CANADIAN AGRICULTURAL INJURY REPORTING

Agriculture-Related Fatalities in Ontario 1990-2015

1.1 GENERAL INTRODUCTION

The Canadian Agriculture-related Injury Reporting (CAIR), formerly known as the Canadian Agriculture Injury Surveillance Program (CAISP) was established in 1995 in response to the need for better information about fatal and hospitalized agriculture-related injuries in Canada. CAIR is a national program with collaborators in each of the ten provinces of Canada. This report includes reported agriculture-related fatality data for persons who were part of the Ontario farm population, those who participated in the temporary foreign workers under the seasonal agriculture works program from Citizenship & Immigration Canada or who were at risk of agriculture-related injuries in Ontario from 1990-2015. There were 710 agriculture-related fatalities in Ontario from 1990 to 2015, an average of 27 each year. Over the 26-year surveillance period, the average fatality rate per 100,000 farm population, per year was 12.0 fatalities.

1.2 HISTORY OF AGRICULTURE-RELATED INJURY SURVEILLANCE IN CANADA

Agriculture-related injuries have been recognized as an important rural health issue since the 1960s, when the problem was first recognized in the medical literature. At that time, some provincial groups began to monitor agriculture-related injuries, but only recently have substantial national resources been committed to the study of agriculture-related injuries.

When compared with other Canadian industrial sectors, agriculture is a dangerous occupation. Agriculture ranks as the fourth most hazardous industry in Canada with respect to rates of fatal injury. In terms of absolute numbers of fatalities, there is no more dangerous occupation. [1] Economic costs associated with agriculture-related injuries are also substantial. In 2004, agriculture-related injuries in Canada cost $465 million dollars.[2] Unintentional injuries accounted for the majority of costs, 80% of all agriculture related injury costs ($374 million).[2]

Until the establishment of CAIR, Canadian data on agriculture-related injuries were limited. This surveillance program has filled an important void in providing national evidence of agriculture-related injury occurrence that can be used in developing and targeting effective injury-prevention strategies. CAIR data has been used by various groups internationally, including Australia, Brazil, Hong Kong, India, Ireland, Netherlands, New Zealand, the United Kingdom and the United States. CAIR has been referenced in a variety of inventories and compendiums including guides to occupational and environmental health and safety, casebooks and inventories published by the Public Health Agency of Canada. In terms of policy, CAIR has been used as a reference source for agriculture-related injury at international, national, provincial, and regional levels. Information gathered indicates that the program's data has contributed to informing, influencing and enacting policy development at both federal and provincial levels. Evidence of strategic planning influences at provincial and organizational levels is also apparent, and contributions can be linked to: child safety guidelines,[3] child labour laws,[4] occupational health and safety guidelines[5] engineering standards[6] and injury reduction and health promotion strategies. At an international level, the Government of Canada has cited CAIR reports in its 2003 submission to the United Nations, on the Convention on the Rights of the Child and identified CAIR as playing an important role in influencing children's rights in Canada.[7] CAIR has also been identified as a tool for awareness raising, skill building and knowledge development through conference presentations, teleconferences, lectures, course materials, social marketing campaigns, and resource materials. From a research perspective, 132 articles in 56 journals reaching a wide range of disciplines were related to CAIR.

[1] Pickett W, Hartling L, Brison RJ, Guernsey J (1999). *Fatal farm injuries in Canada. Can. Med Assoc. J.* 160:1843-1848.

[2] SMARTRISK, (2010). The Economic Burden of Injury within the Agriculture-related Population in Canada. SMARTRISK: Toronto, ON (unpublished).

[3] National Children's Centre for Rural and Agriculture-related Health and Safety, Marshfield Clinic Research Foundation, 2006. Available at: http://www.marshfieldclinic.org/nccrahs/?page=nccrahs_aboutus_center_highlights.

[4] Irwin, John, Stephen McBride and Tanya Strubin. 2005. "Child and Youth Employment Standards: The Experience of Young Workers Under British Columbia's New Policy Regime." Canadian Centre for Policy Alternatives, September 2005. 40 pp.

[5] Ontario Ministry of Labour, 2006; Workers Compensation Board of Prince Edward Island, 2006.

[6] Canadian Standards Association. Available at: http://www.csa.com/

[7] Government of Canada, 2003. Available at:http://www.canadiancrc.com/UN_CRC/UN_Committee_ Rights_Child_Canada_2nd_Report- Over-

1.3 THE CANADIAN AGRICULTURE-RELATED INJURY REPORTING

The Canadian Agriculture-related Injury Reporting (CAIR) is a national program that is funded by the Canadian Agriculture-related Safety Association (CASA). CAIR is a collaborative program involving various organizations from across Canada. It is co-ordinated from a national office at the Injury Prevention Centre, in Edmonton, Alberta. The people and organizations that contribute to CAIR include researchers, government agencies and the agriculture industry.

The main purpose of CAIR is to collect and analyze information on agriculture-related injuries from across Canada. CAIR has established national standards for the collection of fatality and hospitalizations. Although a very rich data source, CAIR ceased the collection of hospital admission data on a national basis due to budget cuts. The collection of hospital admissions data requires the review of hospital records in order to extract the circumstances around the injury producing event.

CAIR's vision: *A pillar of agriculture-related safety providing a comprehensive national system of surveillance for fatal and non-fatal agriculture-related injuries.*

CAIR's mission: *To provide Canada with national and provincial leadership in the prevention of agriculture-related injuries as a world leader in gathering information, conducting research and translating knowledge into products and services.*

CAIR strives to ensure that fatality injury data are collected, compiled, and analyzed in a standard manner by all provinces and that the information is interpreted and communicated in ways that are helpful to those in the agriculture-related industry.

CAIR's primary audience is individuals within the agriculture-related industry who need to make informed decisions about safety programs and policy. CAIR's reports represent one approach to making these data accessible to this audience. Other dissemination formats include articles in scientific journals, presentations at national conferences and information on our website www.CASA-ACSA.ca and click on injury reporting.

1.4 THE USES OF CAIR DATA

CAIR has developed a surveillance system for Canada that describes the occurrence and patterns of agriculture-related injuries at a higher level of detail than was available previously. At both national and provincial levels, CAIR has provided evidence that has assisted in the development of priorities for health and safety programs as well as strategies for the targeting of these initiatives. CAIR data have also facilitated the post-implementation assessment of injury prevention programs.

Agriculture safety specialists and others require objective evidence so that they can promote awareness of agriculture-related injury issues and advocate the allocation of additional resources to injury prevention and research programs. CAIR information has been used repeatedly to assist in advocacy efforts. This has contributed to the development of informed safety policy in the agriculture industry and to the funding of safety programs at international, national and provincial levels.

CAIR has provided baseline evidence to support several applied research projects such as the Saskatchewan Farm Injury Cohort Study funded by the Canadian Institutes of Health Research (2005-2010). These projects include focused investigations aimed at the prevention of agriculture-related injuries in children and the elderly, studies of agriculture-related machinery injuries and their causes, and studies examining the economic burden of agriculture-related injuries.

1.5 THE CHALLENGES OF INJURY PREVENTION IN AGRICULTURE

In other industries, victims of occupational injuries are usually workers aged 18 to 65. Agriculture is unique in that children and the elderly sustain significant numbers of severe work-related injuries. This is partly because farms and ranches are not just work sites, but also places where people of all ages live, play and participate in recreational activities. Also, unlike other industries, it is common for farmers and ranchers to work full time and to operate tractors and other heavy machinery well into their 70s and 80s.

The prevention of injuries in agriculture-related work settings is challenging because of the unique nature of the agriculture-related work environment. Also, in most jurisdictions, agriculture is not a heavily regulated industry in terms of occupational health and safety standards. Unlike other industrial workplaces, many Canadian agriculture-related workplaces have not benefited from modern industrial hygiene and safety practices. The composition of the agriculture-related workforce, farming practices and safety practices is geographically diverse. This diversity adds to the difficulty of establishment and enforcement of safety standards. There has traditionally been reliance on voluntary rather than regulatory safety standards, but the effectiveness of voluntary safety standards has not been well evaluated.

METHODS

2.1 IDENTIFICATION OF AGRICULTURE-RELATED FATALITIES

A detailed review of CAIR's data collection and analysis methods is available in CAIR's national report *Agriculture-related Injuries in Canada for 1990-2000*. The process used in the identification of agriculture-related fatalities varies by province. This is a general description of the process:

1. Potential sources of agriculture-related fatality data are identified. These are kept by a variety of agencies that vary by province. Examples of these agencies include: offices of the provincial coroner or chief medical examiner, occupational health agencies, departments of vital statistics, ministries of transportation and provincial agriculture safety associations.
2. A comprehensive list of all potential agriculture-related fatalities is assembled within each province. These lists draw upon each available source of fatality data.
3. Once cases are identified, detailed case reports are sought for review and data abstraction. The main sources of information are coroners' investigation reports; occupational safety and health agency investigation reports; and RCMP/ provincial police reports.
4. Data abstraction and entry are completed on each eligible fatality. This is done in a consistent manner using a standard data abstraction form (Appendix C). Data abstraction is completed on-site at provincial chief coroners' or medical examiners' offices. Data are then sent to the national site for verification, coding and analysis.

2.2 KEY DEFINITIONS

Agriculture-related Fatalities: CAIR defines an agriculture-related fatality as *1) Any unintentional injury resulting in fatality that occurs during activities related to the operation of a farm or ranch in Canada and/or 2) Any unintentional injury resulting in fatality that involves any hazard of a farm or ranch environment in Canada (excluding fatal non-work-related injuries that take place in the farm residence). This includes fatalities that occur away from agriculture-related work locations if agriculture-related work is being done; e.g., transporting workers, livestock, supplies or harvested crops on public highways; farm animals roaming on public highways. Fatalities where victims are killed because a third party is engaged in agriculture-related work are also included.*

Population of Fatalities: *All persons who live, work on, or visit a Canadian farm or ranch (as defined below), as well as all persons who are fatally injured in other locations (such as public highways) as a result of agriculture-related activity and all temporary foreign workers under the seasonal agriculture workers program from Citizenship & Immigration Canada. See appendix D: Agriculture Populations.*

Farm: *In the Census of Agriculture, Statistics Canada defines a farm as "any farm, ranch or other agriculture-related holding that produces at least one of the following agriculture-related products intended for sale: crops, livestock, poultry, animal products, greenhouse or nursery products, mushrooms, sod, honey, or maple syrup products."* Canada Census of Agriculture, 1996, Statistics Canada.

Farm Population: The population covered by the Agriculture National Household Survey Linkage database and the estimates derived from it also changed in two ways in 2011:

- 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.
- 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.

The farm populations used to calculate rates presented in this report are based on the 2011 definitions and numbers from previous census periods were re-tabulated accounting for the current definition.

2.3 CONFIDENTIALITY OF CAIR DATA

Data are maintained in an electronic database that is managed centrally by the national coordinator under the supervision of the program director. The provincial collaborators retain the complete data set for their own provinces.

Access to the national dataset is strictly limited to CAIR collaborators for the following activities:

1. CAIR provincial collaborators assigned the task of producing special technical reports for Canada.
2. CAIR collaborators who have permission from the CAIR group to conduct special analyses for the purpose of producing scientific reports for submission to peer-reviewed journals.
3. The national program coordinator and program directors for the purpose of maintaining the database and producing periodic comprehensive reports for Canada.
4. To support agriculture-related injury prevention initiatives by others through analyses presented as tabular data.

2.4 ANALYSIS

The analysis presented in this report is descriptive and not interpretive to imply cause and effect. It has three main objectives:

1) to illustrate the magnitude of the agriculture-related fatality problem in Canada,

2) to compare trends in the causes and occurrence of fatal agriculture-related injuries among genders and age groups and

3) to identify emerging patterns of injuries.

The statistics used include simple counts and frequencies as well as cross-tabulations. To allow for comparison across the provinces and years, age-standardized rates were calculated using the direct method. This method controls for potential sources of bias resulting from variations in age distributions of populations. See Appendix E for calculation explanation and details. Formal hypothesis-testing methods and tests of statistical significance were not employed in comparisons.

Rates of fatal agriculture-related injuries are presented in this report. The numerators used in calculating these rates are the numbers of agriculture-related fatalities for particular age categories and mechanisms of injury. These include fatal injuries to farm residents, hired agriculture-related workers, contractors, persons traveling on public highways and a small number of visitors to farms. Denominators for these rate calculations are taken from the 1996, 2001, 2006, 2011 and 2016 Canada Census of Agriculture and extrapolated for the years in which the census was not performed. In addition to the Canada Census of Agriculture population, temporary foreign workers under the seasonal agriculture workers program from Citizenship & Immigration Canada were included.

Some caution is warranted in the interpretation of the rates because it is not possible to obtain complete data on the full population at risk, or to determine relative amounts of exposure to agriculture-related work and associated hazards. Also, the Canada Census of Agriculture includes all farm and ranch residents, some of whom have relatively little exposure to agriculture-related work hazards, but excludes visitors to farms or ranches and agriculture-related workers who are not residents on farms or ranches. The accuracy of agriculture census information may vary among provinces, but is the best source of denominator information available at this time.

The change in trending of the age-standardized rates over time is expressed in average annual per cent between time periods. The sum of the average percentage change will give the overall change. The trending was performed using a statistical software program Joinpoint Regression. To ensure the data in this report are illustrated in an effective and useful manner, data fields with small numbers are often not included in the graphs. In these cases, a note is included below the graph.

Software: Joinpoint Regression Program, Version 4.9.0.0. March, 2021; Statistical Research and Applications Branch, National Cancer Institute.
Methods: Kim HJ, Fay MP, Feuer EJ, Midthune DN. Permutation tests for joinpoint regression with applications to cancer rates. Stat Med 2000;19:335-51 (correction: 2001;20:655).

2.5 DATA LIMITATIONS

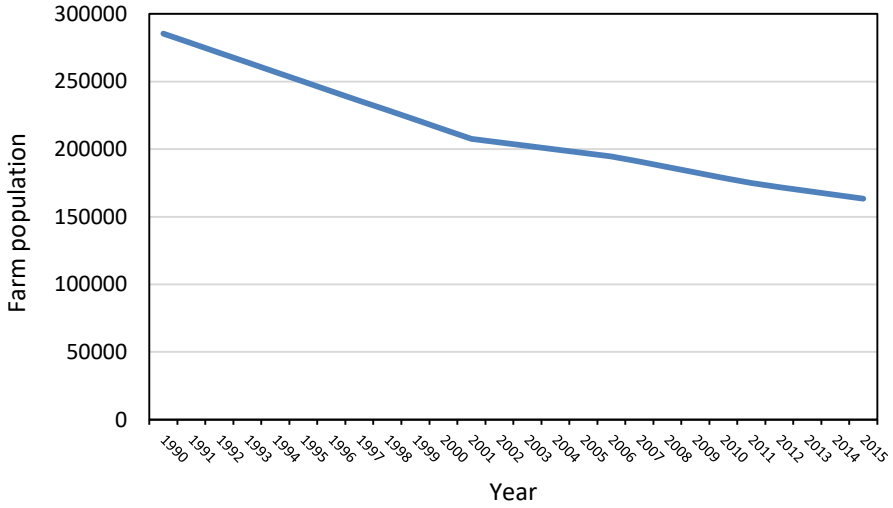
The data is collected in accordance to section 2.1, Identification of Agriculture-Related Fatalities. However, there are limitations to this data collection if the injury has not been identified as having occurred on the on the farm or involving agriculture machinery or agriculture activities these incidents are not captured.

Data abstraction is completed on-site at provincial chief coroners' or medical examiners' offices. The quality of the data is reflective of the detailed documentation available in the records at the provincial chief coroners' or medical examiners' offices. Data is collected in a consistent manner using a standard data abstraction form (Appendix C). Data are then sent to the national site for verification, coding and analysis.

There are also limitations for identifying migrant workers. The numbers of migrant workers included in the denominator for calculating rates only accounts for those workers who participated in the seasonal agriculture-related workers program from Citizenship & Immigration Canada.

