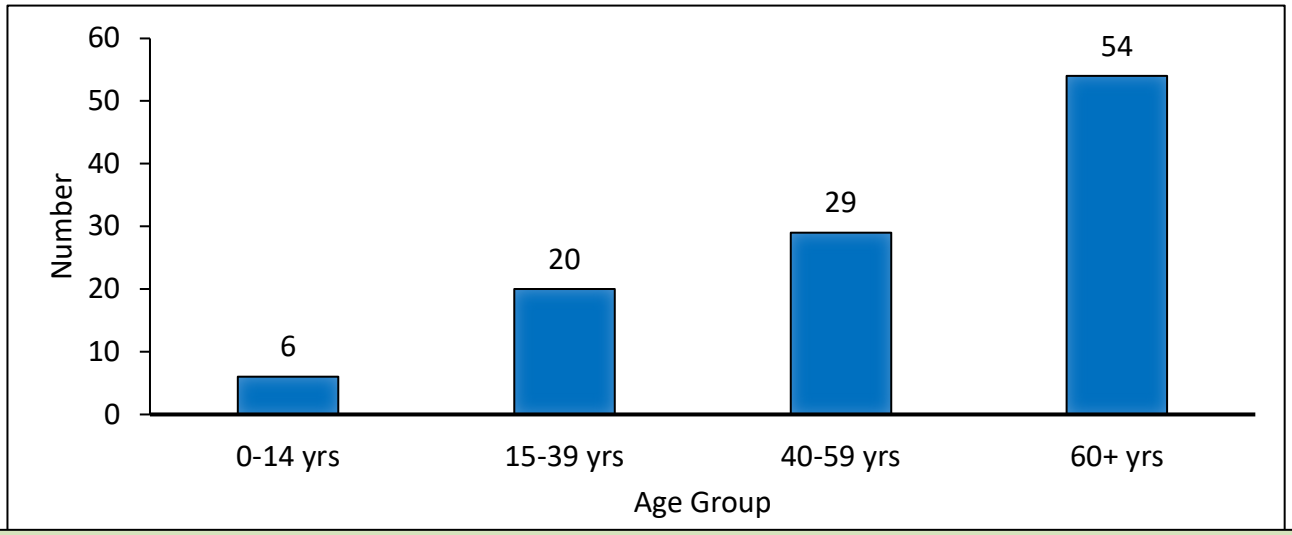
FARM WORK INJURIES – NOT MACHINE RELATED, 1990-2019

Figure 24: Work-related non-machine fatalities by year, 1990-2019 (109 deaths)



