

Agricultural rollovers in Canada for 1990 - 2000

**Published by the
Canadian Agricultural Injury
Surveillance Program**



-with the support of



Canada

Copyright © The Canadian Agricultural Injury Surveillance Program (CAISP), 2006. All rights reserved.

Quotes, whole tables and whole figures may be abstracted from this report as long as the Canadian Agricultural Injury Surveillance Program is referenced. No more than one page of the report may be reproduced or transmitted in any form or by any means without written permission from CAISP. Data published in this report may not be reanalyzed or reinterpreted without written permission from CAISP.

Published by: *The Canadian Agricultural Injury Surveillance Program, Emergency Medicine and Injury Research, Queen's University/Kingston General Hospital, 76 Stuart Street, Kingston, Ontario, Canada, K7L 2V7.*

www.caisp.ca

CAISP is funded by the Canadian Agricultural Safety Association (www.casa-acsa.ca) and by Agriculture and Agri-Food Canada.

ISBN 0-9734118-4-8

Agricultural Rollovers in Canada for 1990-2000.

This report from *The Canadian Agricultural Injury Surveillance Program* describes the occurrence of fatal and hospitalized agricultural rollover injuries in Canada from 1990-2000.

AGRICULTURAL ROLLOVERS IN CANADA FOR 1990 – 2000

Table of Contents

	<i>Acknowledgments</i>	v
	<i>Foreword & Executive Summary</i>	ix
Chapter		Page
	Section I	
1	Introduction	1
2	Methods	5
	Section II Fatal Agricultural Rollovers in Canada, 1990-2000	
3	Agricultural Rollover Fatalities – Overview	9
4	Agricultural Rollover Fatalities – Tractors and other Agricultural Machines	15
5	Agricultural Rollover Fatalities – Off Road Vehicles	19
6	Agricultural Rollover Fatalities – Children under 15	23
7	Agricultural Rollover Fatalities – Adults aged 15-59	27
8	Agricultural Rollover Fatalities – Adults aged 60+	31
9	Agricultural Rollover Fatalities – Type of Rollover Event	35
	Section III Hospitalized Agricultural Rollovers in Canada, 1990-2000	
10	Agricultural Rollover Hospitalizations – Overview	43
11	Agricultural Rollover Hospitalizations – Tractors and Other Agricultural Machines	47
12	Agricultural Rollover Hospitalizations – Off Road Vehicles	51
13	Agricultural Rollover Hospitalizations – Children under 15	55
14	Agricultural Rollover Hospitalizations – Adults aged 15-59	59
15	Agricultural Rollover Hospitalizations – Adults aged 60+	63
Appendix A	Decision rules	67
Appendix B	Glossary	69
Appendix C	Data abstraction forms	71
Appendix D	Denominator data	75
Appendix E	Contact information	77
Appendix F	References	79



Acknowledgements

Funding and Support

The Canadian Agricultural Safety Association

CASA (formerly called the Canadian Coalition for Agricultural Safety and Rural Health) was established in 1993 by a coalition of agencies from across Canada. These agencies joined together to address problems of illness, injury, and accidental death in farmers and ranchers and their families, agricultural workers and other issues related to rural health. www.casa-acsa.ca

Agriculture and Agri-Food Canada

Agriculture and Agri-Food Canada (AAFC) is pleased to participate in the production of this publication. AAFC is committed to working with our partners in the agricultural industry to increase public awareness of the importance of the agriculture and agri-food industry to Canada. Opinions expressed in this document are those of CAISP and not necessarily the Department's.

Participants and sponsors

Project Sponsor	Canadian Agricultural Injury Surveillance Program
Project Director	Rob Brison, MD, MPH, FRCPC
Co-Directors	Kathy Belton, MA ,William Pickett, PhD
Report Writer	Catherine Isaacs, MSc

Individuals and agencies integral to CAISP

British Columbia

Dr. Helen Ward, Respiratory Division, Department of Medicine, University of British Columbia

Tej Sidhu, Chief Coroner's Office, Province of British Columbia

Dr. Shaun Peck, Deputy Provincial Officer, B.C. Ministry of Health

Anne DyBuncio, University of British Columbia

Alberta

Kathy Belton, Alberta Centre for Injury Control and Research

Lisa Hartling, Alberta Research Centre for Child Health Evidence, Department of Pediatrics, University of Alberta

Saskatchewan

Louise Hagel, Institute of Agricultural, Rural and Environmental Health, University of Saskatchewan

Dr. Neils Koehncke, Institute of Agricultural, Rural and Environmental Health, University of Saskatchewan

Allan Walker, Occupational Health and Safety Branch, Saskatchewan Labour

Lorna Nystuen, Office of the Provincial Coroner, Saskatchewan Justice

Dr. Mary Rose Stang, Research Consultant, Population Health Branch, Saskatchewan Health

Manitoba

Dr. Ted Redekop, Manitoba Department of Labour and Immigration, Workplace Safety and Health Division, Occupational Health Branch, Manitoba Health
The Office of the Chief Medical Examiner

Ontario

Dr. Robert Brison, Department of Emergency Medicine, Kingston General Hospital and Queen's University

Dr. William Pickett, Faculty of Health Sciences, Kingston General Hospital and Queen's University

Deborah Emerton, Department of Emergency Medicine, Kingston General Hospital and Queen's University

Catherine Isaacs, Department of Emergency Medicine, Kingston General Hospital and Queen's University

Québec

Bureau du coroner du Québec
Ministère de la santé et des services sociaux du Québec
Dr. Louise Paré, Direction de la santé publique Chaudière-Appalaches
Dr. Benoit Gingras, Direction de la santé publique Chaudière-Appalaches

New Brunswick

Dr. B. Christofer Balram, Director, Provincial Epidemiology Service, Provincial
Epidemiologist, Department of Health and Community Services
Elizabeth Bastin, Department of Health and Community Services

Nova Scotia

Dr. Judy Guernsey, Department of Community Health and Epidemiology,
Dalhousie University
Elizabeth Crouse, Nova Scotia Department of Agriculture and Fisheries, Truro,
Nova Scotia

Prince Edward Island

Marilyn Affleck, P.E.I. Federation of Agriculture

Newfoundland & Labrador

Deborah Guillemette, Newfoundland and Labrador Federation of Agriculture
Billy Woods, Farmers with Disabilities

This study is based in part on de-identified data provided by the Saskatchewan Department of Health. The interpretations and conclusions contained herein do not necessarily represent those of the Government of Saskatchewan or the Saskatchewan Department of Health.

CAISP logo design: Brian Fleck, University of Alberta

Website: www.caisp.ca

Foreword and Executive Summary

Agricultural Rollovers in Canada for 1990 - 2000 includes an analysis of Canadian Agricultural Injury Surveillance Program (CAISP) fatal machine rollover data for eleven calendar years from 1990-2000, and rollover hospitalized injury data for ten fiscal years from April 1990 to March 2000.

Agricultural rollover injuries are not random or isolated “accidents”. In the eleven years from 1990-2000, 270 people were killed in agricultural rollover events. Between April 1990 and March 2000, there were 339 rollover-related hospitalizations. Rollover injuries, especially those involving tractors, are the leading cause of death on Canadian farms and ranches. Machine rollovers account for 21.1% of all agricultural work-related fatalities, but only 2.3% of hospitalized injuries. That is because machine rollovers are particularly lethal. Of the 609 machine rollovers recorded in the CAISP databases, 44.4% were fatal. Victims were most often killed by severe crush injuries. 69.3% of the victims who were fatally injured died at the scene.

Adults aged 60 and over were at highest risk for machine rollovers. They represent only 13.2% of Canada's farming population, yet they comprised 40% of the rollover fatalities and 33.7% of the rollover-related hospitalizations. This might be because older farmers are more likely to operate older tractors without Roll Over Protection Structures (ROPS). Most tractor rollover fatalities could be avoided if ROPS and seatbelts were installed and used on all tractors. 88.1% of rollover fatalities involved tractors.

There are two types of machine rollovers. In sideways rollovers, a machine or vehicle rolls over onto its side and crushes the victim as it rolls. In backwards rollovers, the front tires of a machine rotate around its rear axle by 90 to 180 degrees. Of the 270 fatal rollovers, 53.7% were sideways, 27.8% were backwards, and 18.5% were of unspecified type. Rollover types could not be classified adequately for hospitalized rollovers.

Sideways rollovers generally occur on steep slopes, during sharp turns, or at the edges of ditches, ravines or water sources. 52.9% of the fatal sideways rollovers in road and field locations occurred in ditches. 18.6% of fatal sideways rollovers involved slopes, inclines or steep piles of material. To reduce the possibility of sideways rollovers, machine operators should stay well away from ditches bordering fields and at the side of roads. Operating machines on steep slopes and cornering at excessive speeds should also be avoided. Backwards rollovers usually take place while an operator is using a tractor or other farm machine to haul logs, pull stumps, or tow vehicles or machines. 54.7% of all fatal backwards rollovers involved towing, hauling or dragging objects, vehicles or trailers. 24% of backwards rollovers were related to wood harvesting activities. To reduce the likelihood of a backwards rollover, operators should adhere to manufacturers' recommendations concerning maximum towing capacity, avoid hitching tow ropes and chains above the level of the draw pin, and should not drag trees, logs, or other objects over the ground.

100% of the children killed in sideways and backwards rollovers were male. Children should not be taken as extra riders on farm machines or off road vehicles (ORVs) because they are very likely to be killed or injured seriously in a rollover event. 47.1% of those killed in fatal ORV rollovers were under 15 years old. 41.2% of all fatal ORV rollovers were work related, but in children, only 12.5% were work related. Young children should not be allowed to operate ORVs.

HIGHLIGHTS AND RECOMMENDATIONS

Highlights

Machine rollovers, especially those involving tractors, are the leading cause of death on Canadian farms and ranches.

Over the surveillance period:

- 270 people were killed in agricultural rollover events.
- There were 339 rollover-related hospitalizations.
- Machine rollovers accounted for 21.1% of all agricultural work-related fatalities, but only 2.3% of hospitalized injuries.
- Tractors were involved in 88.1% of all fatal machine rollovers.
- 6.3% of fatal machine rollovers occurred in Off Road Vehicles (ORVs).
- For all age groups, sideways rollovers were more common than backwards rollovers.
- Farmers aged 60 and over were at highest risk for machine rollovers. 108 persons aged 60 and over were killed in rollover events during the surveillance period. Sixteen of these victims were over 79 years old. The crude annual fatal rollover rate for farmers aged 80+ was 18.8/100,000 per year.
- 88.2% of fatal ORV rollovers involved all terrain vehicles (ATVs), including five 4-wheeled ATVs.