2.6 Farm Populations

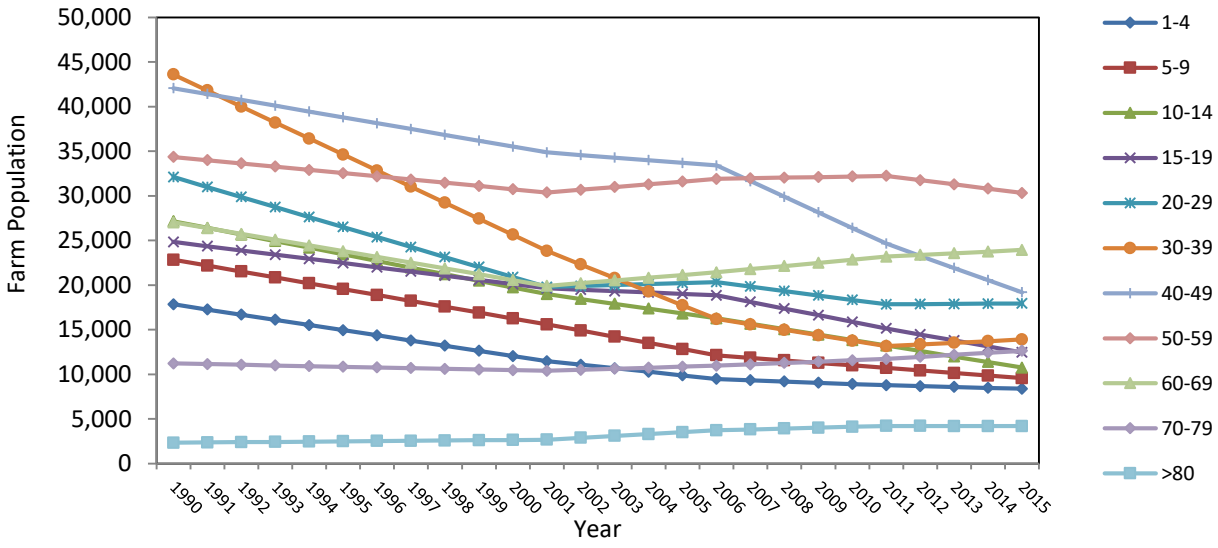
Over the period from 1990-2015 there has been a decrease in the Ontario farm population of 43%. This equates to 122,0479 fewer people on farms. In 1990 there were 285,394 people counted in the agriculture census and based on linear extrapolation using the 1996, 2001, 2006, 2011 and 2016 Canada Census of Agriculture the agriculture population in 2015, the count dropped to 163,315. (see appendix D). The percentage decrease experienced in the Ontario farm population is similar to that of the Canadian farm population which experienced. See key definitions for the changes to inclusion on the Agriculture-National Household survey.



2.7 Farm Population by Age Group

Over the time period from 1990-2015 the age group which experienced the largest percentage decline in farm population was those between the ages of 30 to 39 years with a decline of 68%. This was followed by children 10 to 14 years of age with a decline of 60%, children 5 to 9 years of age with a decline of 58%, and adults 40 to 49 years with a decline of 54%.

There were increases in the older farm population, with the largest increase experienced by those 80 years of age and older with a 79% increase, followed by those 70 to 79 years of age with an increase of 13%.

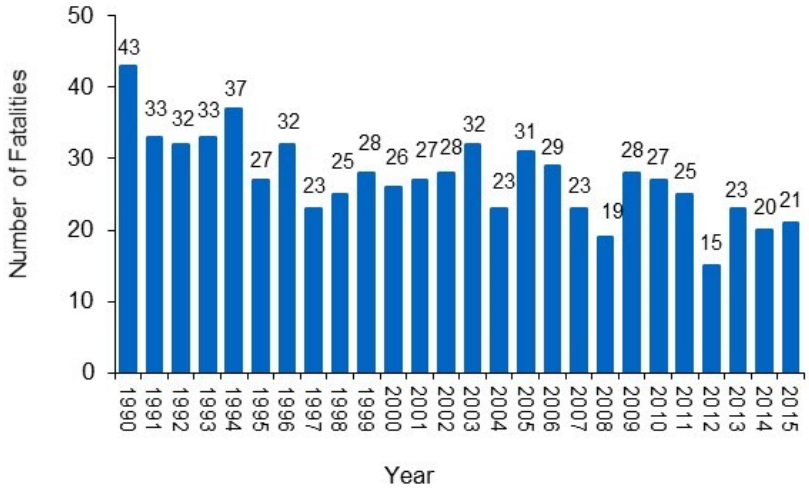


AGRICULTURE-RELATED FATALITIES IN ONTARIO 1990-2015 OVERVIEW

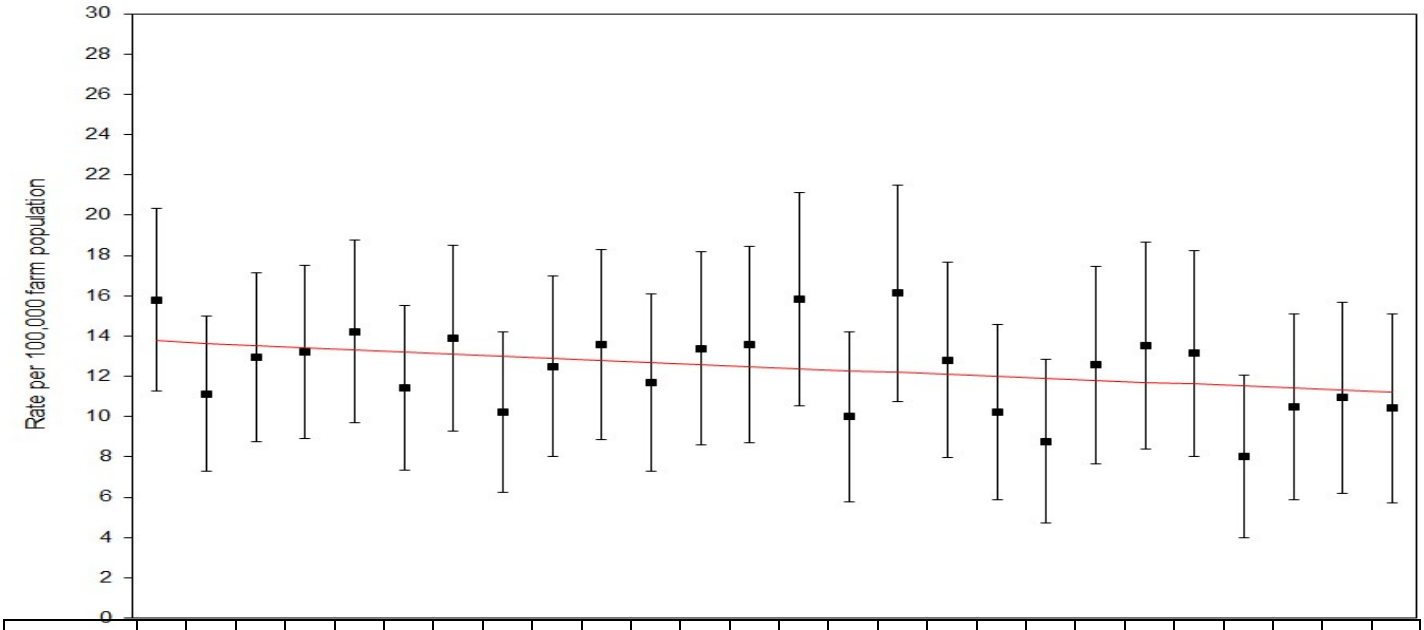
3.1 Fatal agriculture-related injuries by calendar year, 1990-2015

From 1990 to 2015, there were 710 agriculture-related fatalities in Ontario. This equates to an average of 27 fatalities each year.

During the first 13 years of the surveillance period (1990-2002) there was an average of 30 fatalities each year. During the last 13 years (2003-2015) the average number of fatalities dropped to 24 each year.



3.2 Fatal agriculture-related injury rates by years (age-stnd), 1990-2015

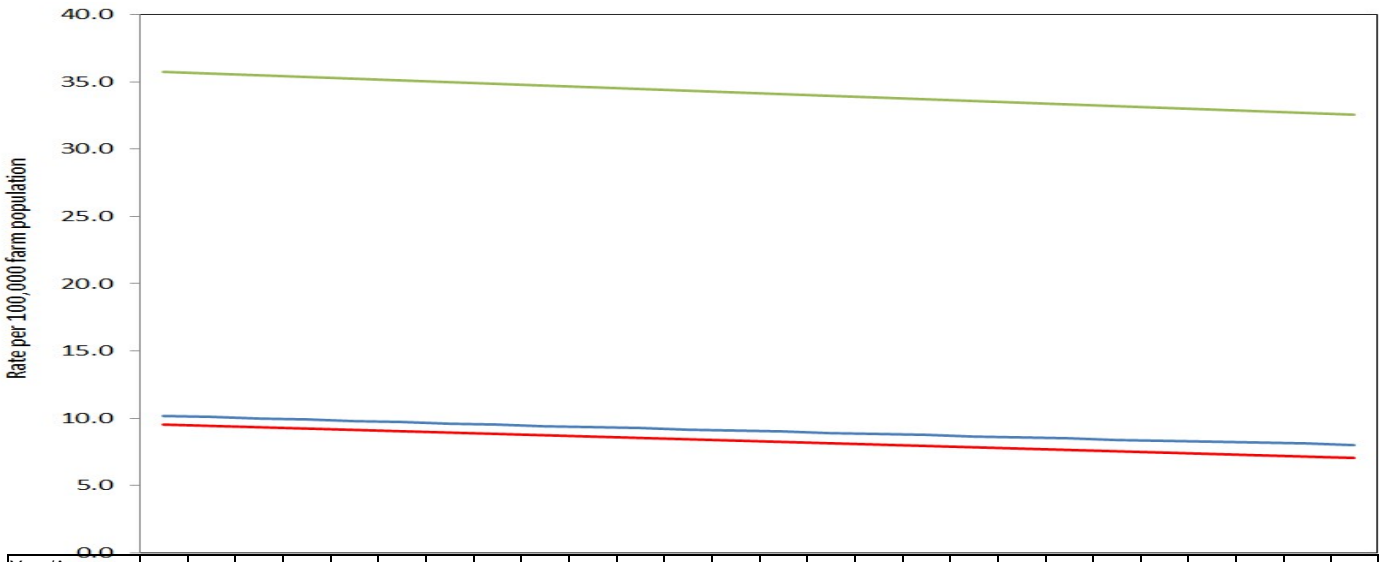


Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Age-Stnd Rate	15.8	11.1	12.9	13.2	14.2	11.4	13.9	10.2	12.5	13.6	11.7	13.4	13.6	15.8	10.0	16.1	12.8	10.2	8.8	12.6	13.5	13.1	8.0	10.5	10.9	10.4
Linear Trend	13.8	13.7	13.5	13.4	13.3	13.2	13.1	13.0	12.9	12.8	12.7	12.6	12.5	12.4	12.3	12.2	12.1	12.0	11.9	11.8	11.7	11.6	11.5	11.4	11.3	11.2

Over the 26 year period the overall agriculture-related fatality rate decreased an average of 0.8% annually.

Note: The definition of the farm population used to calculate the age-standardized rates changed from previous reporting. Therefore, it is advised that comparisons from previous reports not be made.

3.3 Fatal agriculture-related injury comparison by age group, 1990-2015

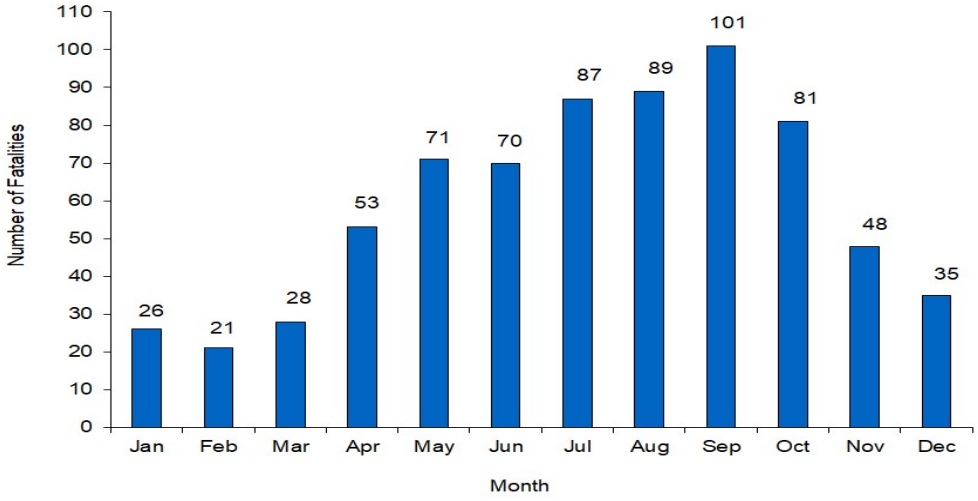


Year/Age Group Specific Rate	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Children (0-14 yrs)	12.5	4.3	6.5	8.7	14.5	4.9	9.5	11.5	8.6	2.3	10.5	5.0	2.6	10.6	4.1	8.5	7.3	0.0	2.3	6.4	12.8	3.3	9.9	6.7	7.3	6.8
Adults (15-59 yrs)	11.6	11.3	10.9	6.6	9.0	10.4	10.4	6.7	7.3	10.1	8.4	8.2	12.1	9.1	5.8	9.1	11.3	7.3	8.0	6.6	8.4	10.2	6.1	8.1	10.3	7.7
Older Adults (60+ yrs)	36.7	18.8	29.3	45.7	35.2	23.5	33.3	22.7	38.4	41.8	26.6	44.6	33.2	49.7	34.5	54.1	25.5	34.5	19.7	44.3	35.1	37.4	13.6	24.7	17.8	25.7

When comparing the fatality rates by population group, older adults (60+ years) consistently had higher fatality rates than children and adults.

Older adults (60+ years) experienced an average annual decrease in the fatality rate of 0.4% annually. Adults (15-59 years) experienced a decrease in the fatality rate with an average of 0.9% annually, and children (0-14 years) had an average decrease of 1.2% annually.

3.4 Fatal agriculture-related injuries by month, 1990-2015



70% (499 fatalities) of all agriculture-related fatalities in Ontario occurred from May to October.

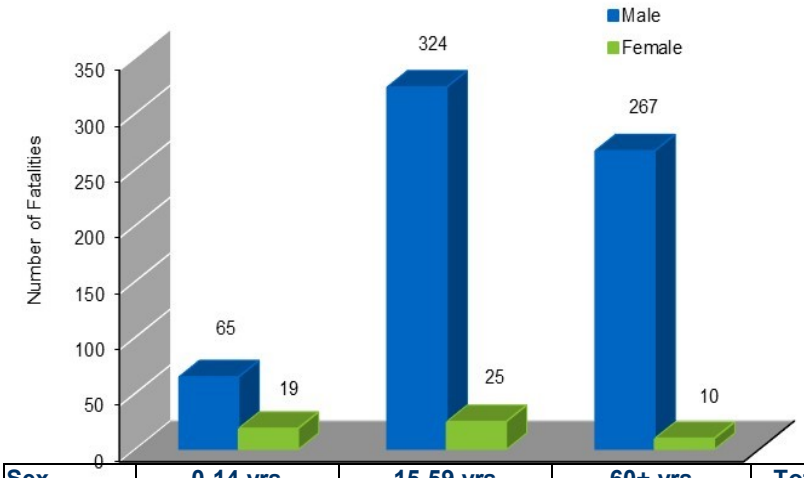
The highest proportion of fatalities took place in September with 14%. 13% of the fatalities occurred in August, while another 12% occurred in July.

Relatively few fatal agriculture-related injuries occurred in the winter months of December to March.