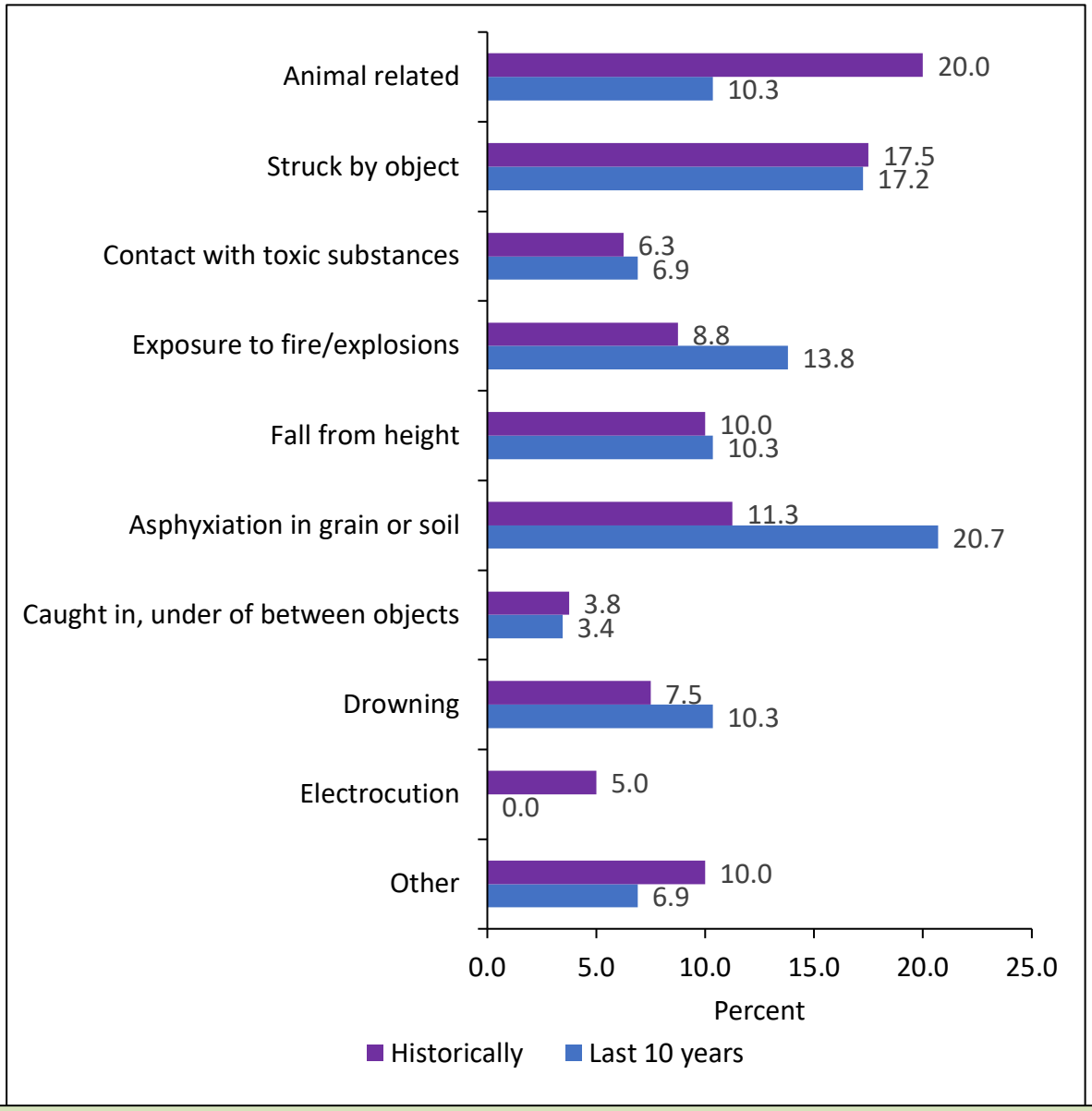
- Due to the small number of non-machine work related fatalities each year it is difficult to determine if the frequency of these types of deaths are changing over time.
- The number per year ranges from a low of 0 to a high of 7.
- The average annual number of fatalities of this type was close to 3.6 deaths per year for the period.

Figure 25: Work-related non-machine fatalities by age group, 1990-2019 (109 deaths)



- Persons in the oldest age group represent the majority of those involved in non-machine related deaths.
- Males represented 89% of those killed in these injury events.

Figure 26: Work-related non-machine fatalities by mechanism of injury, 1990-2019 (109 deaths)



- As demonstrated in the graph the pattern of non-machine related injury events has not significantly changed during the past 10 years compared to historical data.
- Asphyxiation in grain or soil has emerged as the leading cause of fatalities over the past 10 years accounting for 21% of cases. Asphyxiation in grain occurred in 12/15 cases and the remainder occurred in events where a trench wall collapsed.
- Overall animal related injuries (n=19) are the most common type of injury event. The animals most commonly involved are beef cattle accounting for 68% of cases.
- Being struck by an object was the next most common type of injury event accounting for (n=19) cases. The object most often involved was heavy non-machine object, e.g. gate or door.
- In cases caused by a fall from a height the location of the fall was most often ladders or scaffolding on grain bins or barns.