Machine rollovers in children under 15

Over the surveillance period:

- 20 children were killed and 24 were hospitalized due to agricultural rollover events.
- 95% of the children killed and 83.6% of those hospitalized were male.
- 60% of fatal rollovers occurred from June to August.
- 58.4% of hospitalized rollover injuries took place in July and August.
- 45% of fatal rollovers and 41.7% of hospitalized rollovers involved tractors.
- 40% of fatal rollovers and 45.8% of hospitalized rollovers were ORV-related.
- 25% of hospitalized rollover diagnoses were intracranial injuries and 25% were fractures. In older age groups, fractures were a much greater proportion of total rollover injury diagnoses.

Machine rollovers in adults aged 15-59

Over the surveillance period:

- 142 adults aged 15-59 were killed and 201 were hospitalized due to agricultural rollover events.
- 90.1% of the adults aged 15-59 killed and 90% of those hospitalized were male.
- Only 3.2% of all rollover events involving adults aged 15-19 were fatal, whereas 43.2% of all rollover events in adults aged 50-59 were fatal.
- 79.7% of fatal rollovers took place from May to November.
- 80.9% of hospitalized rollover injuries occurred from May to October.
- 88.7% of fatal rollovers and 68.2% of hospitalized rollovers were tractor-related.

- 27.5% of fatal rollovers occurred near fields, 24.6% near public roads, 17.6% near farm roads, 7.7% in woodlots, and 6.3% into water sources.
- 44.8% of the hospitalized rollover injuries in adults aged 15-59 were diagnosed as fractures, other diagnosis types comprised 9% or less of the total diagnoses.

Machine rollovers in adults aged 60+

Over the surveillance period:

- 108 adults aged 60 and over were killed and 114 were hospitalized due to agricultural rollover events.
- 98.1% of the seniors killed and 94.7% of those hospitalized were male.
- 92.7% of fatal rollovers took place from April to November.
- 86.9% of hospitalized rollover injuries occurred from April to September.
- 95.4% of fatal rollovers and 71.9% of hospitalized rollovers were tractor-related.
- 12.3% of hospitalized rollover events involved mowers.
- 27.8% of fatal rollovers occurred near fields, 16.7% near public roads, 14.8% in woodlots, 9.3% near farm roads, and 6.5% into water sources.
- 42.1% of the hospitalized rollover injuries in senior adults were diagnosed as fractures, other diagnosis types comprised 10% or less of the total diagnoses.

Sideways rollovers – 145 cases

- 92.4% of the victims were male.
- All of the children killed were male.
- Sideways rollovers were most frequent among adults aged 60-69.
- 93.6% of fatal sideways rollovers involved tractors.
- Sideways rollovers occurred most frequently near public roads, fields, farm roads, water sources, and driveways.
- 52.9% of the fatal sideways rollovers in road and field locations occurred in ditches.
- 18.6% of fatal sideways rollovers involved slopes.
- Provinces with flatter terrain experienced a low proportion of sideways rollovers relative to the size of their farming populations.

Backwards rollovers– 75 cases

- 94.7% of the victims were male.
- All of the children killed were male.
- Backwards rollovers were most frequent among adults aged 60-69.
- 92% of fatal backwards rollovers involved tractors.
- Backwards rollovers most commonly occurred near fields, in woodlots and near roads.
- 24% of all backwards rollovers involved wood harvesting activities.
- 54.7% of fatal backwards rollovers involved towing, hauling or pulling objects, vehicles or trailers.
- Provinces with flatter terrain experienced a low proportion of backwards rollovers relative to the size of their farm populations.

Recommendations

Based on the data presented in this report, CAISP recommends the following rollover prevention strategies:

All Rollovers

- *The use of ROPS and seatbelts by all operators would reduce rollover fatalities.*
- *ROPs and seat belts should be retrofitted on older tractors. In Victoria Province Australia, the retrofitting of ROPs on tractors was estimated to have lowered the rate of tractor rollover fatalities by 67.5%.*
- *Most farm machines are not designed to seat passengers. Extra riders should not be taken on farm machines or Off Road Vehicles such as All Terrain Vehicles, as they are very likely to be killed or injured seriously in a rollover event.*
- *ORV operators should always wear approved safety helmets.*

¹ Day, L. and G. Rechnitzer (April 2006). Evaluation of the tractor rollover protective structure rebate scheme 1997/1998. Monash University Accident Research Centre Report Number 155.

Sideways Rollovers

- *Machine operators should stay well away from ditches bordering fields and at the side of roads.*
- *Operating machines on steep slopes should be avoided, if possible.*
- *Machine operators should not corner at excessive speeds.*

Backwards rollovers

- *Due to a tractor's high centre of gravity, towing any object or vehicle can easily lead to a backwards rollover. Operators should adhere to manufacturers' recommendations concerning maximum towing capacity.*
- *A towrope or chain should never be attached beneath the seat or anywhere above the level of the draw pin.*
- *Poor terrain conditions such as thick mud, ice, and steep slopes adversely affect normal towing capacity and could lead to a backwards rollover.*
- *Dragging a tree, log, or other object can lead to a backwards rollover if the object becomes caught while the tractor continues to drive forward.*

Age group related recommendations

Senior farmers

- *Prevention programs directed at senior farmers should stress the necessity for changing the types of agricultural tasks attempted, and for adapting the methods used to accomplish tasks in order to fit changing abilities and limitations.*
- *Senior farmers tend to operate older machinery. The much higher fatal rollover rate in this age group may, in part, reflect a relatively lower availability of ROPs and seat belts due to the age of the tractors used. ROPs and seatbelts should be retrofitted on older tractors.*

Children

- *There is a large gender disparity in the incidence of rollover fatalities among children. 100% of the children killed in sideways and backwards rollovers were male. Children should never be taken as extra riders on tractors and other farm machines.*
- *Although only 4.7% of the victims of fatal non-ORV rollovers were children, 47.1% of those killed in fatal ORV rollovers were under 15 years old. 41.2% of all fatal ORV rollovers were work related, but in children, only 12.5% were work related. Young children should not be allowed to operate ATVs and other ORVs.*

1 INTRODUCTION

1.1 GENERAL INTRODUCTION

The Canadian Agricultural Injury Surveillance Program (CAISP) was established in 1995 in response to the need for better information about fatal and hospitalized agricultural injuries in Canada. CAISP is a national program with partners in each of the ten provinces of Canada. *Agricultural Rollovers in Canada for 1990-2000* examines machine rollover fatality data for eleven calendar years from 1990-2000, and machine rollover hospitalization data for ten fiscal years from April 1990 to March 2000.

The report is organized into several sections. Following this introduction, there is a description of the methods used in our surveillance program. Fatal and hospitalized agricultural rollover injuries are then reviewed comprehensively. Important trends and patterns are highlighted and recommendations are made for injury prevention and further research.

1.2 HISTORY OF AGRICULTURAL INJURY SURVEILLANCE IN CANADA

Agricultural 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 agricultural injuries, but only recently have substantial national resources been committed to the study of agricultural injuries.

When compared with other Canadian industrial sectors, agriculture is a dangerous occupation. Agriculture ranks as the third 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 (Pickett et al., 1999). Economic costs associated with agricultural injuries are also substantial. In the United States, when one factors in the costs of treatment, rehabilitation and losses in productivity, agricultural injuries are responsible for over \$10 billion in economic losses annually (Leigh et al., 2001). Canadian estimates of economic burden are in the hundreds of millions of dollars annually (Locker et al., 2003).

Until the establishment of CAISP, Canadian data on agricultural injuries were historically limited. This surveillance program has filled an important void in providing national evidence of agricultural injury occurrence that can be used in developing and targeting effective injury-prevention strategies.

1.3 THE CANADIAN AGRICULTURAL INJURY SURVEILLANCE PROGRAM

The Canadian Agricultural Injury Surveillance Program (CAISP) is a national program that is funded by the Canadian Agricultural Safety Association (CASA). CAISP is a collaborative program run by organizations from across Canada. It is coordinated from a national office at Queen's University in Kingston, Ontario. The people and organizations that contribute to CAISP include researchers, government agencies and the agricultural industry.

The main purpose of CAISP is to collect and interpret information on agricultural injuries from across Canada. During the pilot phase of CAISP, national standards were developed for this process and representatives from each of the ten provinces were recruited. The CAISP fatality and hospitalization databases include data from all ten Canadian provinces.

1.4 OBJECTIVES OF CAISP

The objectives of CAISP are:

1. **To develop a coordinated system for the assembly of national agricultural injury surveillance data.** CAISP's fatality and hospitalized injury data are collected, compiled, and analyzed in a standard manner by all provinces.
2. **To ensure that the collected information is interpreted and communicated in forms that are useful to potential data users in the agricultural industry.** The CAISP collaborators are committed to ensuring that the data are disseminated in an appropriate and useful manner. Our primary audience is individuals within the agricultural industry who need to make informed decisions about safety programs and policy. Our reports represent one approach to making these data accessible to this audience. Other dissemination formats include articles in scientific journals, presentations at national conferences, our website at www.caisp.ca, and press releases.

1.5 USES OF CAISP DATA

CAISP has developed a surveillance system for Canada that describes the occurrence and patterns of agricultural injuries at a higher level of detail than was available previously. At both national and provincial levels, CAISP 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. CAISP data have also facilitated the post-implementation assessment of injury-prevention programs.

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

CAISP has provided baseline evidence to support several applied research projects. These projects include focused investigations aimed at the prevention of agricultural injuries in children and the elderly, studies of agricultural machinery injuries and their causes, and two studies examining the economic burden of agricultural injuries.

1.6 THE CHALLENGES OF INJURY CONTROL IN AGRICULTURE

In other industries, victims of occupational injuries are usually workers aged 18 to 65. Agricultural injuries are unique in that children under 15 and adults over 65 sustain significant numbers of severe work-related injuries. This is partly because farms and ranches are not only work sites, but also places where people of all ages live, play and participate in recreational activities. Also, children begin to work on farms and ranches at an early age and, unlike other industries, it is not uncommon for farmers and ranchers to work and operate tractors and other heavy equipment well into their 70s and 80s. Machine rollovers are the most frequent cause of fatal injuries in adults aged 60 and over.

The prevention of injuries in agricultural work settings is challenging because of the unique nature of the agricultural 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 agricultural workplaces have not benefited from modern industrial hygiene and safety practices. The composition of the agricultural workforce is also geographically diverse. This diversity adds to the difficulty in enforcement of safety standards. Also, there has traditionally been reliance upon voluntary rather than regulatory safety standards; however, the effectiveness of voluntary safety standards has not been well evaluated.

2 METHODS

2.1 FATAL AGRICULTURAL ROLLOVER INJURIES

2.1.1 Identification of Agricultural Rollover Fatalities

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

1. Potential sources of agricultural 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 agricultural 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 standard data abstraction forms (Appendix C) and a database program that has been developed centrally. Data abstraction is generally done on-site at the Provincial Chief Coroners' Offices by reading and abstracting the relevant information from coroners' files. Data are then sent to the national site for verification and analysis.