3.5 Fatal agriculture-related injuries by age group and gender, 1990-2015

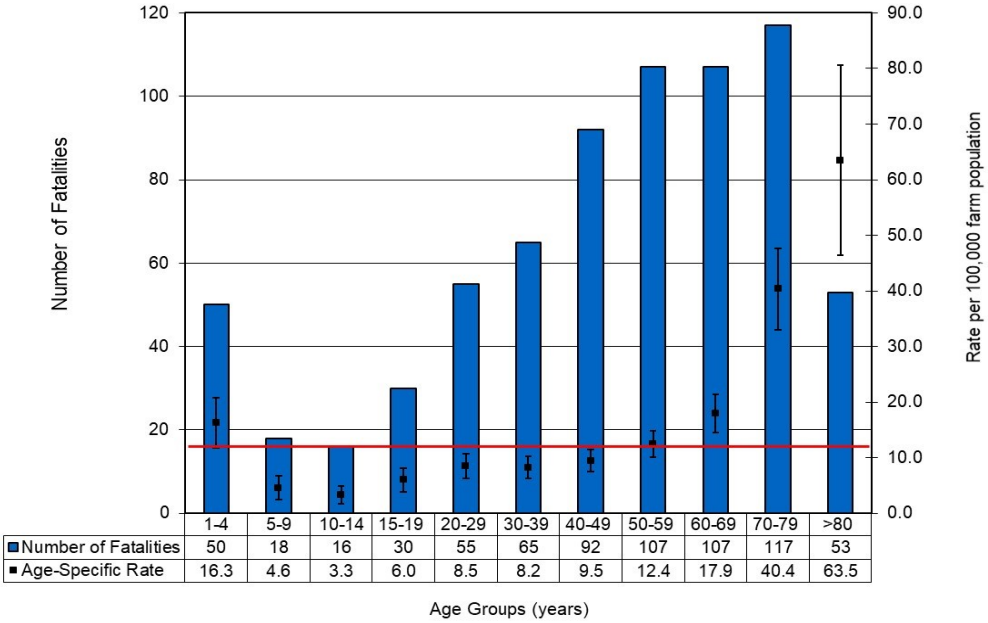
92% of the persons killed in agriculture-related injury events were male (656 fatalities). The ratio of males to females was highest for the 60+ age group (26.7:1), and lowest for the 0-14 year age group (3.4:1).

Just under half (49%, 349 fatalities) of those fatally injured were in the 15 to 59 age group.



Sex	0-14 yrs	15-59 yrs	60+ yrs	Total	%
Male	65	324	267	656	92
Female	19	25	10	54	8
Total	84	349	277	710	100
Percent	12	49	39	100	

3.6 Agriculture-related fatalities by number and rate by age group, 1990-2015

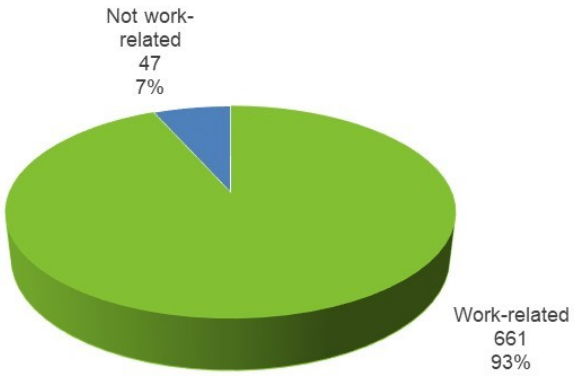


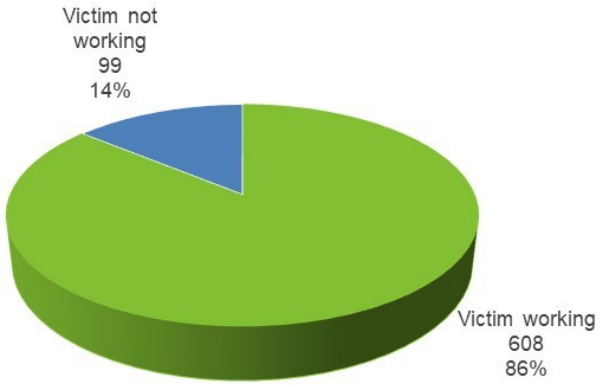
	1-4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	>80
Number of Fatalities	50	18	16	30	55	65	92	107	107	117	53
Age-Specific Rate	16.3	4.6	3.3	6.0	8.5	8.2	9.5	12.4	17.9	40.4	63.5

The overall crude agriculture-related fatality rate was 12.0 fatalities per 100,000 farm population.

The age group with the highest number of fatalities was the 70 to 79 years age group with 117 fatalities. However, this age group didn't have the highest fatality rate. Those 80 years of age and older had the highest fatality rate with a rate of 63.5 fatalities per 100,000 farm population with 53 deaths.

3.7 Fatal agriculture-related injuries: by relationship to agriculture-related work, 1990-2015

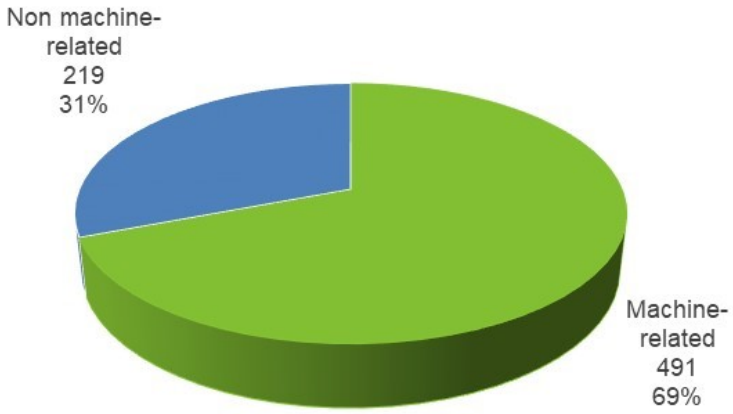




93% (661 fatalities) of the agriculture-related fatalities in Ontario were work-related. 7% (47 fatalities) of the fatalities were not work-related and were due to hazards of the farm environment.

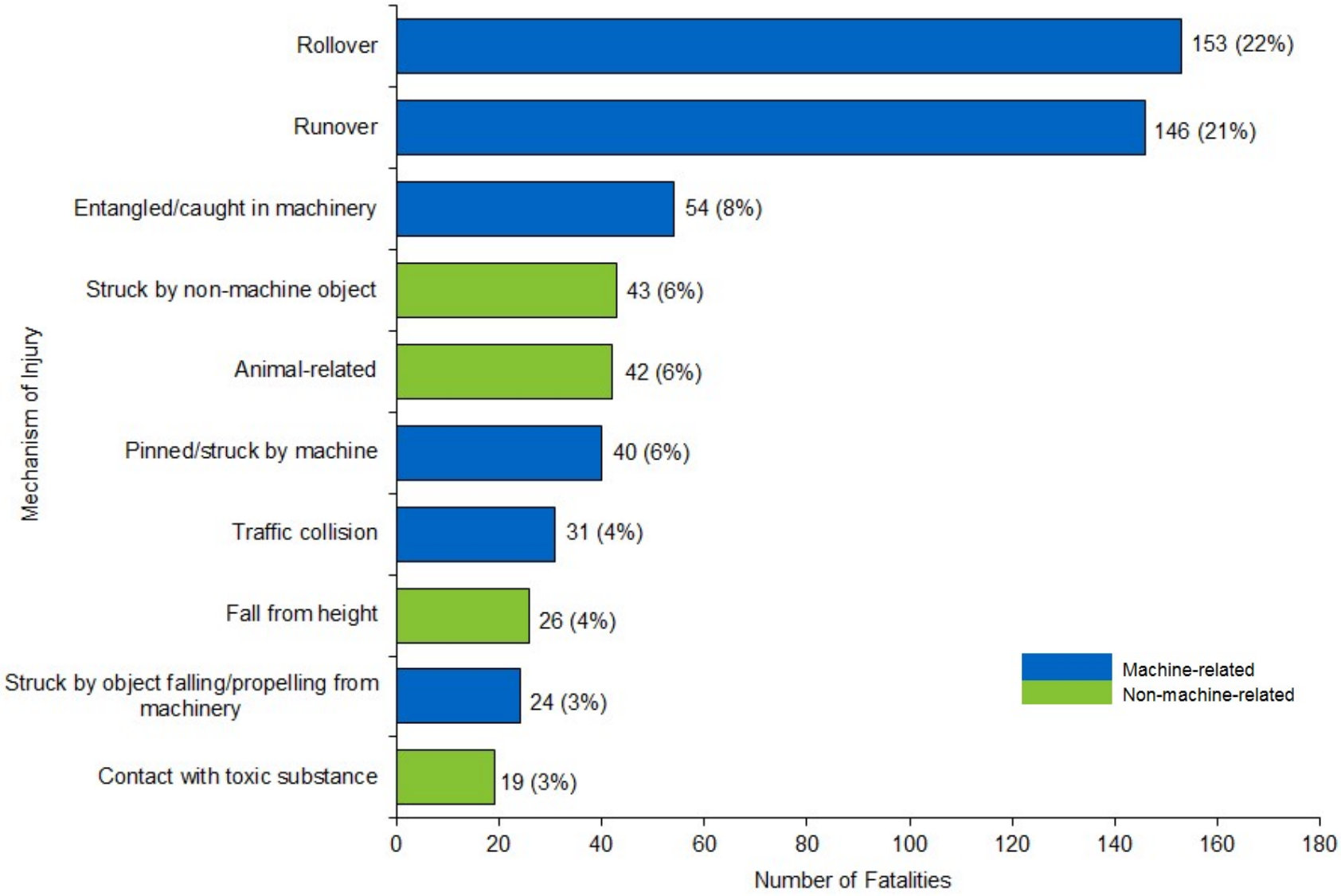
Most adults who died were engaged in agriculture work, whereas the majority of children killed in work-related injury events were not working themselves (figure 4.4).

3.8 Fatal agriculture-related injuries by major cause, 1990-2015



69% (491 fatalities) of agriculture-related fatalities were machine-related. The leading machine-related mechanisms of fatal injury were machine rollovers, machine runovers and machine entanglements. (Figure 3.9).

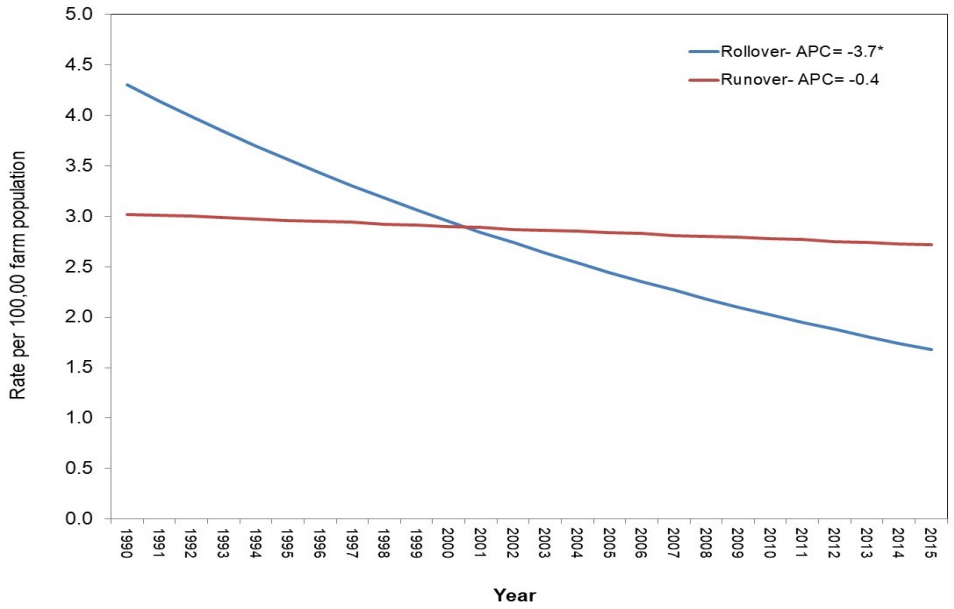
3.9 Fatal agriculture-related injuries by the top 10 causes of injury, 1990-2015



Half of all agriculture-related fatalities in Ontario (50%) were due to three leading machine-related causes: machine rollovers, machine runovers and machine entanglements. The top five causes of agriculture-related fatalities in Ontario were: machine rollovers (22%), machine runovers (21%), machine entanglements (8%), animal-related events (6%) and struck by a non-machine object (6%).

There were an additional 19 mechanism of injuries accounting for 125 fatalities (18%) not included in the graph.

3.10 Comparison of fatal agriculture-related machine-related injuries (age-stnd), 1990-2015



When analyzing the two leading machine-related mechanisms of injuries over time, injury rates due to rollovers experienced a decrease on average of 3.7% annually. Injury rates due to runovers decreased slightly with an average of 0.4% each year.

3.11 Fatal agriculture-related injuries by season, 1990-2015

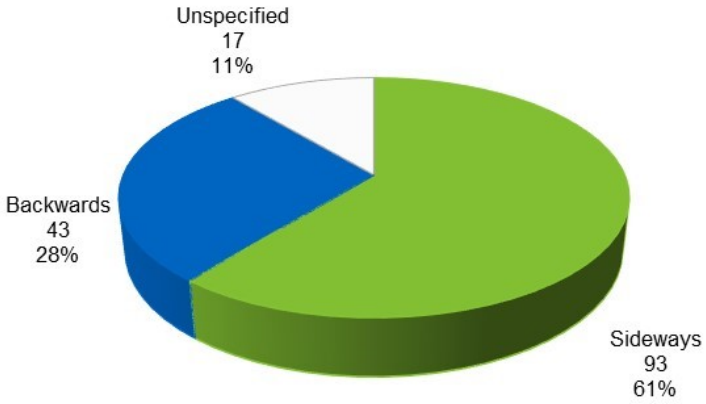
Spring	Summer	Fall	Winter
Mar-May	**Jun-Aug**	**Sep-Nov**	**Dec-Feb**
Machinery rollovers 22%	Machinery rollovers 22%	Machinery rollovers 23%	Machinery rollovers 15%
Machinery runovers 20%	Machinery runovers 21%	Machinery runovers 23%	Machinery runovers 13%
Pinned/struck by machine component 9%	Animal-related 7%	Entanglement in moving machinery parts 10%	Struck by non-machine object 12%
Entanglement in moving machinery parts 6%	Entanglement in moving machinery parts 5%	Animal-related 5%	Entanglement in moving machinery parts 11%
Struck by non-machine object 7%	Pinned/struck by machine component 5%	Struck by non-machine object 6%	Traffic Collision 7%
All other injuries 36%	All other injuries 40%	All other injuries 33%	All other injuries 42%

Machinery rollovers were the leading cause of fatalities in every season except the winter season. Overall, rollovers accounted for 21% of the agriculture-related fatalities.

The per cent is based on all injury fatalities within each season.

3.12 Fatal agriculture-related rollovers by rollover type, 1990-2015

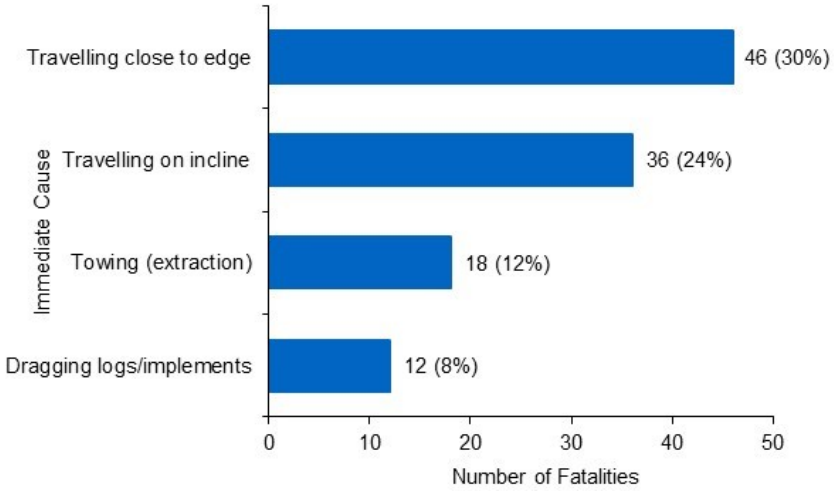
Of the 153 machine rollover fatalities in Ontario, 61% (93 fatalities) of were sideways in direction and 28% (43 fatalities) were backwards. In 11% (17 fatalities) the cases, the direction of rollover could not be determined. Sideways rollovers were more frequent in younger adults while backwards rollovers were more frequent in adults aged 60 or over.