Figure 27: Not work related fatalities by major cause, 1990-2019 (82 deaths)

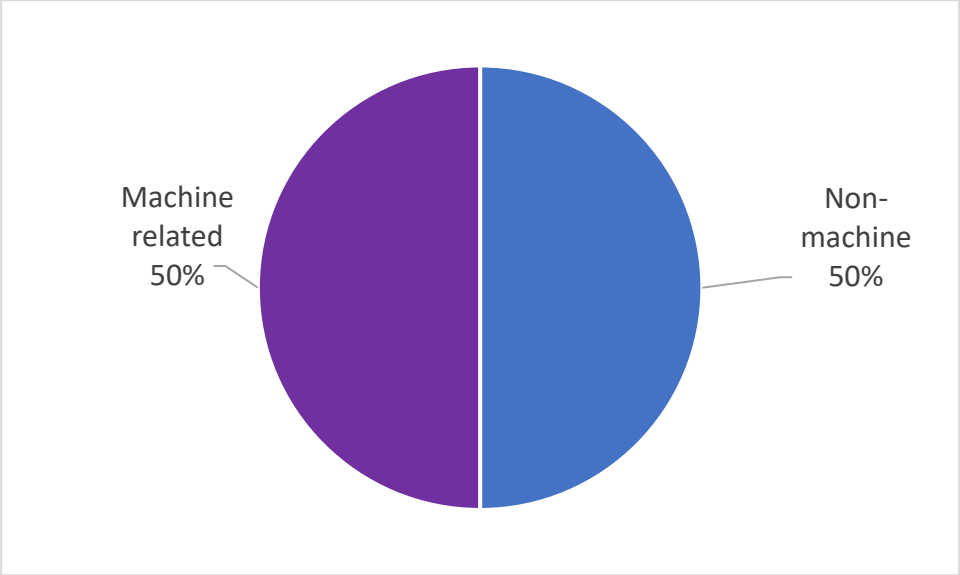


Figure 28: Not work related fatalities by age, 1990-2019 (n=82)