For this study, the following three categories of fatal agricultural machine rollovers were identified using the fatal injury circumstance descriptions:

Sideways rollover: *Death caused by a machine/vehicle rolling over onto its side and crushing the victim as it rolled.*

Backwards rollover: *Death caused by a machine rolling over backwards. (The front tires of the machine rotate around its rear axle by 90-180°).*

Unspecified rollover: *Death caused by a machine rolling over in an undetermined direction.*

These categories included rollovers involving Off Road Vehicles (ORVs), if the location of occurrence was a farm or ranch.

2.1.2 Other Key Definitions

Agricultural Fatalities: *CAISP defined an agricultural injury fatality as: 1) Any unintentional injury resulting in death that occurred during activities related to the operation of a farm (as defined below) or ranch and/or 2) Any unintentional injury resulting in death 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 deaths that occurred away from agricultural work locations if agricultural work was being done; e.g., transporting livestock or harvested*

crops on public highways. Deaths where victims were killed because a third party was engaged in agricultural work are also included. CAISP further sub-divided agricultural injury fatalities into two types: work-related agricultural fatalities and non work-related agricultural fatalities.

Work-Related Agricultural Fatalities: *Work-related agricultural fatalities are deaths that occurred during the course of agricultural work. This includes deaths that took place away from the farm or ranch if agricultural work was being done.*

Non Work-Related Agricultural Fatalities: *This category includes those deaths that, while occurring on a farm (as defined below) or ranch, or caused by some aspect of the agricultural environment, were not directly related to agricultural work. Examples of these fatalities include deaths on agricultural vehicles being used for recreational purposes.*

Study Population: *All persons who live, work on, or visit a Canadian farm (as defined below).*

Farm: *In the Census of Agriculture, Statistics Canada defined a farm as “any farm, ranch or other agricultural holding that produces at least one of the following agricultural 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.*

Other Inclusion/Exclusion Criteria: These rules are provided in Appendix A.

2.2 HOSPITALIZED AGRICULTURAL INJURIES

2.2.1 Basic Hospital Separation Data

Hospital separation data are obtained by CAISP collaborators through agreements with their provincial Departments of Health. Agricultural machinery-related injuries are identified using a systematic computer search of these hospital separation databases. Cases are considered for inclusion if the location of injury occurrence is a farm or ranch, or if the external cause of injury code (International Classification of Diseases – version 9, World Health Organization E-code) is E919.0: *Accidents Caused by Agricultural Machines.*

2.2.2 Enhanced Hospital Data

The patient identifier and institution code in the basic hospital separation data set are used to identify individual cases and the institutions to which they were admitted. The Chief Executive Officer (or equivalent) from each hospital or health district is approached for permission to request chart data from his/her medical records department. Once permission is granted, information is requested using a mail survey format. A standardized data abstraction form (Appendix C) for each case is mailed to the medical records personnel at the appropriate institution. Medical records personnel abstract specific information from the individual patient charts. Regular mail and telephone follow-ups are conducted following the initial mailing in order to ensure a very high response rate.

The information from the computerized hospital record, combined with that obtained from the mail survey abstraction form, constitutes the enhanced CAISP data set. This data set includes variables in addition to those in the basic data set that can be used to better describe injury patterns. For instance, there is information describing what happened to cause each of the injuries, and whether a tractor or other agricultural machine was involved.

For this study, the following categories of hospitalized agricultural machine rollovers were identified using the injury circumstance descriptions:

Sideways rollover: *Hospitalized injury caused by a machine/vehicle rolling over onto its side and crushing the victim as it rolled.*

Backwards rollover: *Hospitalized injury caused by a machine rolling over backwards. (The front tires of the machine rotate around its rear axle by 90-180°).*

Unspecified rollover: *Hospitalized injury caused by a machine rolling over in an undetermined direction.*

These categories included rollovers involving Off Road Vehicles (ORVs), if the location of occurrence was a farm or ranch.

Please see Appendix B for more detailed definitions.

2.3 CONFIDENTIALITY AND CAISP DATA

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

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

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

2.4 ANALYSIS

2.4.1 APPROACH TO ANALYSIS

The analysis presented in this report is descriptive. It has three main objectives: 1) to describe the magnitude of the agricultural rollover injury problem in Canada; 2) to describe trends in the causes and occurrence of fatal and hospitalized agricultural rollover injuries in Canada; and 3) to identify emerging patterns of rollover injuries.

The basic approach to the analysis was to summarize, in a simple manner, risks, trends and other patterns among fatal and hospitalized rollover injuries. Where possible, these patterns were represented in bar charts. The statistics used include simple counts and frequencies as well as cross-tabulations. Where appropriate, injury rates were calculated. Formal hypothesis-testing methods were not employed in comparisons.

2.4.2 Use of Calendar Versus Fiscal Year

Fatalities are reported on a calendar year basis. Records of hospitalization data are kept according to fiscal years (April 1 to March 31). For this reason, hospitalization data have been analyzed and reported on a fiscal year basis.

2.4.3 Length of Stay Analyses

For hospitalized cases, readmissions to hospital, transfer cases, and cases treated in rehabilitation hospitals are excluded from the hospitalized injury database. This was done in order to avoid the “double counting” of injury events. A value for the total length of stay variable was calculated for each case. This variable includes all days in hospital for the treatment of the same injury and takes into account all reported days in hospital for transfers and re-admissions.

2.4.4 Rates

Selected rates of agricultural rollover injuries are presented in this report. The numerators used in calculating these rates are the numbers of agricultural rollover injury fatalities or hospitalizations for particular age categories. These include injuries to farm residents, agricultural workers and a small number of visitors to the farms. Denominators for these rates are taken from the 1996 Canada Census of Agriculture. The 1996 census data were used in the denominators for rate calculations because they were collected roughly halfway through the surveillance period.

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 agricultural work and associated hazards. Also, the Canada Census of Agriculture excludes visitors to farms (as defined by Statistics Canada) and some agricultural workers, but it includes all farm residents, some of whom have relatively little exposure to agricultural work hazards. The accuracy of agriculture census information may vary among provinces, but is the best source of denominator information available at this time.

3 AGRICULTURAL ROLLOVER FATALITIES: OVERVIEW

3.1 AGE GROUP

There were 270 agricultural rollover deaths during the surveillance period, 93% of these fatalities were work related.

The highest number of agricultural rollover fatalities occurred in adults aged 60-69.

The highest rate of rollover deaths was in the oldest age group. Adults aged 80 and over comprised only 1% of the farm population, but were involved in 5.9% of the rollover fatalities.

TABLE 3.1 Fatal agricultural rollovers by age group, 1990-2000

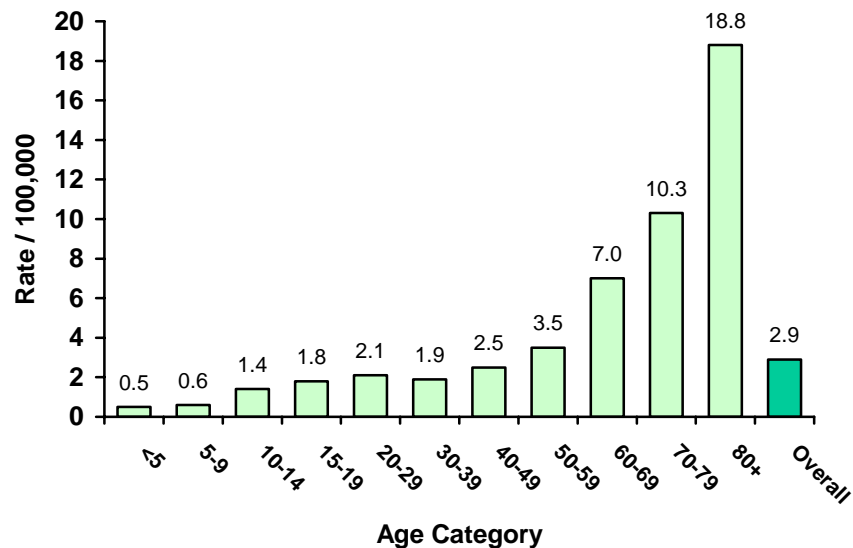
Age Group (Years)	Deaths		Farm Population*		Crude Rate Per 100,000/yr
	No.	%	No.	%	
<5	3	1.1	52,125	6.1	0.5
5 - 9	5	1.9	71,035	8.3	0.6
10 - 14	13	4.8	84,025	9.9	1.4
15 - 19	16	5.9	80,455	9.4	1.8
20 - 29	19	7.0	80,775	9.5	2.1
30 - 39	25	9.3	121,230	14.2	1.9
40 - 49	38	14.1	139,425	16.4	2.5
50 - 59	43	15.9	110,135	12.9	3.5
60 - 69	57	21.1	73,620	8.6	7.0
70 - 79	35	13.0	30,825	3.6	10.3
80 ⁺	16	5.9	7,755	1.0	18.8
Total	270	100.0	851,405	100.0	2.9

* Statistics Canada, Census of Agriculture, 1996

3.2 ROLLOVER RATE BY AGE GROUP

Adults aged 80 and over had a rollover fatality rate of 18.8/100,000/year, which was far higher than the fatality rates for younger adults. Children under 10 had the lowest rollover fatality rates.

FIGURE 3.1 Age-specific fatal agricultural rollover rates in Canada, 1990-2000

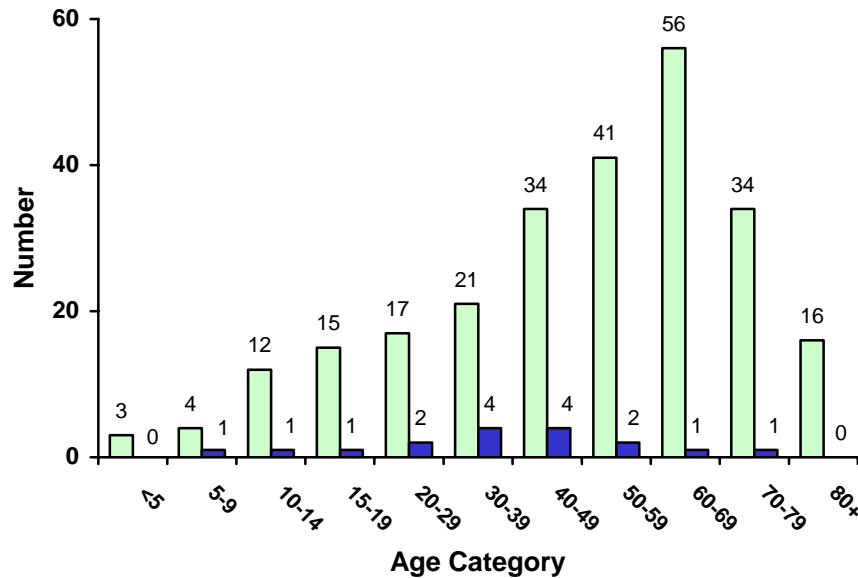


3.3 AGE AND GENDER

93.7% of the persons killed in fatal agricultural rollovers were male. No females were killed in either the oldest or youngest age groups.

Only 7.8% of fatal rollovers involved children aged 14 and under, whereas 40% of the victims were over 59 years old.