3.13 Fatal agriculture-related rollovers by main cause, 1990-2015

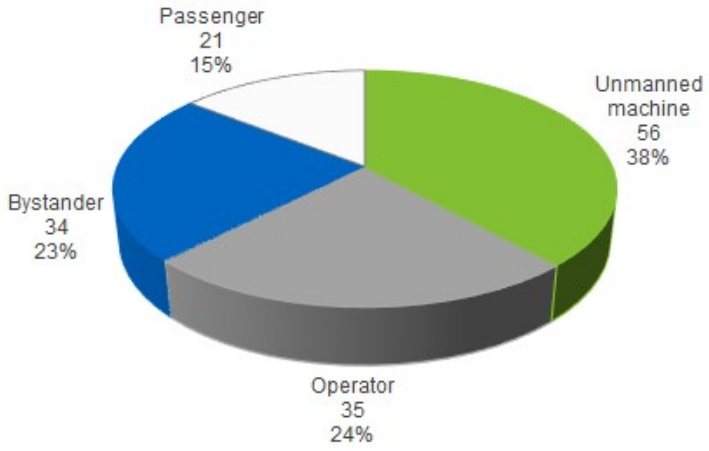
Of the 153 rollover fatalities, the circumstance text descriptions attributed 30% (46 fatalities) of the rollovers as a result of travelling too close to the edge of a ditch or other steep slope bordering a road or field. In another 24% (36 fatalities) of the cases, the side rollover was due to the machine travelling on a steep incline. Towing (extraction) accounted for another 12% (18 fatalities) and dragging logs and other farm implements accounted for another 12 deaths (8%).

There were another 9 rollover causes that accounted for another 20%. There were 11 rollover deaths (7%) in which the main cause of the rollover was not identified.



3.14 Fatal agriculture-related runover by runover type, 1990-2015

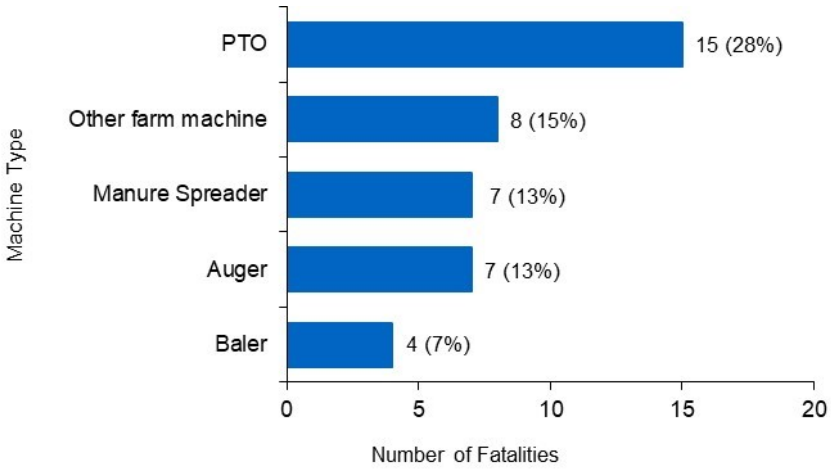
Of the 146 runover fatalities, most involved unmanned machines. This includes machines which had been bypass started, left running, or left unblocked on a slope accounting for 38% (56 fatalities). Operators runover subsequent to falls from a machine accounted for 24% (35 fatalities), bystander runovers accounted for 23% (34 fatalities) and passengers/extra rider runovers accounted for 15% (21 fatalities).



3.15 Fatal agriculture-related entanglement by machine type, 1990-2015

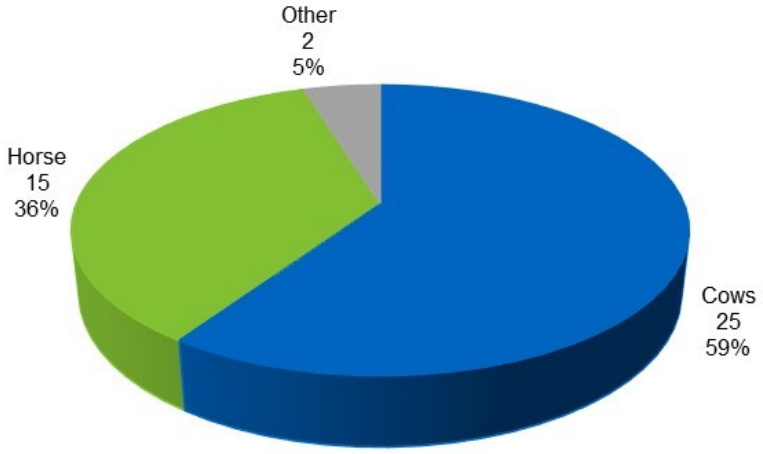
Of the 54 entanglement fatalities, the machine most frequently involved was a power take off (PTO) accounting for 28% (15 fatalities). Another 15% (8 fatalities) involved other farm equipment , both manure spreader and auger entanglements accounted for 13% (7 deaths) each. Fatalities involving a baler accounted for 7% (4 fatalities).

There were an additional 9 machine types accounting for 13 fatalities (24%) not included in the graph.



3.16 Animal-related fatal injuries by type of animal, 1990-2015

Of the 42 animal-related fatalities in Ontario, 59% (25 fatalities) involved a cow/bull/calf, another 36% (15 fatalities) involved a horse/ stallion/colt and 5% (2 fatalities) were due to other animals.

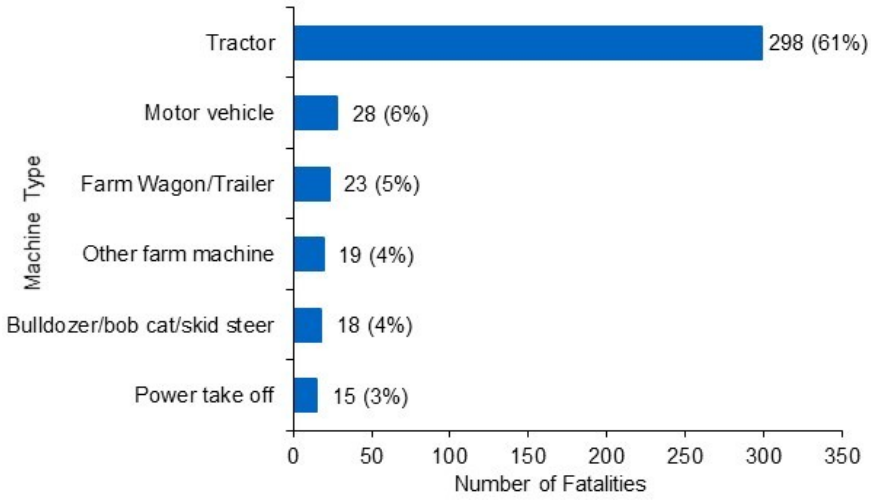


3.17 Fatal machine-related agriculture-related injuries by machine type, 1990-2015

Of the 491 machine-related fatalities, the machine types most frequently involved were tractors (61%), followed by motor vehicles (6%), farm wagon/trailers (5%), other farm machines and bulldozer/bobcat/skid steer each accounting for 4% of the fatalities.

It should be noted that tractors were associated with 40% of all agriculture-related fatalities in Ontario.

There were an additional 17 machine types accounting for 90 fatalities (18%) not included in the graph.

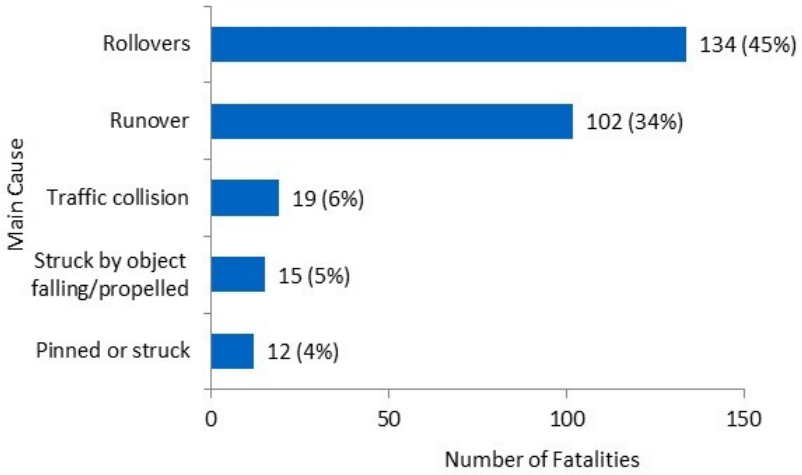


3.18 Fatal tractor-related agriculture-related injuries by cause of injury, 1990-2015

Of the 298 tractor-related fatalities, 95% (282 fatalities) were due to 5 main causes.

Rollovers accounted for 45% (134 fatalities), runovers accounted for 34% (102 fatalities), traffic collisions accounted for another 6% (19 fatalities), being struck by object falling/ propelling, most often a large round bale being lifted and then falling crushing the driver of the tractor, accounted for another 5% (15fatalities) and being struck or pinned by a tractor accounted for another 4% (12 fatalities).

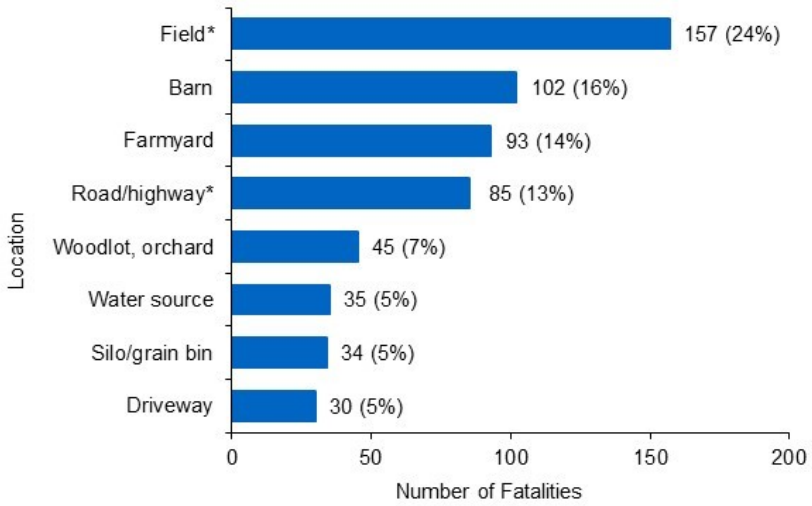
There were an additional 8 causes accounting for 16 fatalities (5%) not included in the graph.



3.19 Fatal agriculture-related injuries by location of injury, 1990-2015

Of the known location, the most common locations of injury for agriculture-related fatalities in Ontario were fields and their adjacent ditches accounting for 24% (157 fatalities). Fatalities in a barn accounted for 16% (102 fatalities) and farm yards an additional 14% (93 fatalities). Fatalities on road/highways accounted for another 13% (85 fatalities).

There were an additional 6 locations accounting for 77 fatalities (12%) not included in the graph. There were 52 fatalities (8%) in which the location of the incident was not documented/unknown.

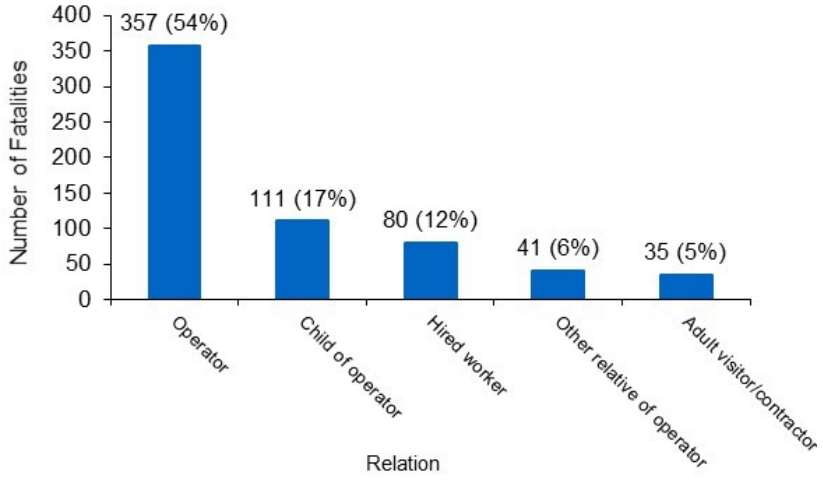


*= includes adjacent ditches

3.20 Fatal agriculture-related injuries by relationship, 1990-2015

Of the known relationships, the majority, 54% (357 fatalities) were owner/operators. Another 17% (111 fatalities) were children of the owner/operator, another 12% (80 fatalities) were hired workers. There were 6% (41 fatalities) which were identified as other relative of operator. This included: grandson, nephew, father-in-law. There were another 5% (35 fatalities) identified as adult visitors.

There were an additional 7 relationship categories accounting for 6% (42 fatalities), and 7% (44 fatalities) in which a relationship was not be identified were not included in the graph.

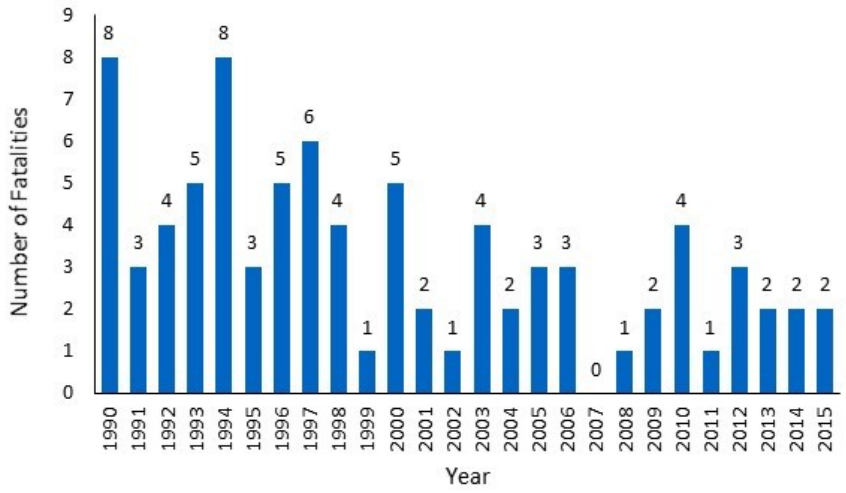


AGRICULTURE-RELATED FATALITIES IN ONTARIO 1990-2015 CHILDREN and YOUTH (0-14 yrs)

4.1 Fatal agriculture-related injuries in children and youth by calendar year, 1990-2015

From 1990 to 2015, there were 84 agriculture-related fatalities among Ontario children under 15 years of age. There was an average of 4 fatalities per year.

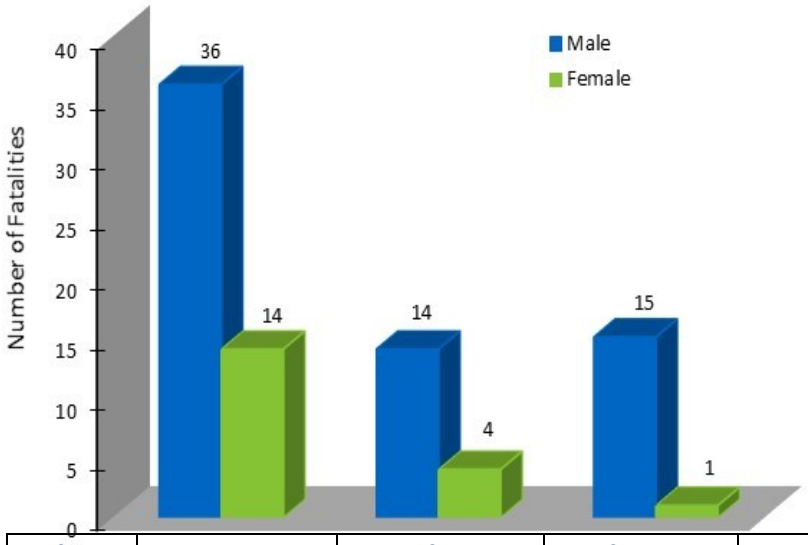
During the first 13 years (1990-2002) there was an average of 4 fatalities each year. During the last 13 years (2003-2015) there was an average of 2 fatalities each year.



4.3 Fatal agriculture-related injuries in children and youth by age group and gender, 1990-2015

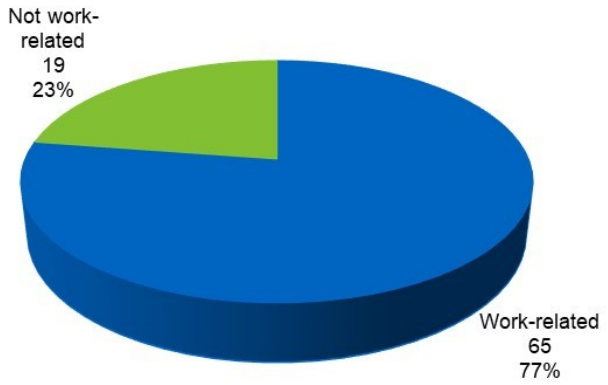
77% of the child victims of agriculture-related fatalities were male (65 fatalities). The ratio of males to females was highest for the 10 to 15 year old age group (15.0:1), and lowest for the 1 to 4 year old age group (2.6:1).