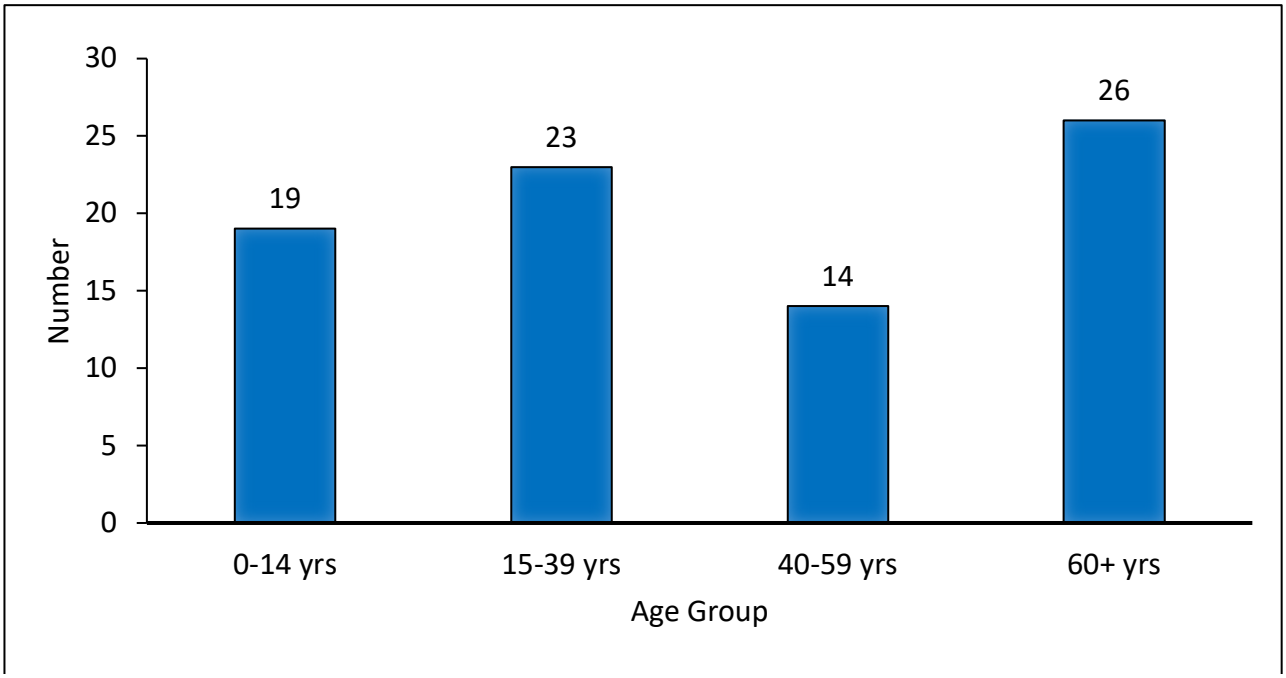
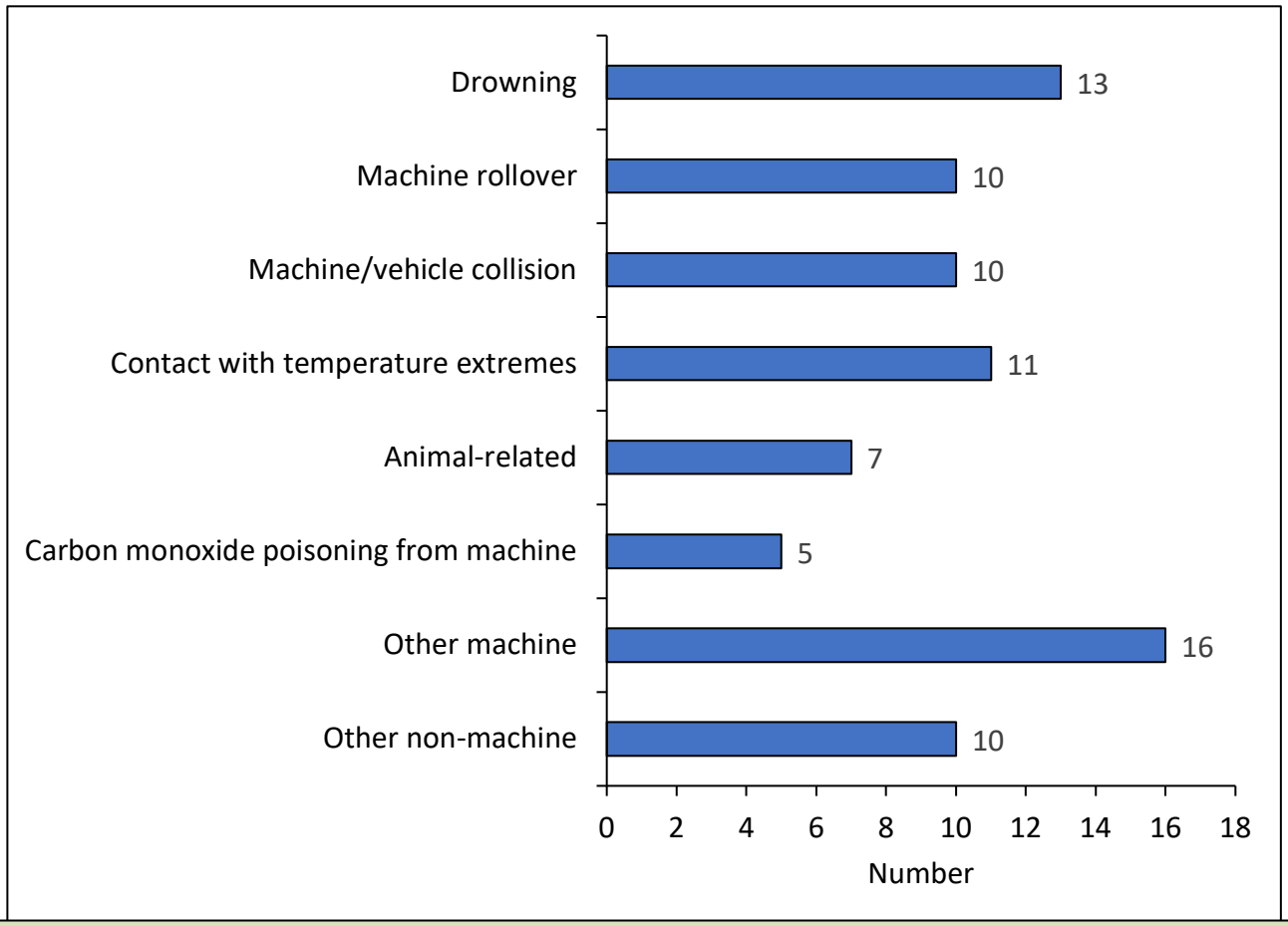