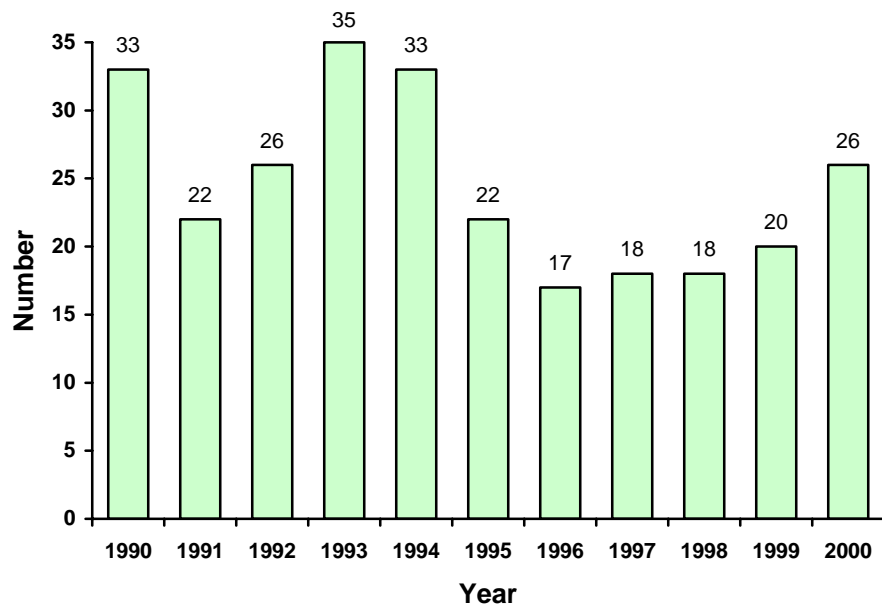
FIGURE 3.2 Number of fatal agricultural rollovers by age and gender, 1990-2000



3.4 FATALITIES BY YEAR

Over the surveillance period, there was an average of 24.5 agricultural rollovers per year. There was no clear trend in the annual number of agricultural rollovers.

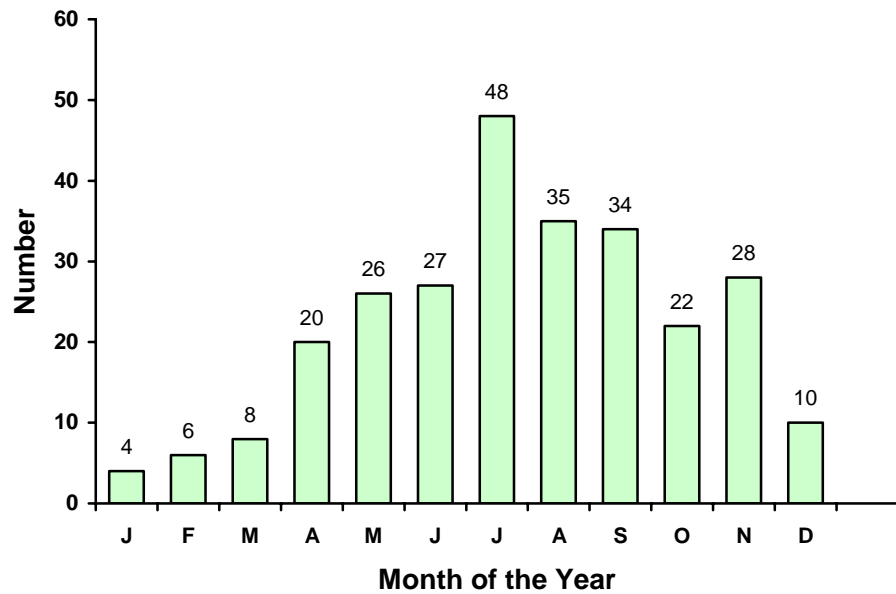
FIGURE 3.3 Fatal agricultural rollovers by year, 1990-2000



3.5 FATALITIES BY MONTH

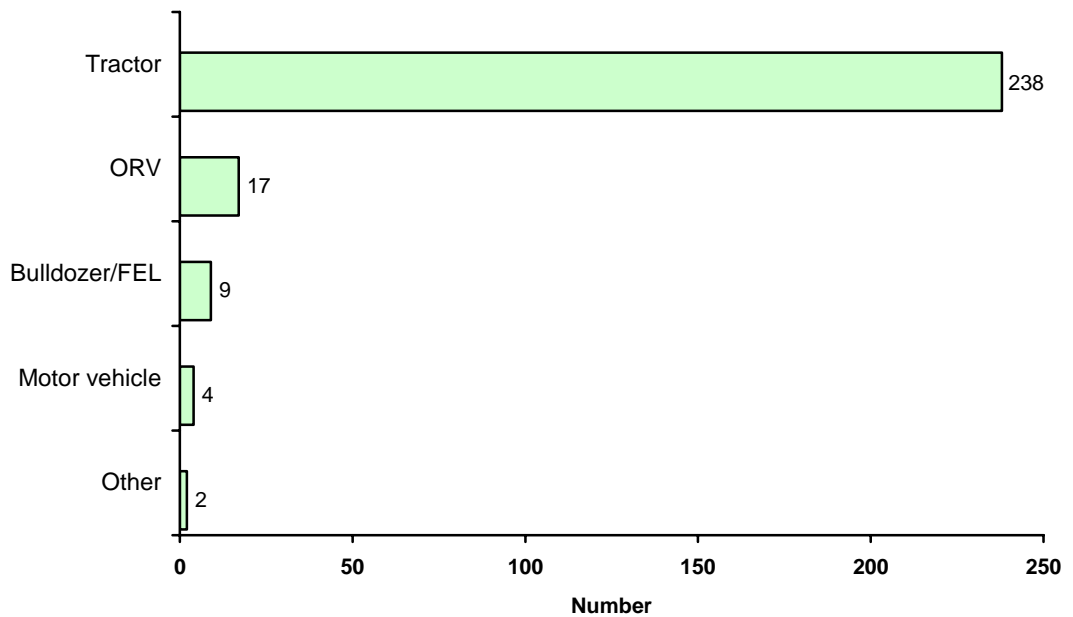
There was a clear seasonal trend in rollover fatalities. 88.9% of fatal rollovers occurred in the months associated with active farming and wood harvesting, from April to November.

FIGURE 3.4 Fatal agricultural rollovers by month of the year, 1990-2000



3.6 FATALITIES BY MACHINE TYPE

FIGURE 3.5 Fatal agricultural rollovers by machine type, 1990-2000

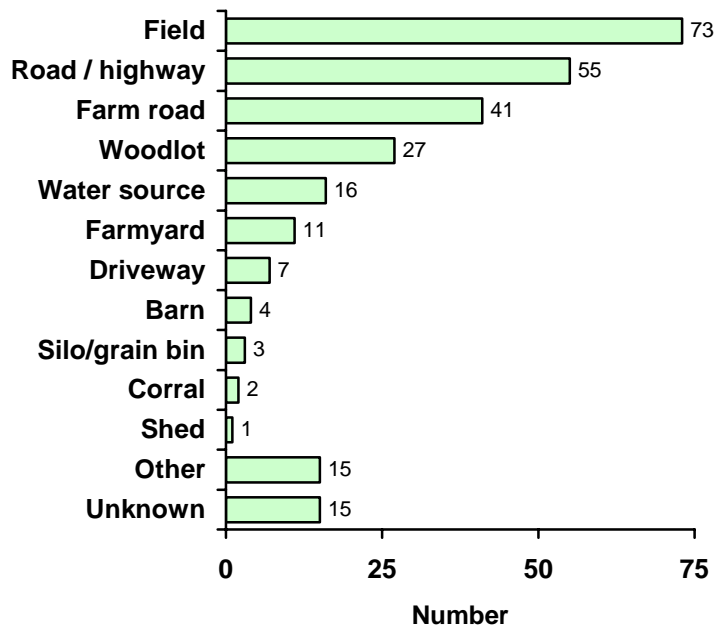


Tractors were involved in 88.1% of all rollovers. The next most common machine type was off road vehicles (6.3%).

3.7 FATALITIES BY LOCATION

The most frequent five locations for fatal rollovers were fields (27%), public roads ((20.4%), farm roads (15.2%), woodlots (10%) and water sources (5.9%). From the circumstance text it was apparent that most rollovers in field and road locations occurred in ditches.

FIGURE 3.6 Fatal agricultural rollovers by location of injury event, 1990-2000



3.8 TYPE OF ROLLOVER EVENT

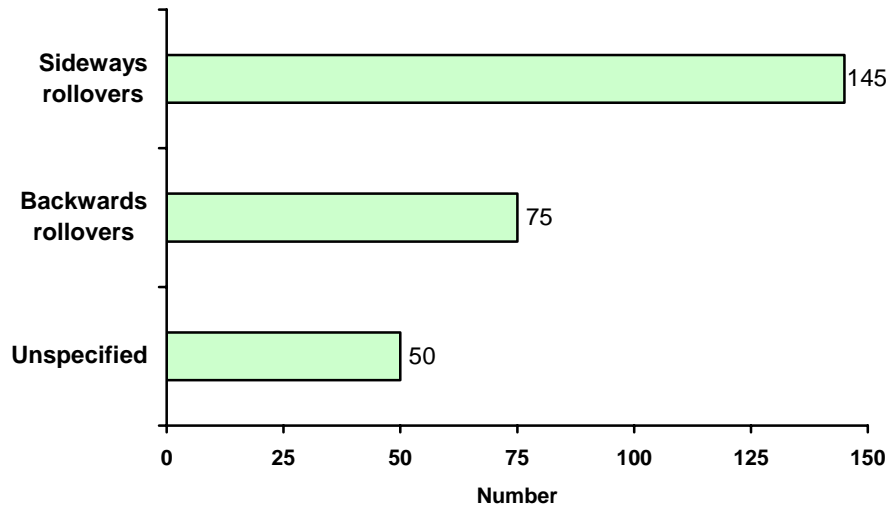
TABLE 3.2 Fatal agricultural rollover fatalities by age group and rollover type*, 1990-2000

Cause of Injury	0 – 14 years		15 – 59 years		60 + years		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Sideways rollover	8	40.0	78	54.9	59	54.6	145	53.7
Backwards rollover	5	25.0	38	26.8	32	29.6	75	27.8
Unspecified rollover	7	35.0	26	18.3	17	15.7	50	18.5
TOTAL	20	100.0	142	100.0	108	100.0	270	100.0

For all three age groups, sideways rollovers were the most common rollover type (53.7%). Backwards rollovers comprised 27.8% of all fatal rollovers. 18.5% of rollovers could not be classified. Analyses of sideways and backwards rollovers are presented in Chapter 9.

*Rollover types are defined in Chapter 2.