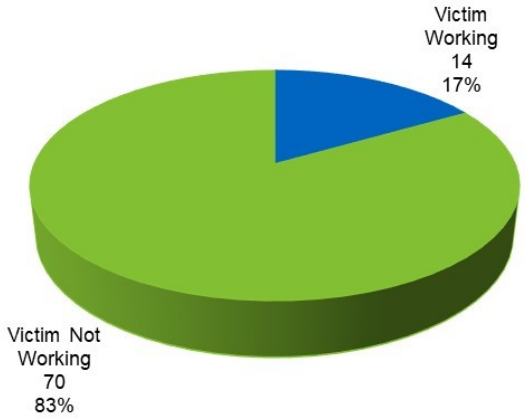
60% of the children killed were less than five years old. Among the 50 agriculture-related fatality victims under age five, 9 deaths were of one year old infants and 32 were two- and three-year old toddlers. Of the 41 infants and toddlers (age 0 to 3 years), 76% (31 fatalities) were male.



Sex	<5 yrs	5-9 yrs	10-14 yrs	Total	%
Male	36	14	15	65	77
Female	14	4	1	19	23
Total	50	18	16	84	100
Percent	60	21	19	100	

4.4 Fatal agriculture-related injuries in children and youth: the relationship to agriculture-related work, 1990-2015





Seventy-seven percent (65 fatalities) of the agriculture-related fatalities among children were work-related.

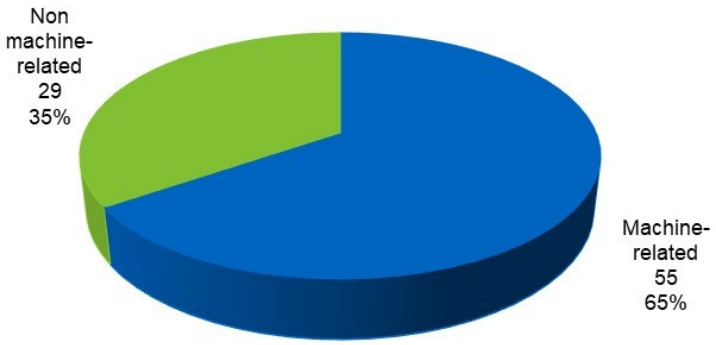
Of the child fatalities on the farm, 83% (70 fatalities) the victim (the child) was not performing the work, but died while someone else was engaged in agriculture-related work.

Non-work-related agriculture-related fatalities (19 fatalities) included those due to hazards of the farm environment such as riding horses, barn lofts, dugouts and troughs.

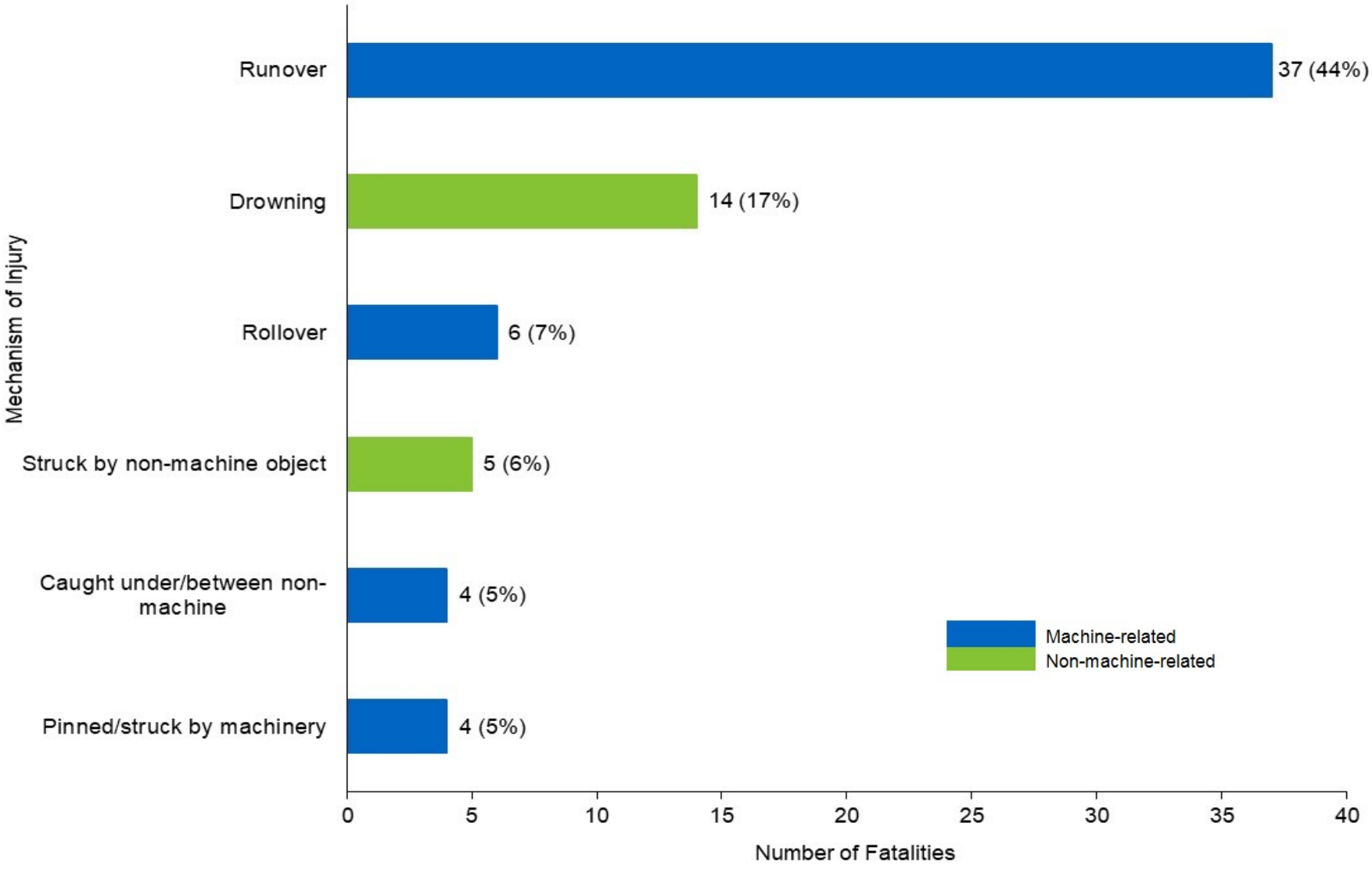
4.5 Fatal agriculture-related injuries in children and youth by major cause, 1990-2015

Of the 84 fatalities of children, 66% (55 fatalities) were machine-related. These included machine runovers, machine rollovers and machine entanglements.

Thirty-five percent (29 fatalities) of agriculture-related fatalities that were non-machine-related. These include drownings, being struck by objects, being caught under heavy objects and falls from heights.



4.6 Fatal agriculture-related injuries in children and youth by mechanism of injury, 1990-2015

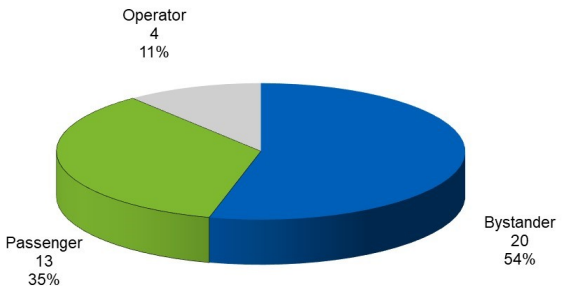


In children, three mechanisms of injury (machine runovers, drownings and machine rollovers) were responsible for 68% all of fatalities. For children aged fourteen and under, machine runovers caused the largest proportion of fatal injuries (44%, 37 fatalities), followed by drownings (17%, 14 fatalities), machine rollovers (7%, 6 fatalities). Being caught under or between non-machine objects, being struck by non–machine objects, or being pinned or struck by machinery each accounted for 6%, (5 fatalities). Runovers and drownings were most common among young children.

There were an additional 9 mechanisms of injury accounting for 17% (14 fatalities) not included in the graph.

4.7 Fatal agriculture-related runovers in Ontario children and youth by runover type, 1990-2015

Of the 37 runover fatalities, bystander runovers were the most frequent type of runover for children accounting for 54% (20 fatalities). A further 35% (13 fatalities) of child runover victims were killed when they fell from a machine that they had been riding as a passenger and were subsequently runover and 11% (4 fatalities) of children were runover by machines that they had been operating themselves.



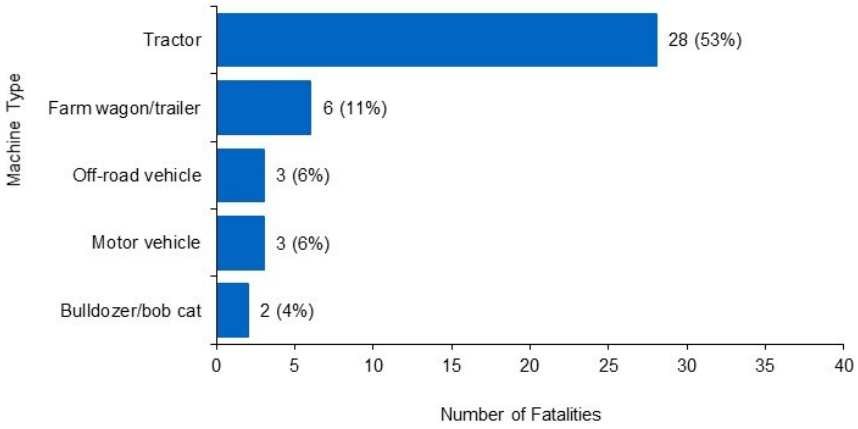
4.8 Fatal agriculture-related drowning fatalities in children and youth by location, 1990-2015

Of the 14 children and youth who died as a result of drowning, 36% drown in a slough/pond (5 fatalities), another 21% (3 fatalities) the location of the drowning was a trough/barrel. There were another 2 fatalities 14% in a ditch, another 2 deaths in sewage/manure pit and 2 more deaths where the location of the drowning was not identified. All the deaths were to children less than 10 years of age. Ten of the 14 children who died of drowning were less than 5 years of age. Due to the small numbers, a graph is not being presented.

4.9 Fatal agriculture-related injuries in children and youth by machine type, 1990-2015

Of the 54 machine-related fatalities among children, more than half (53%, 28 fatalities) involved tractors, followed by farm wagons/ trailers (11%, 6 fatalities), off-road vehicles and motor vehicles each accounted for another 6% (3 fatalities).

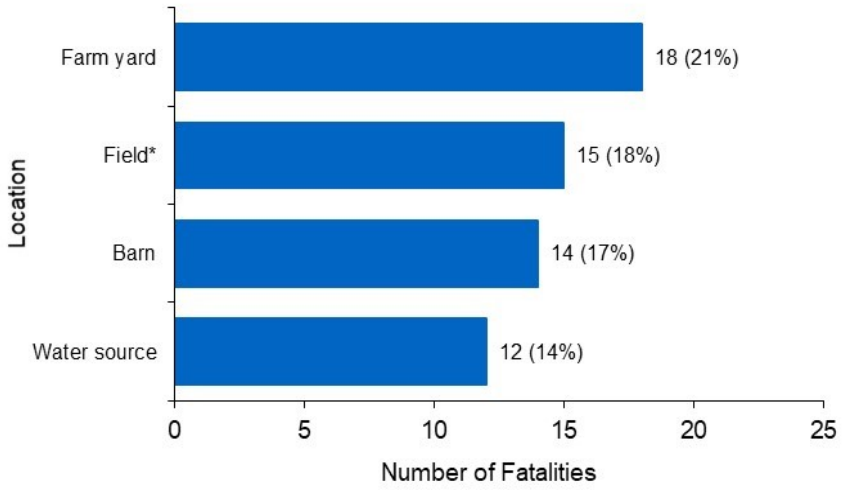
One out of every 3 children killed on the farm involved a tractor (33%).



4.10 Fatal agriculture-related injuries in children and youth by location of injury, 1990-2015

The top 4 locations accounted for 70% of the injury locations. Fatalities occurring in the farm yard accounted for 18% (15 fatalities) Fatalities in the field accounted for another 18%(15 fatalities). Deaths in a barn accounted for 17% (14 fatalities) and another 12 fatalities (14%) involving a water source

There were an additional 9 locations accounting for 27% (23 fatalities) not included in the graph.



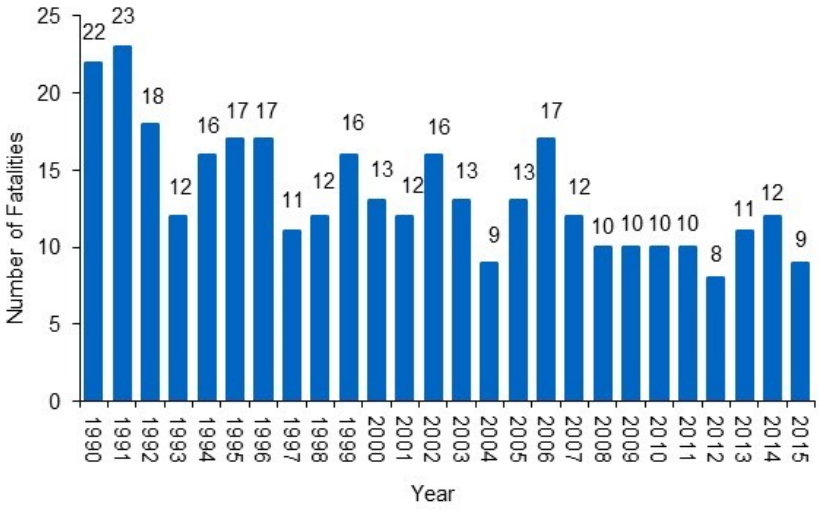
* includes adjoining ditches

AGRICULTURE-RELATED FATALITIES IN ONTARIO 1990-2015 ADULTS (15-59 yrs)

5.1 Fatal agriculture-related injuries in adults aged 15 to 59 by calendar year, 1990-2015

From 1990 to 2015, there were 349 agriculture-related fatalities among Ontario adults aged 15 to 59. This was an average of 14 fatalities per year.

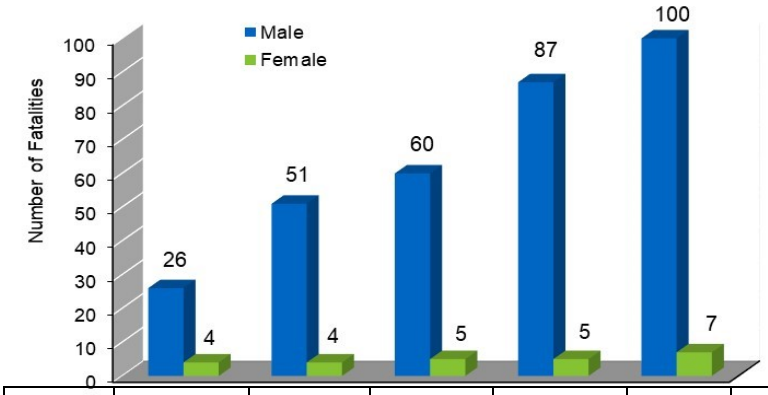
During the first 13 years (1990-2002) the average number of fatalities was 16 each year. During the last 13 years (2002-2015) the average number of fatalities was 11 each year.