Figure 29: Not work related fatalities by mechanism of injury 1990-2019 (82 deaths)



- The patterns of injury associated with not work related fatal injuries on farms is quite different than for work-related injuries. 50% were not machine-related, very different from work related patterns.
- Drowning in farm dugouts and ponds is the most common fatal event. These include primarily children and elder farmers and include both males and females.
- Machine rollovers and traffic collision are the next most common mechanisms. Events involving half ton trucks and ATVs account for almost all of the events.
- Deaths due to exposure were also identified. These occurred primarily among older males with impaired mobility.
- Of those killed in these not work related fatal events 50% were the farm owner/operator and 22% were the children of the owner operator.

APPENDIX A

Mechanism of Injury Definitions

Non-Machinery Injuries

Animal-related injuries

1 **Crushed by / struck by animal**
Includes being kicked, gored, crushed or butted by animal; falling from an animal then being crushed by it.
Example #1: victim rides horses, falls off, and horse falls on him, crushing him.
Example #2: victim was kicked by a bull.

2 **Other animal**
Includes being bitten, mauled or dragged by an animal; other animal related injury not elsewhere classified.
Example: The victim was attacked by the dogs at the farm. The dog bites penetrated her neck causing severe bleeding. She died of her injuries.

3 **Fall from animal**
Example: victim falls off horse, striking his head on the ground.
Excludes: victim fell from then crushed by an animal (non machine-related #1)

Struck By injuries

4 **Struck by object**
Includes: *The object was moving and struck against the person;*
Flying object;
Swinging or slipping object;
Rolling, sliding object on floor;
Falling object during handling;
Falling object, Not Elsewhere Classified;
Struck by, Not Elsewhere Classified.
Excludes: *Being struck or pinned by a machine component or collapsing machine (machine-related #5); being struck by an object (e.g. bale or log) while hoisting it or unloading it from a machine (machine-related #18) (e.g. tractor with front end loader or truck trailer / flat deck); being struck by a non-machine object, if the object then completely traps the victim and results in cash asphyxiation (non machine-related #6); asphyxiation in grain or soil (non machine-related #18).*

5 **Struck against object**
Includes: *Person was moving and struck against the object;*
Struck against moving object;
Step on stationary object;

Struck against stationary object;
Struck against, Not Elsewhere Classified.

Excludes: being caught under an object (e.g., a bale or log) that fell from a machine or fell while being handled by a machine (machine-related #18); struck against a non-machine object as the result of a fall (non machine-related #7 or #8); striking against a machine-related object (machine-related #77).

Caught-in injuries

6 Caught in, under, or between objects

Includes: Compressed / pinched by rolling, sliding / shifting objects;
A moving and a stationary object;
Two or more moving objects;
Land slides and cave-ins (e.g dirt trenches);
Collapsing materials;
Caught in (buried in) grain;
caught inside a confined space resulting in suffocation, e.g. caught inside a barrel with a lid.
Caught in, under, or between, Not Elsewhere Classified;
Crush asphyxiations;

Excludes: Being caught under an object (e.g. bale or log) that has fallen from a machine(e.g. tractor with front end loader or truck trailer / flat deck) while hoisting or unloading the object.(See machine related #18); crush asphyxiations that are machine-related (see machine-related #1, #2, #3, or #5).

Fall injuries

7 Fall from height

Includes: From scaffolds, walkways, platforms, etc.;
From ladders;
From roof;
From piled or stacked materials;
On stairs or steps;
Into shafts, excavations, floor openings, etc.;
Through floor surface;
From ground level to lower level;
Fall from elevation, Not Elsewhere Classified.

Excludes: falls from machines (moving machine (machine-related #7, #8, #9, #10); stationary machine (machine-related #77)).

8 Fall on same level

Includes: Fall to the walkway or working surface;
Fall onto or against objects;
Fall on same level, Not Elsewhere Classified.

Other injuries

9 **Jumped to lower level**

Includes: *From scaffold, platform, loading dock;*
From structure, structural element, Not Elsewhere Classified;
From stationary vehicle;
To lower level, Not Elsewhere Classified.