FIGURE 3.7 Agricultural rollover fatalities by type of rollover event, 1990-2000



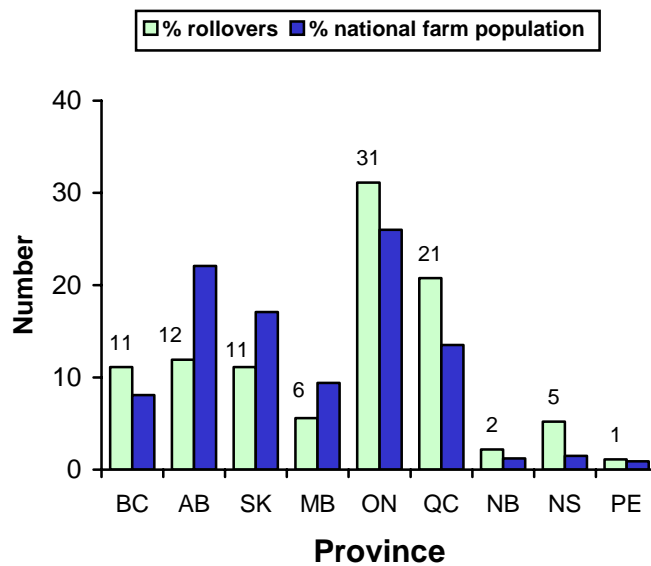
Sideways rollovers were 1.9 times more frequent than backwards rollovers.

3.8 FATALITIES BY PROVINCE

Ontario (31.1%) and Quebec (20.7%) had the highest percentages of fatal agricultural rollovers during the surveillance period.

The percentage of fatal rollovers that occurred in BC, Ontario, Quebec, New Brunswick and Nova Scotia had rollover exceeded their proportion of the national farm population.

FIGURE 3.6 Fatal agricultural rollovers by province, 1990-2000



4 AGRICULTURAL ROLLOVER FATALITIES: TRACTORS AND OTHER AGRICULTURAL MACHINES

4.1 AGE GROUP

There were 253 non-ORV agricultural rollover deaths during the surveillance period, 96.4% of these fatalities were work related.

The highest number of non-ORV rollover fatalities occurred in adults aged 60-69.

The highest rate of rollover deaths was in the oldest age group. Adults aged 80 and over comprised only 1% of the farm population, but were involved in 5.5% of the non ORV rollover fatalities.

4.2 ROLLOVER RATE BY AGE GROUP

Adults aged 80 and over had a non-ORV rollover fatality rate of 16.4/100,000/year, which was much higher than the fatality rates for younger adults. Children under 10 had the lowest non-ORV rollover fatality rates.

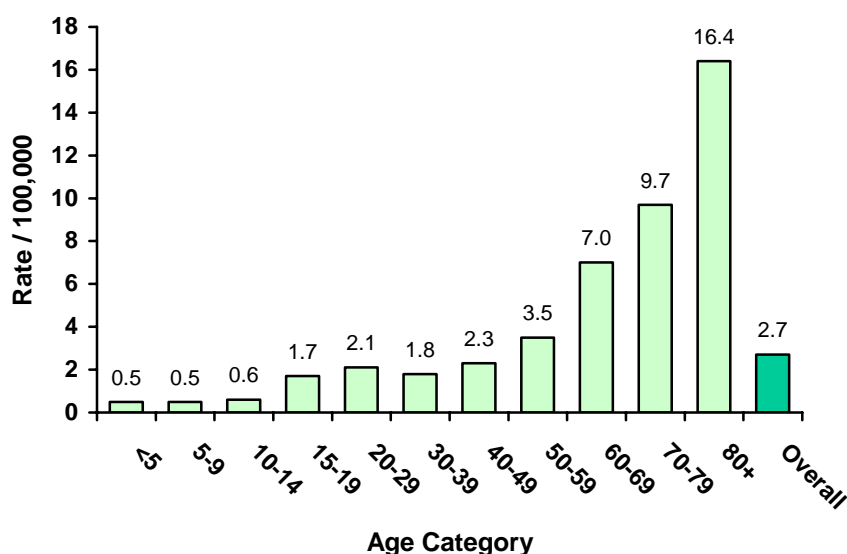
TABLE 4.1

Fatal agricultural tractor and non-ORV rollovers by age group, 1990-2000

Age Group (Years)	Deaths		Farm Population*		Crude Rate Per 100,000/yr
	No.	%	No.	%	
<5	3	1.2	52,125	6.1	0.5
5 – 9	4	1.6	71,035	8.3	0.5
10 – 14	6	2.4	84,025	9.9	0.6
15 – 19	15	5.9	80,455	9.4	1.7
20 – 29	19	7.5	80,775	9.5	2.1
30 – 39	24	9.5	121,230	14.2	1.8
40 – 49	35	13.8	139,425	16.4	2.3
50 – 59	43	17.0	110,135	12.9	3.5
60 – 69	57	22.5	73,620	8.6	7.0
70 – 79	33	13.0	30,825	3.6	9.7
80 +	14	5.5	7,755	1.0	16.4
Total	253	100.0	851,405	100.0	2.7

* Statistics Canada, Census of Agriculture, 1996

FIGURE 4.1 Age-specific fatal agricultural tractor and non-ORV rollover rates in Canada, 1990-2000

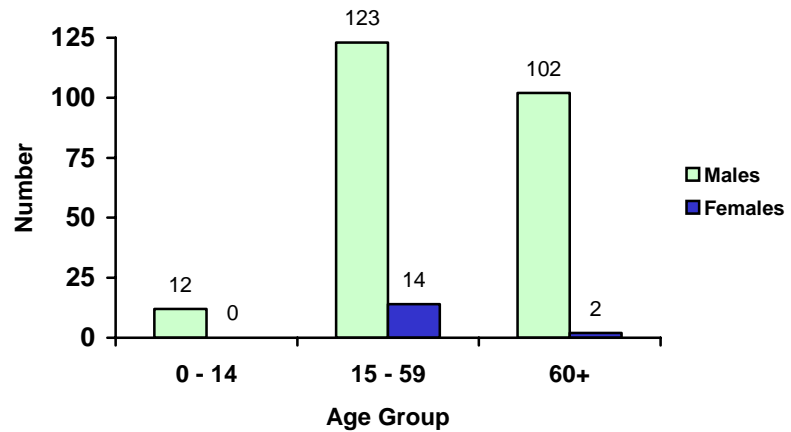


4.3 AGE AND GENDER

93.7% of those killed in non-ORV rollover events were male. No females under 15 were involved in fatal non-ORV rollovers.

Only 4.7% of fatal non-ORV rollovers involved children. 54.2% occurred in adults aged 15-59, and 41.1% involved adults aged 60 and over.

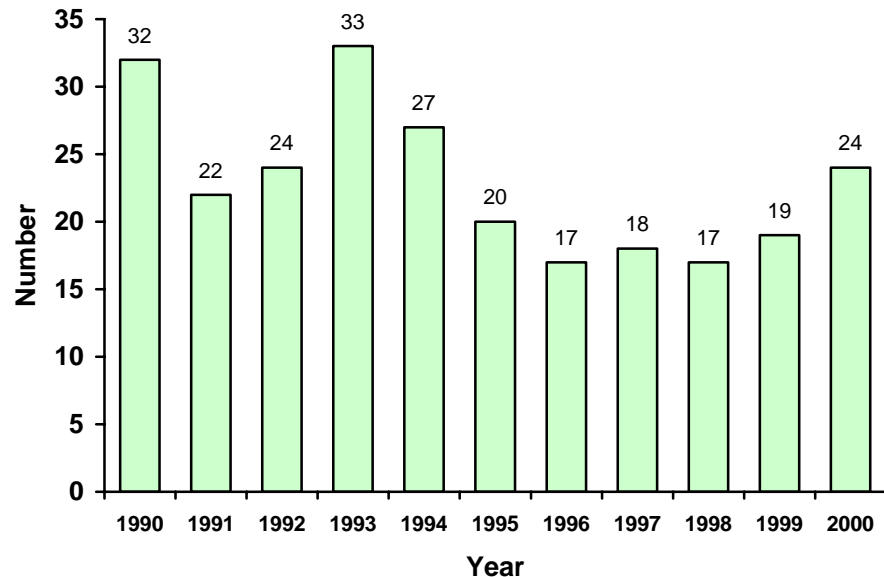
FIGURE 4.2 Fatal agricultural tractor and non-ORV rollovers by age and gender, 1990-2000



4.4 FATALITIES BY YEAR

There were an average of 23 fatal non-ORV rollovers per year during the surveillance period. There was no consistent pattern in the annual number of non-ORV rollovers.

FIGURE 4.3 Fatal agricultural tractor and non-ORV rollovers by year, 1990-2000

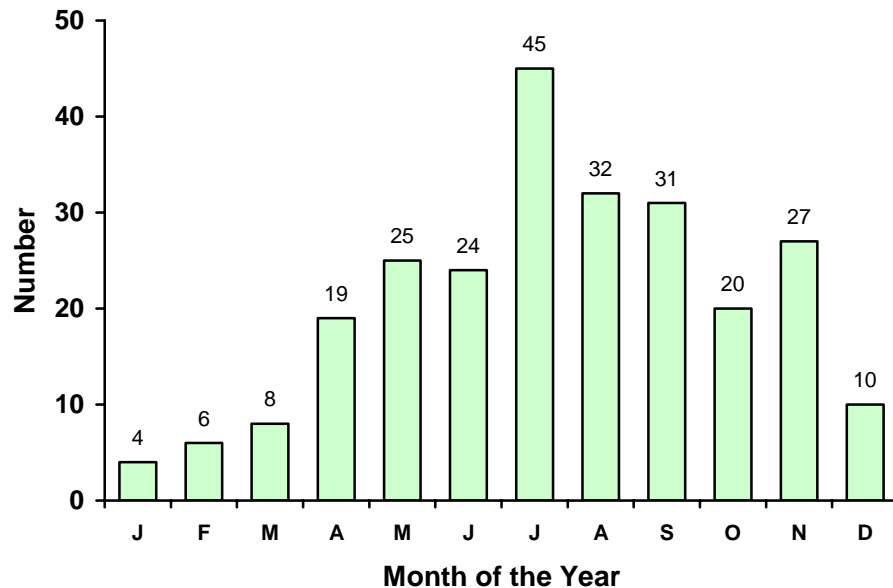


4.5 FATALITIES BY MONTH

There was a clear seasonal trend in non-ORV rollover fatalities. 88.2% of these rollovers occurred from April to November, in the months associated with active farming and wood harvesting.

The 27 fatal non-ORV rollovers that occurred in the month of November represented 96.4% of all fatal rollovers that occurred during that month.