5.2 Fatal agriculture-related injuries in adults aged 15 to 59 by age group and gender, 1990-2015

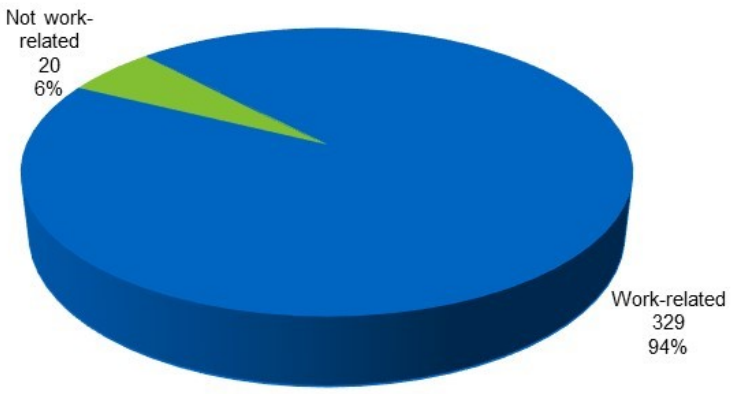
93% (324 fatalities) of younger adults killed in agriculture-related injury events were male. The ratio of males to females was highest for the 40 to 49 year age group (17.4:1), and lowest for the 15 to 19 year age group (6.5:1).

Older members of the 15 to 59 year age groups were more likely to be killed in an agriculture-related injury event than younger members were. 43% (150 fatalities) of the younger adults killed were aged 15 to 39, whereas 57% (199 fatalities) were 40 to 59 years old.



Sex	15-19	20-29	30-39	40-49	50-59	Total	%
Male	26	51	60	87	100	324	93
Female	4	4	5	5	7	25	7
Total	30	55	65	92	107	349	100
Percent	9	16	19	26	31	100	

5.3 Fatal agriculture-related injuries in adults aged 15 to 59 by the relationship to agriculture-related work, 1990-2015

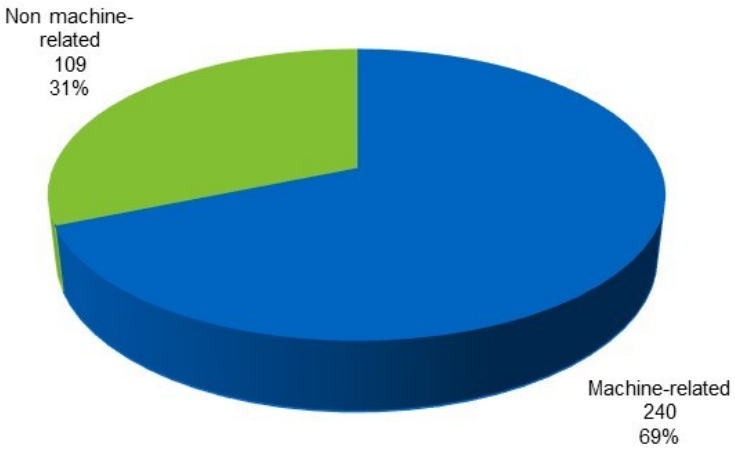


94% (329 fatalities) of the fatalities in younger adults were work-related. The few fatalities that were not work-related (6%, 20 fatalities) were due to hazards of the farm environment. The majority of not work-related fatalities involved either riding a horse recreationally or the deceased was a person in a motor vehicle involved in a traffic collision with a piece of farm or agriculture machinery.

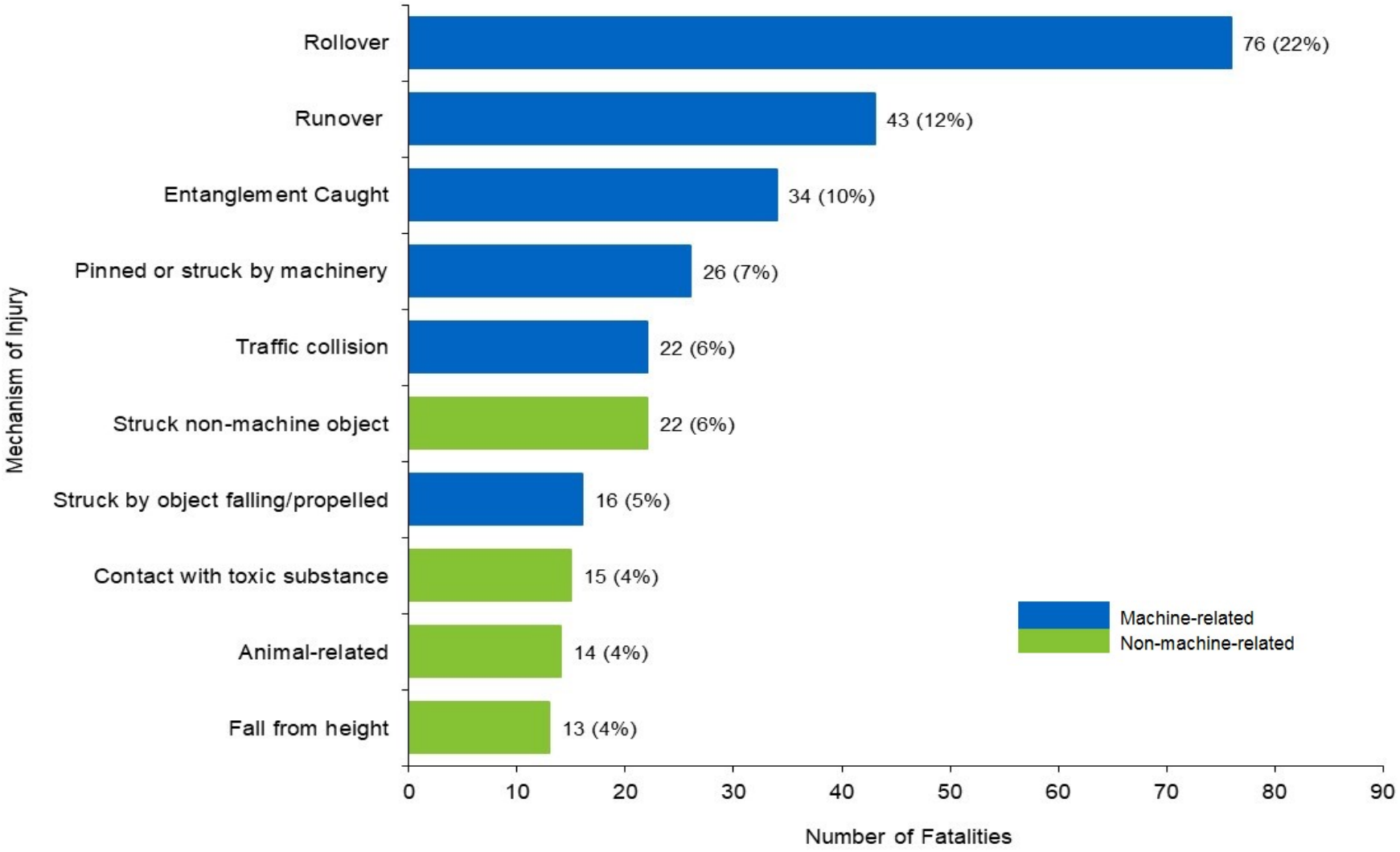
5.4 Fatal agriculture-related injuries in adults aged 15 to 59 by major cause, 1990-2015

69% (240 fatalities) of agriculture-related fatalities in younger adults were machine-related. The leading machine-related mechanisms of injury were machine rollovers, machine runovers and machine entanglements.

The agriculture-related fatalities that were non-machine-related (31%, 109 fatalities) included struck by object events, animal-related events, exposure to toxic substances, and falls from height.



5.5 Fatal agriculture-related injuries in adults aged 15 to 59 by mechanism of injury, 1990-2015

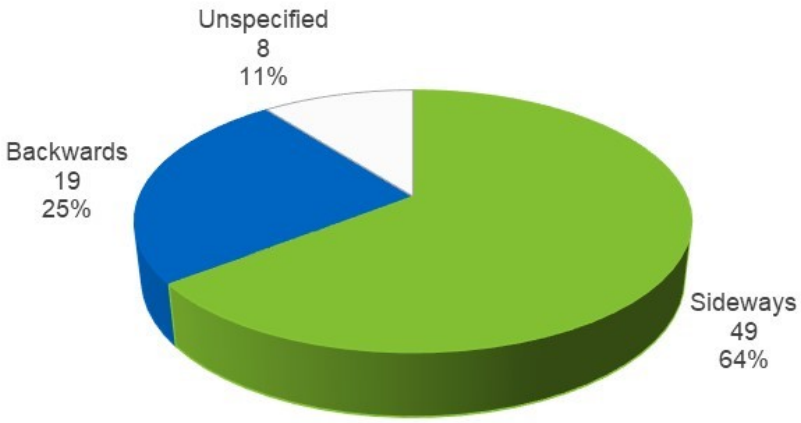


In adults aged 15 to 59, the top three causes of fatal injuries accounted for 44% (153 fatalities) of the fatalities. Machine rollovers resulted in the largest number of deaths with 22% (76 fatalities). Machine runovers accounted for 12% (43 fatalities) and machine entanglements accounted for another 10% (34 fatalities). Being pinned or struck by machinery accounted for 7% (26 fatalities). Traffic collisions and being struck by non-machine object each accounted for 6% (22 fatalities). Being struck by an object falling/being propelled by machine accounted for 5% (16 fatalities). Contact with a toxic substance accounted for 4% (15 fatalities). Another 4% (14 fatalities) were animal-related. Another 4% (13 fatalities) were as a result of falling from a height.

There were 20 mechanisms of injury accounting for 19% (68 fatalities) not included in the graph.

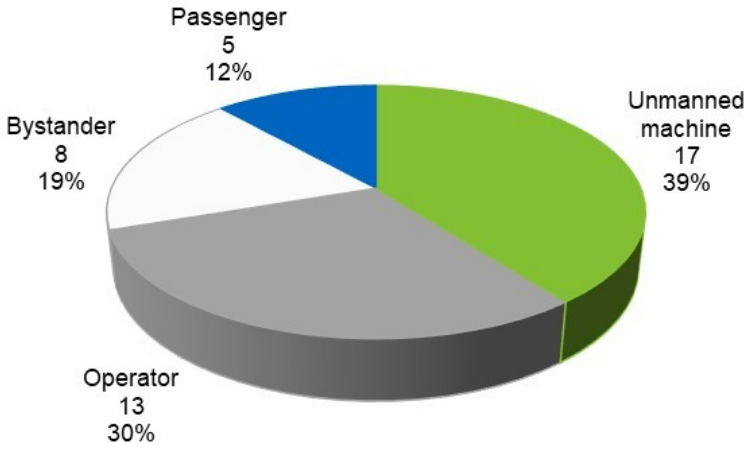
5.6 Fatal agriculture-related rollovers in adults aged 15 to 59 by rollover type, 1990-2015

In adults aged 15 to 59, 64% of the machine rollovers were sideways in direction (49 fatalities) and 25% were backwards (19 fatalities). In 11% of the cases, the direction of rollover could not be determined (8 fatalities).



5.7 Fatal agriculture-related runovers in adults aged 15 to 59 by runover type, 1990-2015

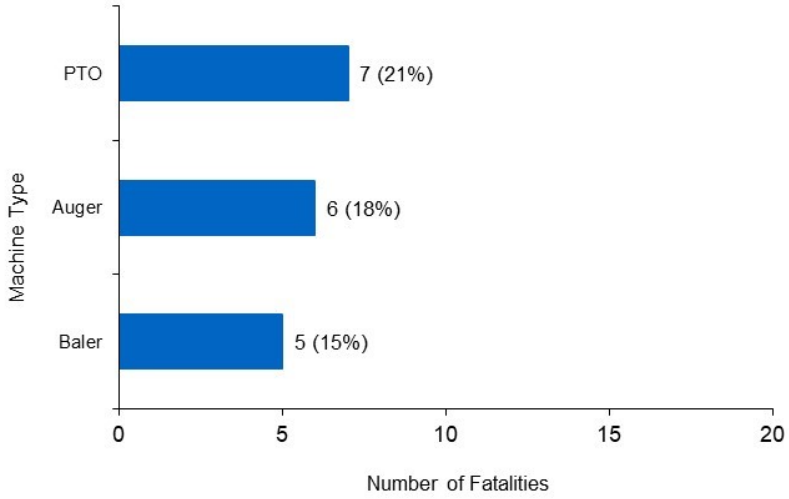
Adults aged 15 to 59, were most frequently runover by unmanned machines (39%, 17 fatalities) which had been bypass started, left running or left unblocked on a slope. In 30% (13 fatalities) of the runovers, an operator was struck by a moving machine after falling from it. Bystanders accounted for another 19% (8 fatalities) and passengers accounted for 12% (5 fatalities).



5.8 Fatal agriculture-related entanglements in adults aged 15 to 59 by machine type,1990-2015

The most common equipment involved in entanglements was a power take off (PTO) accounting for 21% (7 fatalities). Another 18% (6 fatalities) involved an auger and 15% (5 fatalities) involved a baler.

There were an additional 8 machine types accounting for 47% (16 fatalities) not included in the graph.

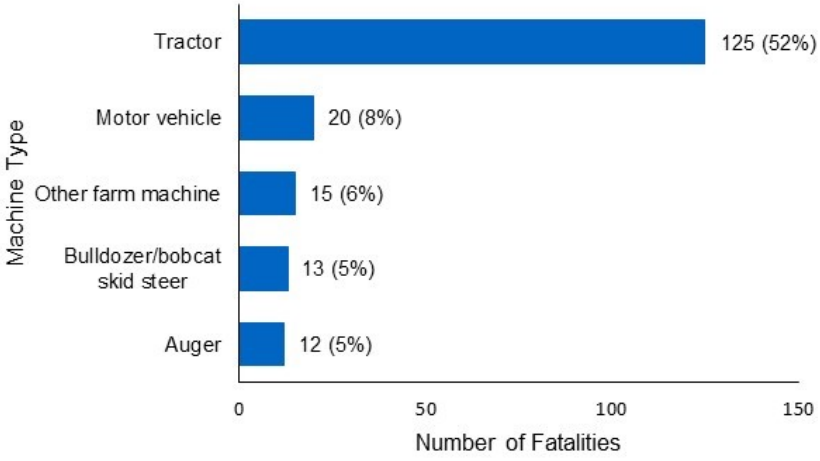


5.9 Fatal agriculture-related injuries in adults aged 15 to 59 by machine type, 1990-2015

Over half of the machine-related fatalities among younger adults involved tractors (52%, 125 fatalities). This was followed by fatalities involving motor vehicles (8%, 20 fatalities), other farm machinery accounted for 6% (15 fatalities) and bulldozer/bob cat/skid steer and augers each accounted for 5% (13 fatalities). Augers accounted for 5%, 12 fatalities.

It should be noted that tractors were associated with 36% of all agriculture-related fatalities among younger adults.

There was an additional 13 machine types accounting for 14% (30 fatalities) not included in the graph.

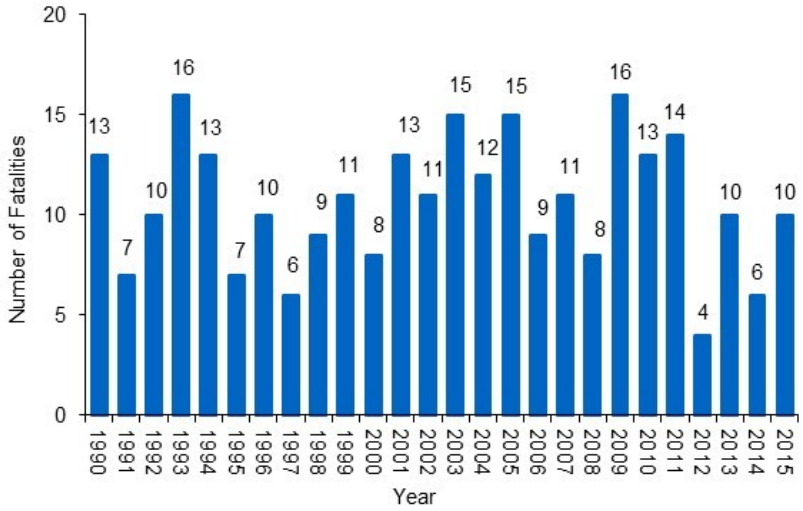


AGRICULTURE-RELATED FATALITIES IN ONTARIO 1990-2015 ADULTS (60+ yrs)

6.1 Fatal agriculture-related injuries in adults aged 60 and over by calendar year, 1990-2015

From 1990 to 2015, there were 277 agriculture -related fatalities among Ontario adults aged 60 and over. This is an average of 11 fatalities each year.