Excludes: *jumps from stationary or moving machine (machine-related #77).*

10 **Overexertion**

Includes: *In lifting objects;*
In pulling or pushing objects;
In holding, wielding or throwing objects;
Overexertion, Not Elsewhere Classified.

11 **Drowning in water**

Includes: *drowning in Manure Pit, sewage lagoon, ditch, dugout, pond, river, stream, lake, trough, barrel, water-filled ditch and Other water bodies.*

Excludes: Drowning due to flowing grain, silage, soil. (*non machine-related #18, Asphyxiation in Grain or Soil); drowning while in a ma*chine (machine-related #17).

12 **Exposure to fire / explosions**

Includes: *Fire in building or other structure including bunk house for hired workers;*
Forest, brush, grass, or other outdoor fire;
Ignition of clothing from controlled heat source; Explosions.

Excludes: *Fire in farm residence, as injuries occurring in farm home / residence are excluded from database; except where caused by materials (e.g., gasoline) stored for agricultural use; fires in machines, machine-related explosions (machine-related #15).*

13 **Contact with temperature extremes**

Includes: *General heat – atmospheric or environmental;*
General cold – atmospheric or environmental;
Hot objects or substances;
Cold objects or substances;
Contact with temperature extremes, Not Elsewhere Classified.

Excludes: *Contact with hot objects or substances coming from machines (e.g. radiator fluid) (machine-related #15).*

14 **Contact with electric current**

Excludes: *Excludes: contact with overhead wires via a machine or part of a machine; e.g., grain auger, crane boom, FEL (machine-related #14); being struck by lightning (non machine-related #77).*

16 **Contact with radiation, caustic, toxic or noxious substances or environment (specify)**

Includes: pesticides (e.g., herbicides, fungicides, insecticides, rodenticides, etc.); silo gases (nitrous oxide, etc.); manure pit gases (methane, hydrogen sulfide); carbon monoxide; insect stings; venom; mould; vaccines; medicines; fertilizer; paint; gasoline; oil; other solvents; any industrial or household chemicals not elsewhere specified; and allergic reactions including anaphylaxis.

Excludes: *crush asphyxiations (due to non machine-related #6 or machine-related #1, #2, #3, or #5) and asphyxiation due to entrapment in flowing grain, silage or soil (#18).*

18 **Asphyxiation in grain or soil** (specify means)

Includes: asphyxiation due to flowing grain, silage or soil; trench collapse.

Excludes: crush or traumatic asphyxiations, (due to non machine-related #6 or machine-reltaed #1, #2, #3, or #5); asphyxiation due to submersion in liquid (#11, drowning).

19 ***Firearms***

Includes: injuries due to being shot by a gun, where the gun involved was a tool used in the course of farm work.

77 **Other non machine-related**

Specify in Othcausinj; e.g., "struck by lightening".

88 **Unknown non machine-related**

99 **Not applicable** (use if machine related)

Other non-machine cause of injury (othcausinj)

If Causinj = 77
Describe the cause of the non machine-related injury.

Machinery related Injuries

1 **Sideways rollover**

Includes: Deaths caused by a machine / vehicle rolling over on its side and crushing the victim as it rolled. Usually the victim was operating or riding on the machine.

Excludes: Deaths caused by being run over by an upright machine. runover, struck or pinned by a moving machine (machine-related #s 8, 10, 11, 12, 13, 20.)

2 **Backwards rollover**

Includes: Death caused by a machine rolling backwards, that is the front tires of the machine rotate around the rear axle of the machine causing it to land on its top. (The front tires of the machine rotate around its rear axle by 90-180°).

Excludes: runover, struck or pinned by a moving machine (machine-related #s 8, 10, 11, 12, 13, 20.)