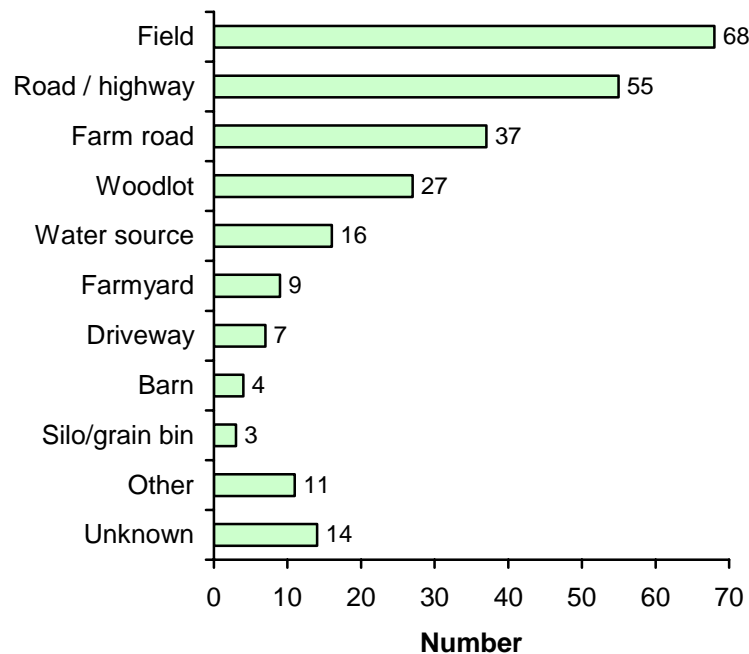
FIGURE 4.4 Fatal agricultural tractor and non-ORV rollovers by month of the year, 1990-2000



4.6 FATALITIES BY LOCATION

The five most common locations of occurrence for fatal non-ORV rollovers were fields (26.9%), public roads (21.7%), farm roads (14.6%), woodlots (10.7%), and water sources (6.3%). Most of the rollovers in field and road locations occurred in ditches.

FIGURE 4.5 Fatal agricultural tractor and non-ORV rollovers by location of injury event, 1990-2000



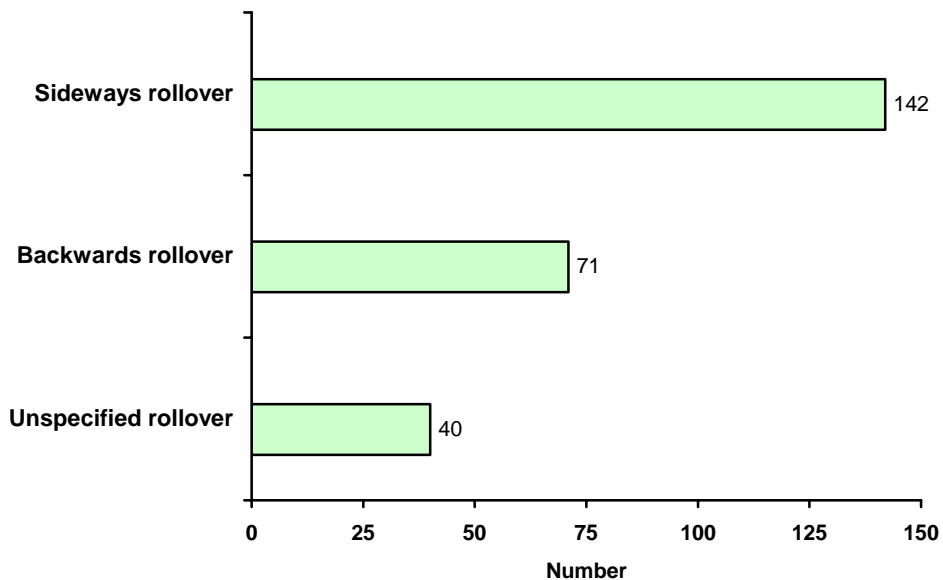
4.7 TYPE OF ROLLOVER EVENT

TABLE 4.2 Fatal agricultural tractor and non-ORV rollover fatalities by age group and rollover type, 1990-2000

Cause of Injury	0 – 14 years		15 – 59 years		60 + years		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Sideways rollover	6	50.0	78	56.9	58	55.8	142	56.1
Backwards rollover	4	33.3	36	26.3	31	29.8	71	28.1
Unspecified rollover	2	16.7	23	16.8	15	14.4	40	15.8
TOTAL	12	100.0	137	100.0	104	100.0	253	100.0

For all three age groups, sideways rollovers were the most common type of fatal non-ORV rollovers. In total, 56.1% of non-ORV rollovers were sideways and 28.1% were backwards.

FIGURE 4.6 Fatal agricultural tractor and non-ORV rollover fatalities by type of rollover event, 1990-2000



During the surveillance period, there were twice as many fatal non-ORV sideways rollovers as there were backwards rollovers.

5 AGRICULTURAL ROLLOVER FATALITIES: OFF-ROAD VEHICLES

5.1 AGE GROUP

Whereas only 4.7% of the victims of fatal non-ORV rollovers were children, 47.1% of those killed in fatal ORV rollovers were under 15 years old. 41.2% of all fatal ORV rollovers were work related, but in children, only 12.5% were work related.

88.2% of the ORV rollovers involved All Terrain Vehicles (ATVs), including five 4-wheeled ATVs.

TABLE 5.1 Fatal agricultural off-road vehicle rollovers by age group, 1990-2000

Age Group (Years)	Deaths		Farm Population*		Crude Rate Per 100,000/yr
	No.	%	No.	%	
<15	8	47.1	207,185	24.3	0.4
15 - 59	5	29.4	532,020	62.5	0.1
60+	4	23.5	112,200	13.2	0.3
Total	17	100	851,405	100.0	0.2

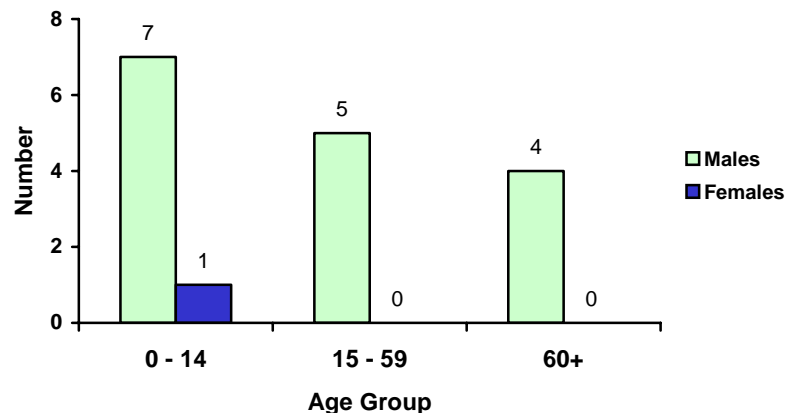
*Statistics Canada, Census of Agriculture, 1996

5.2 AGE AND GENDER

Only one female (a child) was involved in a fatal ORV rollover.

29.4% of the ORV rollover victims were adults aged 15-59 and 23.5% were adults aged 60+.

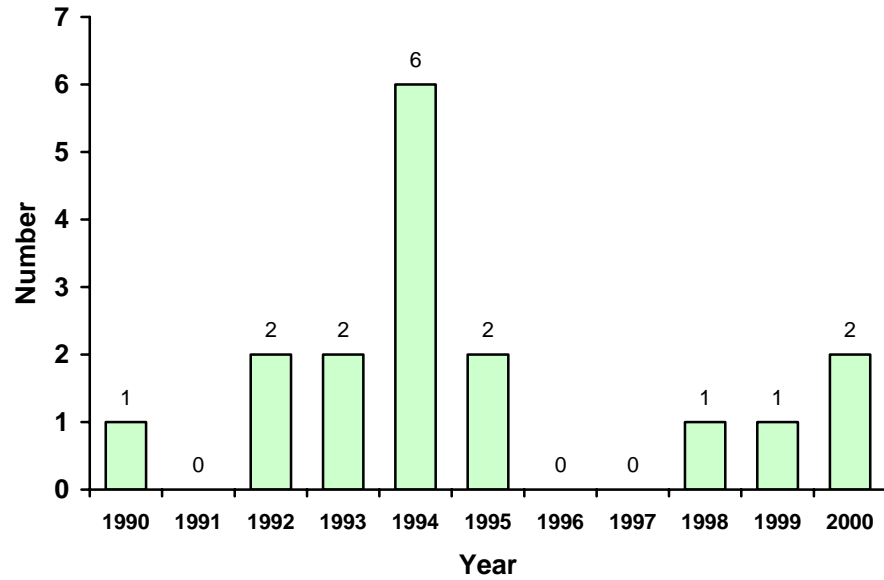
FIGURE 5.1 Fatal agricultural off-road vehicle rollovers by age and gender, 1990-2000



5.3 FATALITIES BY YEAR

Over the surveillance period, the number of fatal ORV rollovers per year varied from 0 to 6, with an average of 1.5.

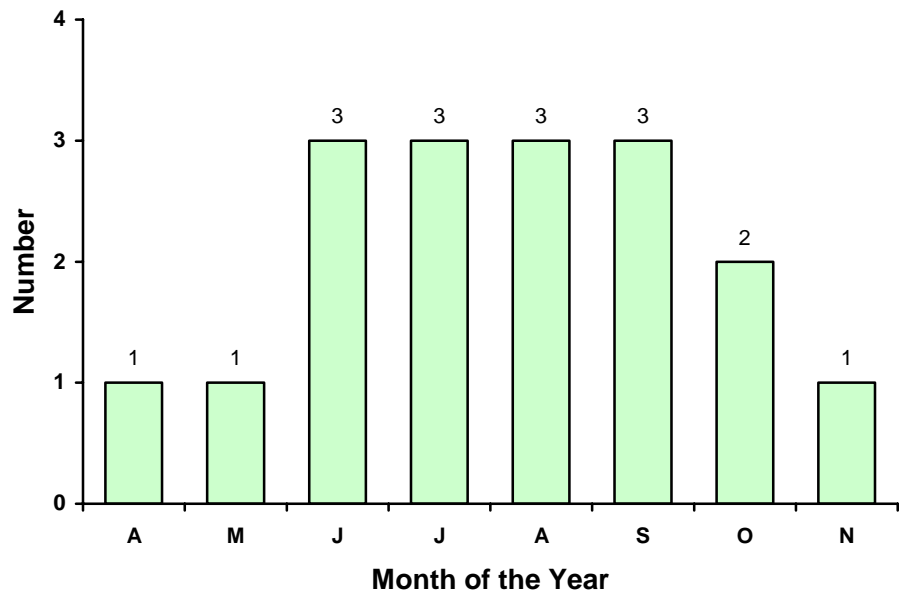
FIGURE 5.2 Fatal agricultural off-road vehicle rollovers by year, 1990-2000



5.4 FATALITIES BY MONTH

All fatal ORV rollovers occurred between April and November. 70.6% happened between June and September.