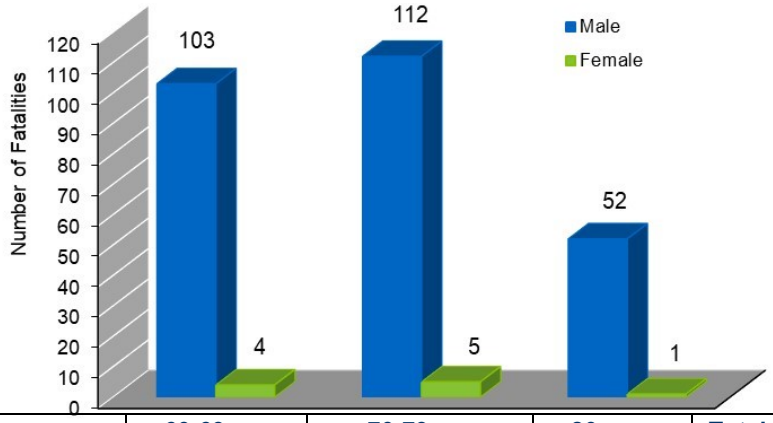
During the first 13 years (1990-2002), the average number of fatalities was 10 each year. During the last 13 years (2003-2015) the average number increased to 11 fatalities each year. It should be noted that this age group also experienced an increase in the farm population during the same time period (figures 2.6 and 2.7).



6.2 Fatal agriculture-related injuries in adults aged 60 and over by age group and gender, 1990-2015

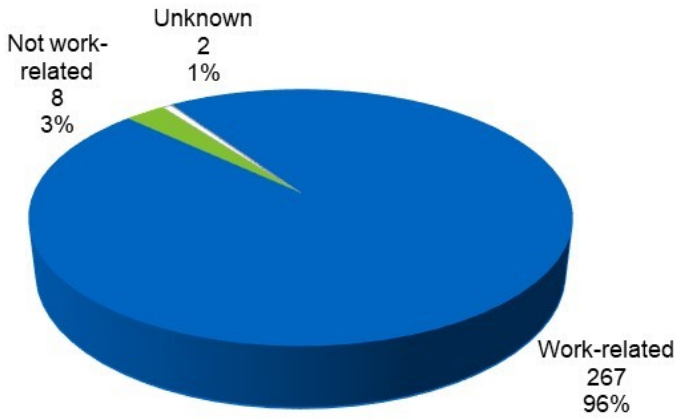
96% (267 fatalities) of the older adults killed in agriculture-related injury events were male. The ratio of males to females was highest for the 80+ age group (52:1), and lowest for the 70 to 79 year age group (22.4:1).

Even though farmers between 70 and 79 years of age had the highest number of fatalities, farmers 80 years of age and older had the highest agriculture-related fatality rate (see section 3.6).



Sex	60-69 yrs	70-79 yrs	80+ yrs	Total	%
Male	103	112	52	267	96
Female	4	5	1	10	4
Total	107	117	53	277	100
Percent	39	42	19	100	

6.3 Fatal agriculture-related injuries in adults aged 60 and over: the relationship to agriculture-related work, 1990-2015

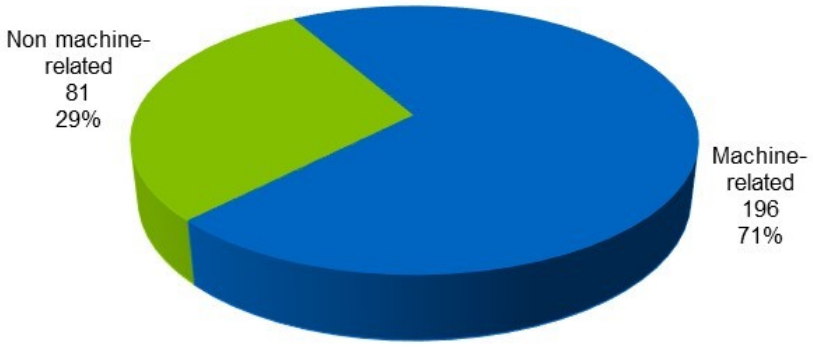


Ninety-six percent (267 fatalities) of the fatalities in older adults were work-related. Of the eight fatalities that were not work-related, four were due to hazards/activities of the farm environment. The majority of not work-related fatalities involved riding a horse recreationally. There were 2 fatalities in which there was not enough documentation to determine if the death was work or non-work related. There was adequate documentation that the death occurred on or involving agriculture activities. i.e. kick and killed by a horse. Unknown if the deceased was performing agriculture work or riding recreationally.

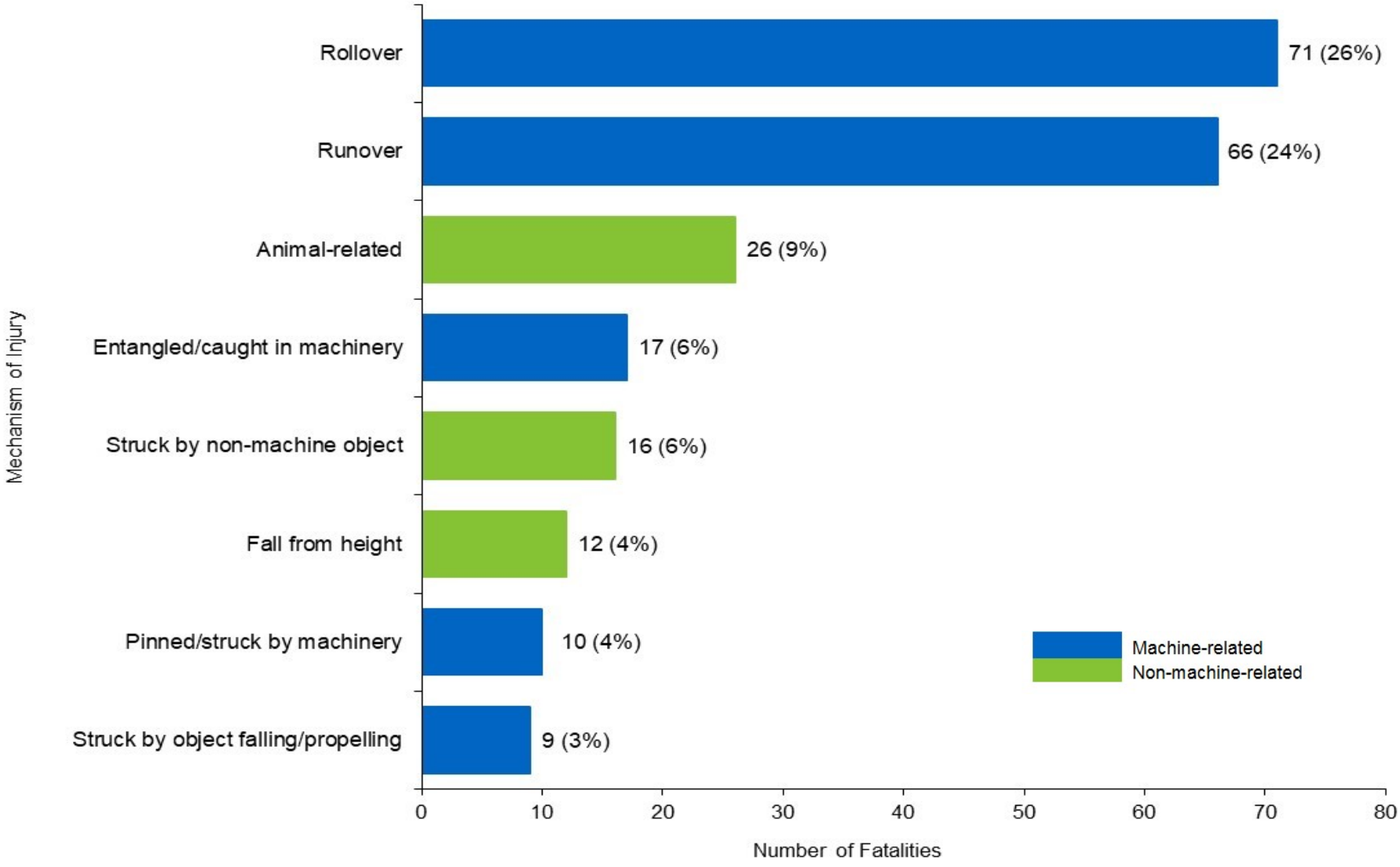
6.5 Fatal agriculture-related injuries aged 60 and over by major cause, 1990-2015

71% (196 fatalities) of agriculture-related fatalities in older adults were machine-related.

The leading machine-related mechanisms of injury were machine rollovers and machine runovers. Of the 81 non-machine-related agriculture-related fatalities (29%) the leading causes included animal-related and struck by object events.



6.6 Fatal agriculture-related injuries in adults aged 60 and over by mechanism of injury, 1990-2015



In adults aged 60 and over, 50% (137 fatalities) were due to two main mechanisms of injury, machine rollovers and machine runovers. Rollovers accounted for 26% (71 fatalities) of the fatalities, and runovers accounted for 24% (66 fatalities) of the fatalities. The next most common mechanism of fatal injury in older adults was animal-related 9%(26 fatalities).

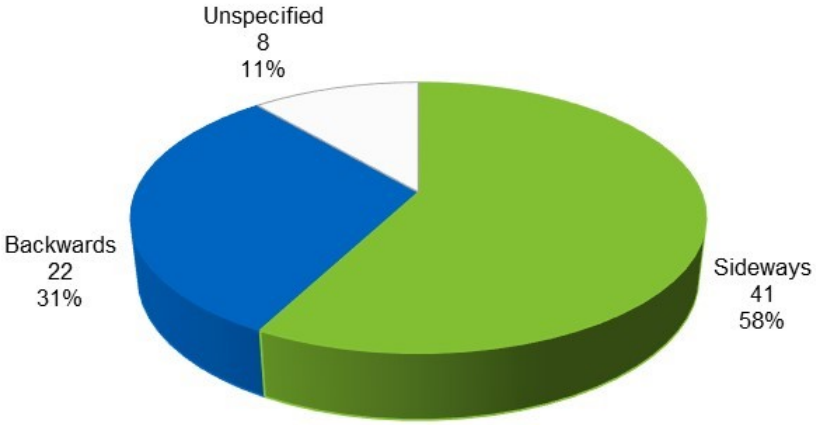
There were an additional 15 causes accounting for 15% (50 fatalities) not included in the graph.

6.7 Fatal agriculture-related rollovers in adults aged 60 and over by rollover type, 1990-2015

Of the 71 rollovers, 58% (41 fatalities) were sideways and 31% (22 fatalities) were backwards. Rollover direction could not be determined in 11% (8 fatalities).

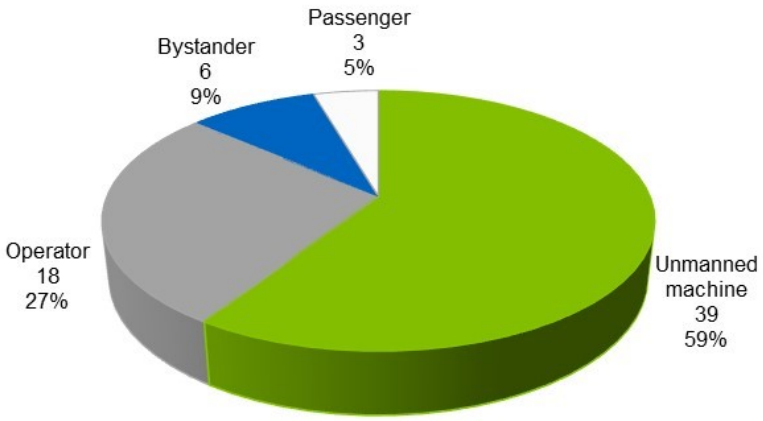
The majority of the sideways rollovers 73% (30 fatalities) were as a result of either traveling too close to the edge or traveling on an incline.

Of the backwards rollovers, 50% (11 fatalities) involved forestry activities.



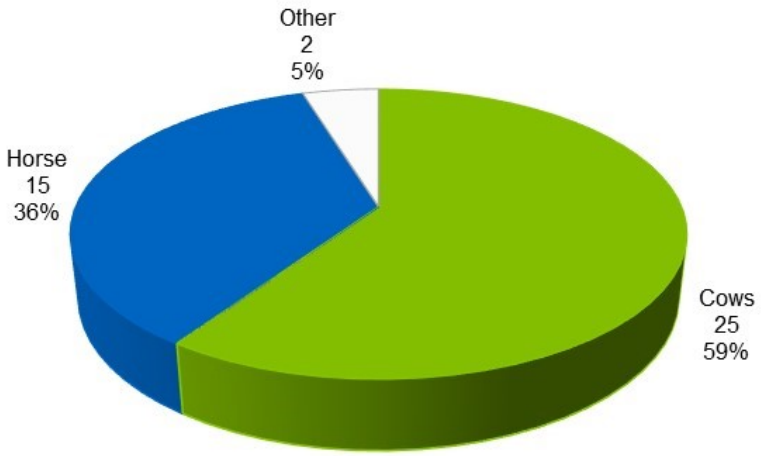
6.8 Fatal agriculture-related runovers in adults aged 60 and older by runover type, 1990-2015

Of the 66 runovers, the majority, 59% (39 fatalities) involved unmanned machines which had been bypass-started, left running or left unblocked on a slope. Operators runover subsequent to falls from machines accounted for 27% (18 fatalities). Bystander runovers accounted for 9% (6 fatalities) and passenger/ extra rider runovers accounted for 5% (3 fatalities).



6.9 Fatal agriculture-related injuries in adults aged 60 and over by animal, 1990-2015

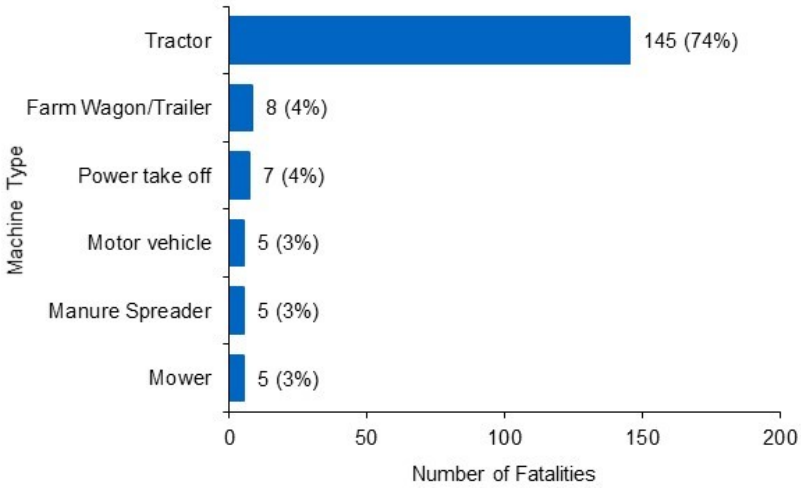
Of the 42 animal-related fatalities to those 60 years of age and older, the majority 59% (25 fatalities) involved cows/steers/calves. Another 36% (15 fatalities) involved horses/stallions/colts and 5% (2 fatalities) were other animals.



6.10 Fatal agriculture-related injuries in adults aged 60 and over by machine type, 1990-2015

Of the 196 machine-related fatalities, the majority, 74% (145 fatalities) involved a tractor. Farm wagon and power take off each accounted for another 4% (8 and 7 fatalities respectively). Motor vehicle, manure spreader and mower each accounted for an additional 3% (5 fatalities).

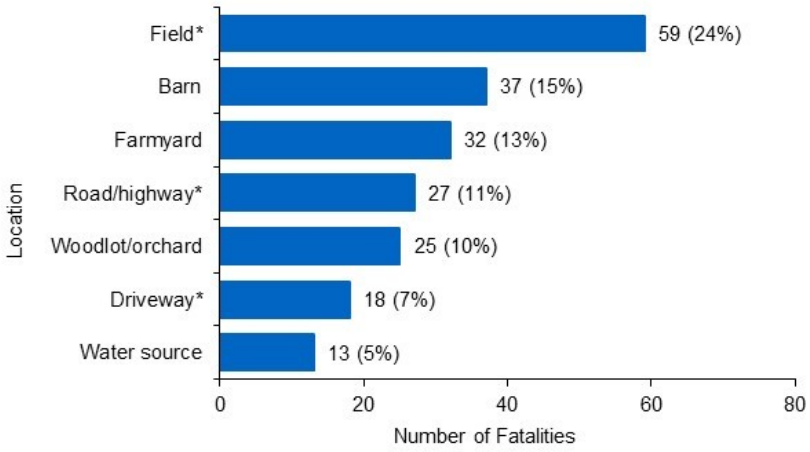
There were an additional 11 machine types accounting for 10% (21 fatalities) not included in the graph.