3 **Unspecified rollover**

Includes: *machine rollover events where the direction of the roll (sideways or backwards) is not clear or where the vehicle rolled end over end.*

Exclude: *Death due to being run over by an upright machine. Runover, struck or pinned by a moving machine (machine-related #s 8, 10, 11, 12, 13, 20).*

4 **Entangled or caught in moving parts of machinery**

Includes: *Any part of the body becoming being pinched, sheared, crushed, pulled into, wrapped around or compressed between two or more machine-related objects, or between parts of a machine-related object as the result of the body part being 'put into' (intentionally or unintentionally) the pinch, shear, crush pull-in, wrap or compression point.*

5 **Pinned or struck by machine**

Includes: *Being struck by a machine component (e.g., truck box, hood or door, FEL arms, bucket etc.); being caught under a collapsing machine or a moving machine component e.g., as a result of blocking or jack collapse, hydraulic failure, inadvertent lever operation etc.*

Excludes: *Being run over or pinned by an upright vehicle or machine which is under power or rolling on an incline (machine-related #s 8, 10, 11, 12, 13, 20); being pinned subsequent to a rollover (machine-related #s 1, 2 or 3); being entangled in a machine (machine-related #4); being struck by an object falling or propelled from a machine (machine-related #18).*

6 **Machine / motor vehicle Collision**

Includes: *collision between farm machines/vehicles;*
collision between farm machines/vehicles and non-farm vehicles;
collision between farm trucks and non-farm vehicles;
collision between a farm vehicle and an animal on a roadway;
collision between a non-farm vehicle and a farm animal on a roadway.

Excludes: *collision between a farm vehicle and any bystander, or collision between a non-farm vehicle and a farm worker (machine-related #12 or #13); collision between a farm vehicle or machine and a machine, vehicle, tree, building, or farm animal in any location other than public road/highway or farm road (machine-related #16); rollovers (machine-related #s 1, 2, 3), except for those subsequent to a traffic collision.*

7 **Operator fell from machine, not runover**

8 **Operator fell from machine, then runover**

9 **Passenger fell from machine, not runover**

10 **Passenger fell from machine, then runover**

11 **Unmanned runover**. Alighted operator or other person runover, pinned or struck by a moving unmanned machine. (Includes bypass start and ground start fatalities)

12 **Alighted passenger runover, pinned or struck by a moving machine he/she had just dismounted** (excludes falls)

13 **Bystander runover, pinned or struck by a moving machine** (with an operator)

14 **Machine-related contact with electrical current** (e.g., augur contact with overhead power lines)

15 **Machine related fire, explosion or burn**

16 **Machine collision off-road** (e.g., with tree, building, ditch, animal, other machine etc. Excludes collisions in location 6 or 9 (Mechainj 6); excludes collisions with bystanders, excludes rollovers.)

17 **Machine-related drowning**

18 **Struck by an object propelled, sliding or falling from a machine** (specify object)
Includes: being caught under an object (e.g., a bale or log) that fell from a machine or fell while being handled by a machine. *Being struck by or caught under an object (e.g. bale or log) while hoisting it or unloading it from a machine (e.g. tractor with front end loader or truck trailer / flat deck); Being struck by an object that was propelled by a machine (e.g. stone propelled from mower striking the victim; while towing a truck with a tractor the towing chain broke and struck the victim); Part(s) of a machine breaks and then strikes the victim (e.g. the belt of a grain auger breaks striking the victim; pins of front end loader break and front end loader falls off tractor striking the victim).*

20 **Runover, pinned or struck by a moving machine, unspecified** (not enough detail to classify as a bystander runover or an unmanned runover.)

77 **Other machine-related**
Specify in Othmechainj; e.g., plane crash, struck by lightning while in machine, fall from a stationary machine, deliberate jump from machine, etc.

88 **Unknown machine-related**

99 **Not applicable** (use for non-machine-related)

Other mechanical cause of injury (othmechainj)

If machine-related = #77
Describe the other cause of the machine- or vehicle-related injury.

ADDITIONAL RESOURCES

Canadian Centre for Health and Safety in Agriculture
https://cchsa-ccssma.usask.ca/

Agricultural Health and Safety Network
http://aghealth.usask.ca/

Canadian Agriculture Safety Association
https://www.casa-acsa.ca/

Canadian Agriculture Injury Reporting
https://www.cair-sbac.ca/

Prairie Agriculture Machinery Institute
http://pami.ca/

Saskatchewan Farm Injury Study
https://cchsa-ccssma.usask.ca/skfarminjuryproject/