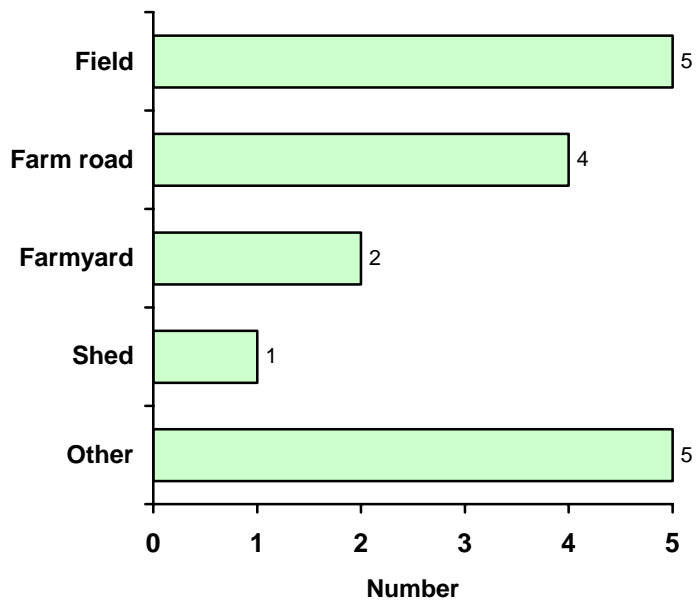
FIGURE 5.3 Fatal agricultural off-road vehicle rollovers by month of the year, 1990-2000



5.5 FATALITIES BY LOCATION

Most fatal ORV rollovers occurred in field and farm road locations. Other specified locations included two gravel pits, an embankment and a ravine.

FIGURE 5.4 Fatal agricultural off-road vehicle rollovers by location of injury event, 1990-2000



5.6 TYPE OF ROLLOVER EVENT

TABLE 5.2 Fatal agricultural off-road vehicle rollovers by age group and rollover type, 1990-2000

Cause of Injury	0 – 14 years		15 – 59 years		60 + years		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Sideways rollover	2	25.0	0	0	1	25.0	3	17.6
Backwards rollover	1	12.5	2	40.0	1	25.0	4	23.5
Unspecified rollover	5	62.5	3	60.0	2	50.0	10	58.8
TOTAL	8	100.0	5	100.0	4	100.0	17	100.0

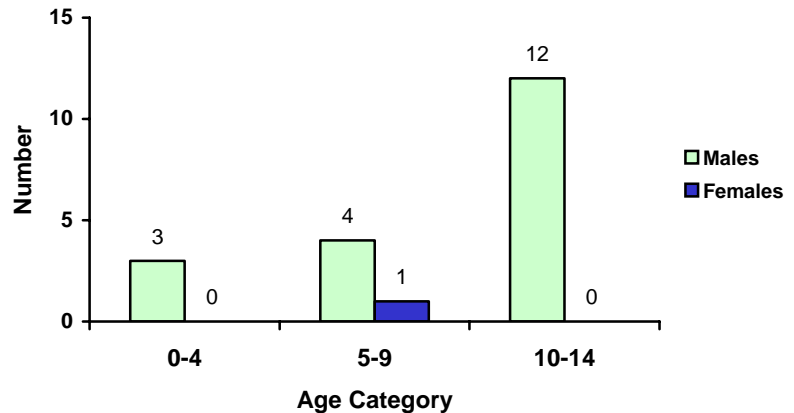
Unfortunately, in 58.8% of the cases, it was impossible to classify the type of ORV rollover. Of the seven that were classified, four were backwards and three sideways.

6 AGRICULTURAL ROLLOVER FATALITIES: CHILDREN UNDER 15

6.1 AGE AND GENDER

20 children under fifteen were killed in agricultural rollovers during the surveillance period. 95% of the children were male. The majority (60%) were aged 10-14.

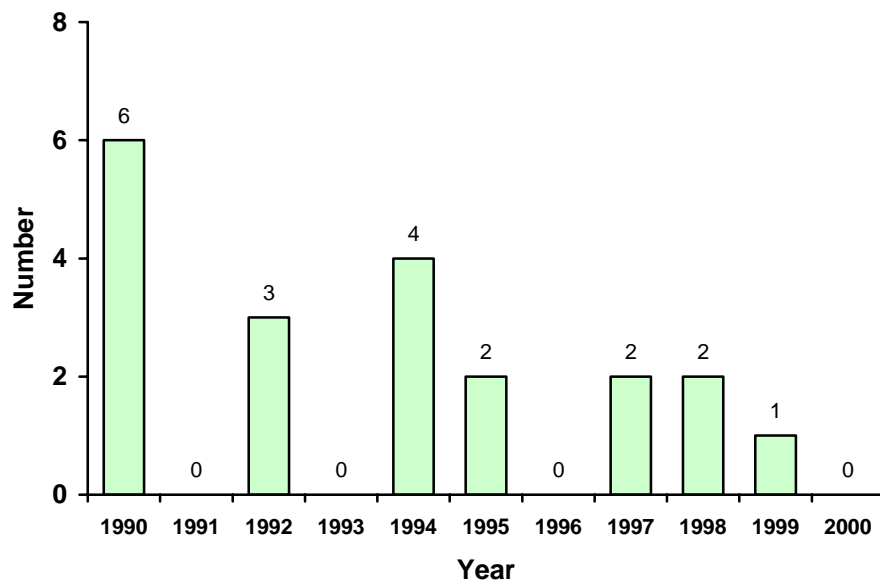
FIGURE 6.1 Fatal agricultural rollovers in children by age and gender, 1990-2000



6.2 FATALITIES BY YEAR

There was great variability in the number of children killed annually in fatal agricultural rollovers. The number of deaths per year ranged from 0 to 6. On average, 1.8 children per year were involved in fatal rollovers.

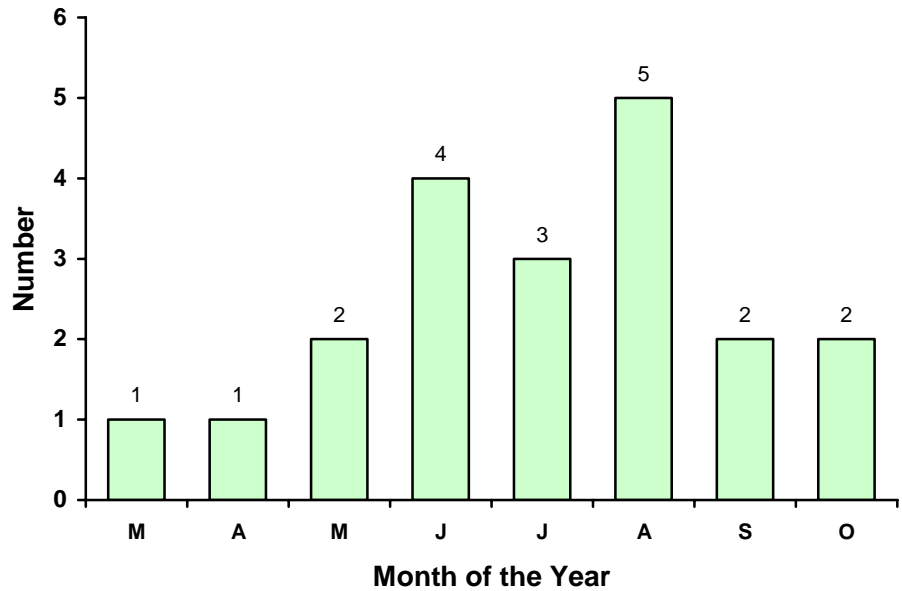
FIGURE 6.2 Fatal agricultural rollovers in children by year, 1990-2000



6.3 FATALITIES BY MONTH

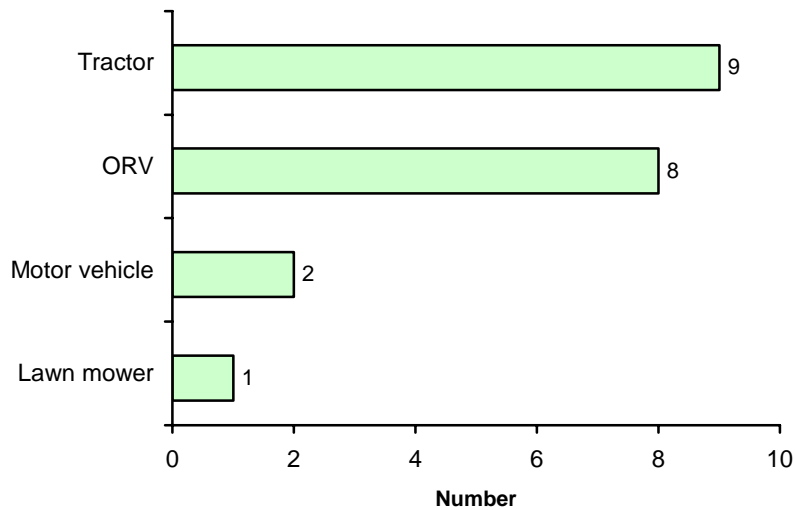
All fatal rollovers among children occurred from March to October, with 60% taking place from June to August.

FIGURE 6.3 Fatal agricultural rollovers in children by month of the year, 1990-2000



6.4 FATALITIES BY MACHINE TYPE

FIGURE 6.4 Fatal agricultural rollovers in children by machine type, 1990-2000

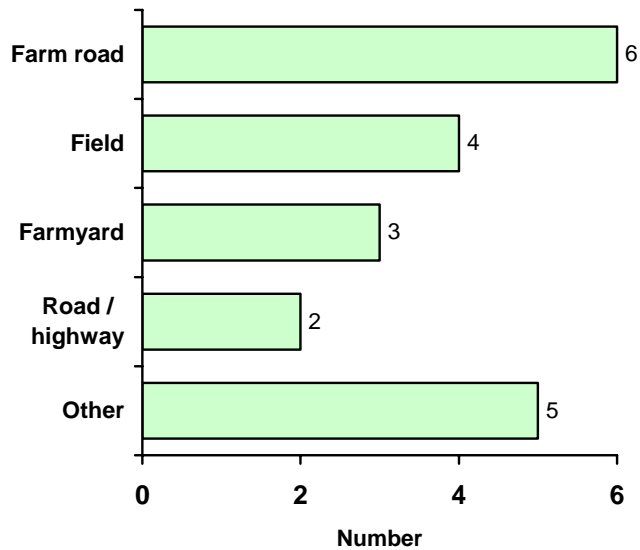


40% of the fatal rollovers in children involved ORVs, whereas 45% were tractor-related. This is a markedly different pattern than is seen in the older two age groups, where the vast majority of fatal rollovers involved tractors.