6.11 Fatal agriculture-related injuries in adults aged 60 and over by location of injury, 1990-2015

The most common locations of fatal injury for older adults were fields and their adjacent ditches accounting for 24% (59 fatalities). Another 15% (37 fatalities) of the fatalities occurred in a barn and an additional 13% (32 fatalities) of the fatalities occurred on the farmyard.

There were an additional 5 locations accounting for 14% (34 fatalities) not included in the graph.



Appendices

Appendix A: Decision Rules

Inclusion of fatalities in the CAIR databases

Alcohol Involvement

Fatal or hospitalized injuries where the victim was under the influence of alcohol were included in the databases if they involved agriculture-related work or an agriculture-related hazard.

Fatalities on Highways

Fatal or hospitalized injuries on public highways that involved agriculture-related vehicles, agriculture-related machinery, farm workers or farm animals were included in the databases.

Off-Road Vehicles

Fatal or hospitalized injuries involving off-road vehicles such as ATVs, dirt bikes and dune buggies were included in the databases if they occurred on a farm or ranch and/or were involved agriculture-related work.

Children at Play

Fatal or hospitalized injuries in children who were playing in the agriculture-related workplace were included e.g., cases where a person engaged in agriculture-related work was unable to supervise a child whom he/she had taken to the agriculture-related workplace; cases where a child was killed or injured as a direct result of someone engaged in an agriculture-related work activity cases where a child was killed or injured due to a hazard of the farm or ranch environment such as a farm animal, dugout, manure pit, off-road vehicle etc.

Assault and Deliberate Self-Injury

Cases of assault and deliberate self-injury were excluded from the databases.

Medical Conditions

Fatalities attributed to pre-existing medical conditions (e.g., previous seizure or heart attack) were excluded from the fatality database. Fatalities where an agriculture-related injury (such as a fall from a machine) was immediately preceded by a significant medical event such as a stroke, seizure or heart attack, were also excluded. Fatalities from a heart attack where the victim was engaged in strenuous agriculture-related work at the time of or immediately before the heart attack were included in the fatality database as “overexertion”.

Secondary Complications

Fatalities that occurred in hospital from secondary complications of agriculture-related injuries (e.g., embolism, respiratory distress) were included in the fatality database.

Appendix B: Glossary and Definitions

Agriculture-related fatalities
CAIR defines an agriculture-related fatality as 1) Any unintentional injury resulting in fatality that occurs during activities related to the operation of a farm or ranch in Canada and/or 2) Any unintentional injury resulting in fatality that involves any hazard of a farm or ranch environment in Canada (excluding fatal non-work-related injuries that take place in the farm residence). This includes fatalities that occur away from agriculture-related work locations if agriculture-related work is being done e.g., transporting livestock, supplies or harvested crops on public highways. It also includes collisions with farm animals on public highways. Fatalities where victims are killed because a third party is engaged in agriculture-related work were also included.

Denominator data
Data used as denominator values in rate calculations. If presented as a fraction, the lower half of an injury rate refers to the population exposed over a given period of time.

Farm
In the Census of Agriculture, Statistics Canada defined a farm as *"any farm, ranch or other agriculture-related holding that produces at least one of the following agriculture-related products intended for sale: crops, livestock, poultry, animal products, greenhouse or nursery products, mushrooms, sod, honey, or maple syrup products."* (Canada Census of Agriculture, Statistics Canada).

Numerator data
Data used as numerator values in rate calculations. If presented as a fraction, the top half of an injury rate refers to the number of cases (events) for a particular mechanism of injury and/or age group.

Runover types:

> ***Bystander runover***
> A bystander is runover, pinned or struck by a manned machine, or by a machine or implement towed by it; this includes being runover while attempting to board a moving manned machine.
>
> ***Extra rider runover***
> A passenger falls from a machine and is then runover, pinned or struck by the machine, or by a machine or implement towed by it.
>
> ***Operator runover***
> An operator falls from a machine and is then runover, pinned or struck by the machine, or by a machine or implement towed by it.
>
> ***Unmanned runover***
> A person is runover, pinned or struck by an unmanned machine, or by a machine or implement towed by it; this includes being runover while attempting to board a moving unmanned machine.

Study population
All persons who live, work on, or visit an Ontario farm or ranch (as defined above), as well as all persons who are injured in other locations (such as public highways) as a result of agriculture-related activity.

Surveillance
The ongoing systematic collection, analysis, interpretation and dissemination of health data.

Unintentional Injury.
Unintentional injuries consist of that subset of injuries for which there is no evidence of predetermined intent.

To further identify the activities or circumstances surrounding the leading causes of the fatalities, additional analysis was done based on the documentation in the circumstances text field of the abstract.

Activity prior to rollover

- included transportation of goods/livestock
- towing
- field work
- forestry
- working in the farm yard
- recreation, moving
- road maintenance
- extra rider
- unknown

Cause of Rollover

- travelling too close to the edge
- travelling on an incline, cornering
- falling from a ramp
- carrying a heavy load in a bucket
- dragging logs/implements
- pulling stumps/trees
- towing
- collision with an object
- rough terrain
- tractor arms/bucket caught on ground
- pulling heavy machine/trailer
- unknown

Activity prior to entanglement

- maintenance/repairs/cleaning of equipment
- checking on machine or contents
- removing blockage from machinery
- retrieving an item (not blocked)
- fall into machine
- stepping/reaching over entanglement hazard
- starting machine
- bystander
- other activity near entanglement hazard,
- unknown

Objects involved from injuries as a result of being pinned or struck by a machine or non-machine

- bale (large round)
- bale other
- tree, branch, log
- collapsing building or structure
- other heavy non-machine object example: gate or door
- heavy machine (not under power)
- truck box
- bucket
- front end lower arms
- other heavy machine component
- knife or blade
- baling or barbed wire
- tool or part of tool (includes power tools)
- hook, tow rope or chain
- hitch or tongue
- jacks or hydraulic lifts
- other non-machine object
- unknown
- other machine-related object

CAIR·SBAC
Canadian Agricultural Injury Reporting
Surveillance des blessures dans le secteur agricole au Canada

CAIR FATAL FARM INJURIES – DATA ABSTRACTION FORM

Coroner's File #: _____-_____ CAIR ID: _____-_____-_____

year no. **prov. year no.**

An Agriculture-related Fatality is: 1) Any unintentional injury resulting in fatality that occurred during activities related to the operation of a farm or ranch and/or 2) Any unintentional injury resulting in fatality that involved any hazard of a farm or ranch environment in Canada (excluding fatal non work-related injuries that took place in the farm residence). This includes fatalities that occurred away from agriculture-related work locations if agriculture-related work was being done; e.g., transporting livestock, supplies, workers or harvested crops on public highways. Fatalities where victims were killed because a third party was engaged in agriculture-related work are also included.

Age: _____ Birth Date: ____ / ____ / ____ Birth date missing (circle)? Yes No

mm dd yyyy

Gender (circle): M F Province: _____ County/Regional Municipality: _____

Region: _____ Date of Injury: ____ / ____ / ____ Weekday of Injury (circle): S M T W T F S

mm dd yyyy

Time of Injury _____ (24:00) Date of Fatality: ____ / ____ / ____

mm dd yyyy

Source of data for case identification (circle all that apply):

1 Coroner 2 Medical Examiner 3 Media

4 RCMP / police 5 Registrar General 6 Other

A. DESCRIPTION OF INJURY EVENT

Please include as many details as possible about the decedent's activity, task and location at the time of the incident. For falls and drownings, please describe exact location. For struck or pinned by object injuries, please specify object or machine component. For entanglements, please state whether clothing was involved. For tractor rollovers, please indicate whether the tractor had ROPS. For machine injuries, please describe the machine in as much detail as possible.

If the injury <u>was not</u> machinery or vehicle related, complete Section B and then proceed to Section E.

If the injury <u>was</u> machinery or vehicle related, begin with Section C and continue.

B. CAUSE OF INJURY NOT MACHINERY OR VEHICLE RELATED

1 crushed or struck by animal. Specify animal:

_____

2 other type of animal injury. Specify animal:

_____

3 fall from animal. Specify animal:

_____

4 struck by non-machine object
5 struck against non-machine object
6 caught inside, under or between non-machine objects

If 4 or 6, specify object:

_____

7 fall from height. Give specific fall location:

_____

8 fall on same level
9 jumped to lower level
10 overexertion
11 drowning
12 exposure to fire/explosion
13 contact with temperature extremes
14 contact with electric current
16 contact with radiation, caustic, toxic or noxious substance by (circle):
inhalation ingestion absorption injection

Specify agent: _____

18 asphyxiation by grain or soil. Specify:

_____

19 firearm
77 other non machine related. Specify:

_____

88 unknown non machine related
99 not applicable

C. CAUSE OF INJURY MACHINERY OR VEHICLE RELATED

1 sideways rollover
2 backwards rollover
3 unspecified rollover
4 entangled/caught in machinery
5 pinned or struck by machine component or collapsing machine (specify)
6 traffic collision on road or highway
7 operator fell from moving machine, not runover, pinned, or struck by it
8 operator fell from moving machine, then runover, pinned, or struck by it
9 passenger fell from moving machine, not runover, pinned, or struck by it
10 passenger fell from moving machine, then runover, pinned, or struck by it
11 alighted operator/other person runover, pinned, or struck by unmanned machine
12 alighted passenger runover, pinned, or struck by moving machine
13 bystander runover, pinned, or struck by moving machine
14 machine-related contact with electrical current
15 machine related fire, explosion or burn
16 machine collision off-road
17 machine-related drowning
18 struck by object falling or propelled from machine (specify)
20 runover, pinned, or struck by moving machine - unspecified
77 other machine related. Specify:

_____

88 unknown machine related
99 not applicable

If 5 or 18, specify object/component:

_____

D. TYPE OF MACHINERY

(Circle appropriate number if the injury event was machinery or vehicle related)

1 tractor
2 auger. Specify whether freestanding, attached to machine, or unknown (circle)
3 mower
4 power take off, specify machine PTO attached to:

_____

5 baler
6 farm wagon/trailer
7 combine
8 power tool (not chainsaw)
9 chainsaw
10 welder
11 harvester
12 plough/disk
13 hay elevator
14 manure spreader
15 bulldozer, bob cat, skid steer
16 motor vehicle. Specify:

_____

17 off-road vehicle. Specify:

_____

19 fencing equipment
20 spraying equipment
22 garden equipment
24 planting equipment
25 swather
26 rock picker
27 snow blower
28 airplane
77 other farm implement/machine. Specify:

_____

88 unknown
99 not applicable

E. IMMEDIATE LOCATION OF INJURY

1 Field (includes dry ditches next to field)
2 Barn
3 Silo/grain bin, (circle)
4 Shed
5 Farmyard
6 Road/highway (includes dry ditches)
7 Driveway (includes dry ditches)
8 Farm house
9 Farm road (includes dry ditches)
10 Woods, orchard
11 Water source; includes water-filled ditch, dugout, manure lagoon, sewage pit, etc. Specify:

_____

12 Corral/outdoor animal enclosure
13..Other unspecified ditch/embankment/dyke
14 Trench
77 Other location. Specify:

_____

88 Unknown

F. LOCATION OF DEATH

1 Found dead
2 Died *en route*
3 Died in hospital
77 Other location of death. Specify:

_____

88 Unknown

G. RELATIONSHIP OF INJURED PERSON TO FARM OWNER/OPERATOR

1 Operator
2 Spouse of farm operator
3 Child of farm operator
4 Other relative of farm operator. Specify:

_____

5 Hired worker
6 Spouse of hired worker
7 Child of hired worker
8 Other relative of hired worker. Specify:

_____

9 Other non-visiting child
10 Other non-visiting adult
11 Adult visitor or contractor
12 Child visitor
77 Other relationship. Specify:

_____

88 Unknown

H. METHOD OF DISCOVERY

Who found the deceased? (i.e. relationship to deceased)

_____

Was the injury event witnessed? (circle)

Y N

(Indicate if the information is not available)

I. NATURE OF INJURY BY BODY PART

e.g., NI1 crush injury, BP1 chest.
(List from most to least serious injury, where the most serious injury was the cause of death.)

Nature of injury 1:

_____

Body part 1:

_____

Nature of injury 2:

_____

Body part 2:

_____

J. ALCOHOL INVOLEMENT (effective 2012 date of death)

Was alcohol involved? Y N If yes, was the deceased tested for alcohol? Y N

If yes, was the test positive for alcohol? Y N If yes, what was the alcohol level?_____

If yes, is this greater than the legal provincial level? Y N

K. REVIEW FOR CONSENSUS? (Circle) Yes No If yes, please explain the points needing consensus of opinion on a separate sheet.

Appendix D: Denominator Data

Ontario Farm Populations by Age Group and Year

Including Temporary Foreign Workers

Total Population	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1-4	17844	17268	16686	16107	15531	14949	14370	13791	13212	12633	12054	11475	11077
5-9	22838	22182	21522	20864	20206	19548	18890	18232	17574	16916	16258	15600	14907
10-14	27157	26415	25673	24933	24189	23447	22705	21963	21221	20479	19737	18995	18453
15-19	24857	24380	23893	23426	22948	22475	22010	21538	21066	20599	20127	19650	19493
20-29	35816	34180	32419	31193	30012	28601	27220	26134	25548	24892	24286	23495	23307
30-39	48126	46090	44294	42658	41197	39406	37770	36384	35053	33902	32371	31035	29432
40-49	44239	43565	42906	42287	41963	41184	40800	40526	39972	39418	39119	38980	38720
50-59	34666	34280	33949	33608	33357	33021	32790	32589	32233	31897	31551	31295	31618
60-69	27040	26399	25753	25117	24471	23829	23183	22552	21908	21262	20626	19990	20288
70-79	11220	11149	11070	10995	10920	10845	10770	10695	10620	10548	10473	10395	10513
>80	2340	2370	2401	2430	2462	2490	2520	2550	2580	2610	2643	2673	2885
Total	296143	288278	280566	273618	267256	259795	253028	246954	240987	235156	229245	223583	220693

Total Population	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total 1990-2015
1-4	10679	10281	9883	9485	9343	9201	9059	8917	8775	8679	8583	8487	8391	306760
5-9	14214	13521	12828	12135	11851	11567	11283	10999	10715	10428	10141	9854	9567	394640
10-14	17908	17360	16815	16270	15663	15056	14449	13842	13235	12617	11999	11381	10763	482725
15-19	19331	19174	19022	18870	18128	17396	16644	15890	15150	14475	13802	13126	12453	499923
20-29	23309	23191	23253	23275	22711	22217	21408	20879	20215	20240	20545	20570	20030	648946
30-39	27834	26266	24963	23370	22651	22397	21428	20684	20175	20250	20935	21530	20755	790956
40-49	38635	38570	38610	38520	37046	35567	33938	32294	30930	29644	28593	27802	26156	969984
50-59	31991	32364	32707	33110	33269	33468	33632	33916	34260	33967	33689	33586	33363	860176
60-69	20611	20929	21272	21585	21953	22346	22689	23062	23455	23664	23903	24112	24341	596340
70-79	10628	10743	10858	10973	11126	11277	11428	11584	11735	11965	12195	12430	12660	289815
>80	3097	3306	3518	3730	3827	3927	4021	4118	4215	4212	4206	4197	4191	83519
Total	218237	215705	213729	211323	207568	204419	199979	196185	192860	190141	188591	187075	182670	5923784

Denominators for these rate calculations are taken from the 1996, 2001, 2006 and 2011 Canada Census of Agriculture and extrapolated for the years in which the census was not performed. In addition to the Canada Census of Agriculture population, temporary foreign workers under the seasonal agriculture workers program from Citizenship & Immigration Canada were including.

Note: Statistics Canada randomly rounds category totals up or down by a factor of five.

Farm Population: The population covered by the Agriculture–National Household Survey Linkage database and the estimates derived from it also changed in two ways in 2011:

- 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. This definition was applied to the 1996, 2001, and 2006 census data.

- 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.