6.5 FATALITIES BY LOCATION

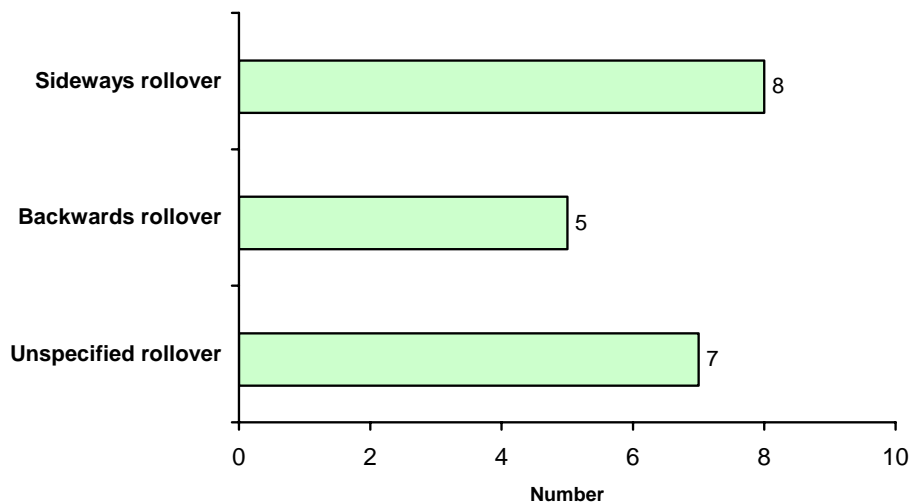
Fatal rollovers in children most commonly occurred in farm road (30%), field (20%), and farmyard (15%) locations. Other specified locations included gravel pits, an embankment and a ravine.

FIGURE 6.5 Fatal agricultural rollovers in children by location of injury event, 1990-2000



6.6 TYPE OF ROLLOVER EVENT

FIGURE 6.6 Fatal agricultural rollover fatalities in children by type of rollover event, 1990-2000



Many of the fatal rollovers in children involved ORVs. It is very difficult to determine rollover type from ORV rollover circumstance descriptions so 35% were unspecified. 40% were classified as sideways rollovers and 25% were backwards rollovers.

7 AGRICULTURAL ROLLOVER FATALITIES: ADULTS AGED 15-59

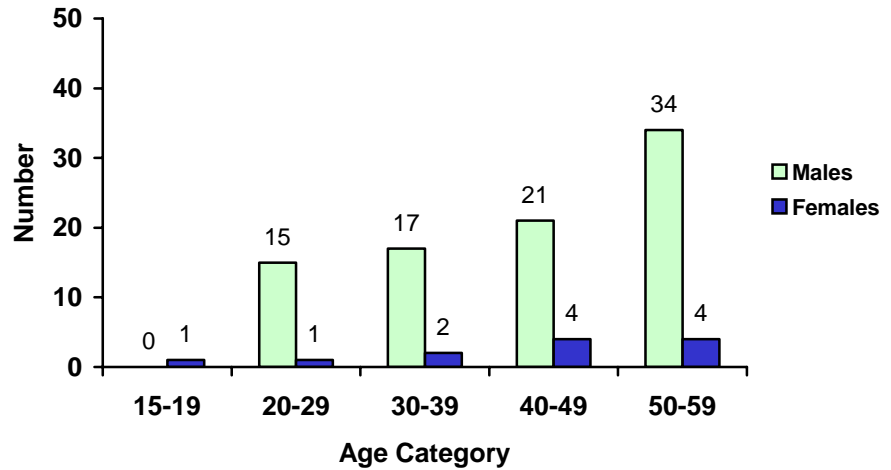
7.1 AGE AND GENDER

90.1% of the 142 adults aged 15-59 who were killed in fatal rollovers were male.

There was a definite trend towards increasing numbers of fatal rollovers with increasing age.

Only 0.7% of fatal rollovers in adults aged 15-59 occurred in persons under 20, whereas 30.3% of the victims of fatal rollovers were adults aged 50-59.

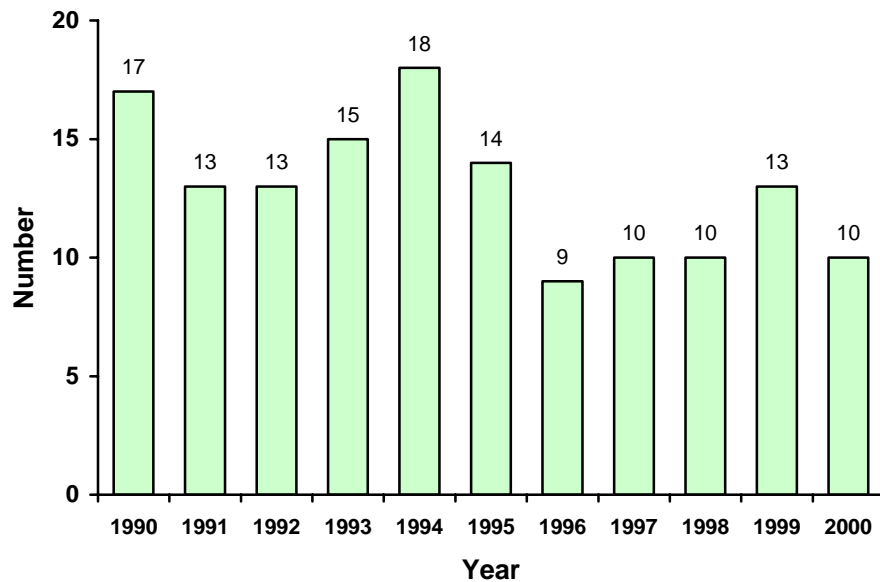
FIGURE 7.1 Fatal agricultural rollovers in adults aged 15-59 by age and gender, 1990-2000



7.2 FATALITIES BY YEAR

An average of 12.9 adults aged 15-59 were killed in rollovers each year during the surveillance period. Although there was no consistent trend, on average there were fewer rollover deaths during the last five years of the surveillance period.

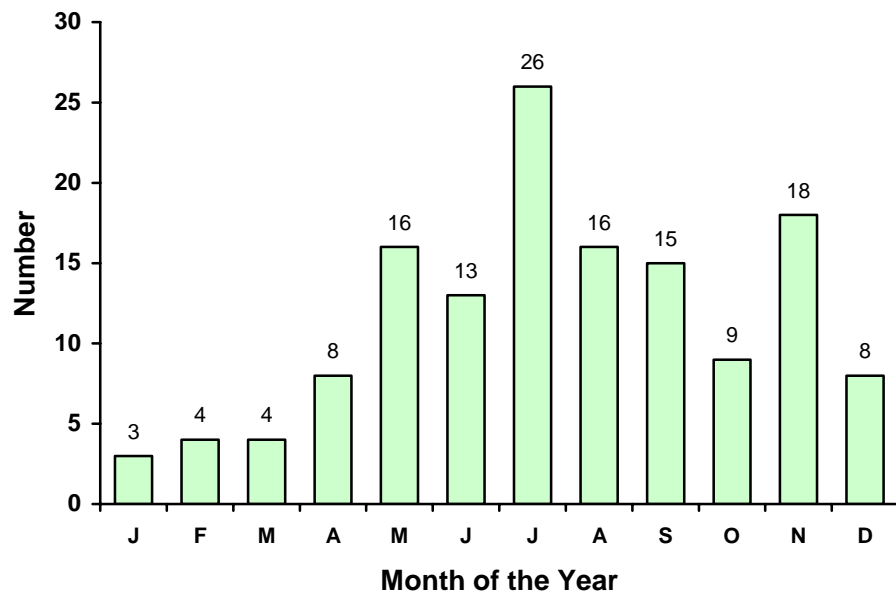
FIGURE 7.2 Fatal agricultural rollovers in adults 15-59 by year, 1990-2000



7.3 FATALITIES BY MONTH

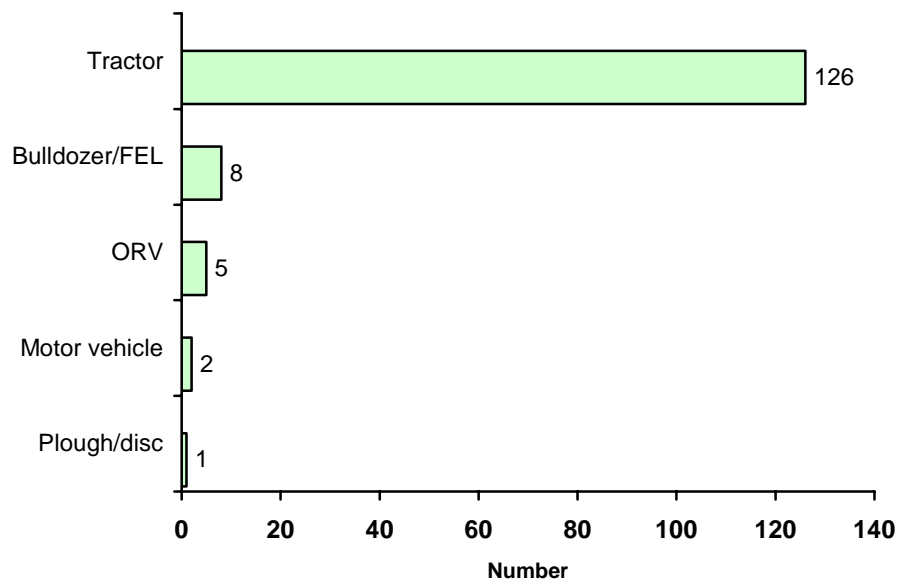
Unlike the pattern seen in the youngest age group, fatal rollovers in adults aged 15-59 occurred throughout the year. 79.7% of fatal rollovers among adults took place during the months of May to November. There was a late peak in rollover fatalities in November.

FIGURE 7.3 Fatal agricultural rollovers in adults 15-59 by month of the year, 1990-2000



7.4 FATALITIES BY MACHINE TYPE

FIGURE 7.4 Fatal agricultural rollovers in adults 15-59 by machine type, 1990-2000 (48 cases)

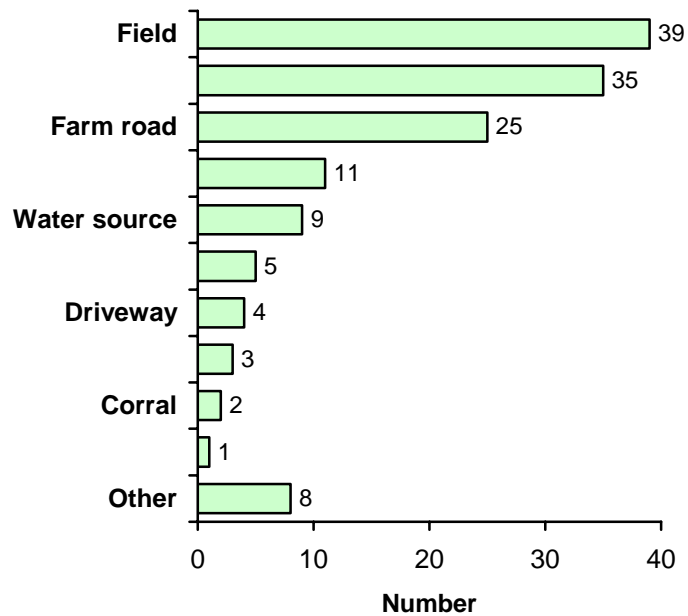


Unlike the child age group, where there was an almost equal number of tractor and ORV rollovers, the vast majority of fatal rollovers in adults aged 15-59 (88.7%) involved tractors, 5.6% occurred in bulldozers or FELs, and only 3.6% were ORV-related.

7.5 FATALITIES BY LOCATION

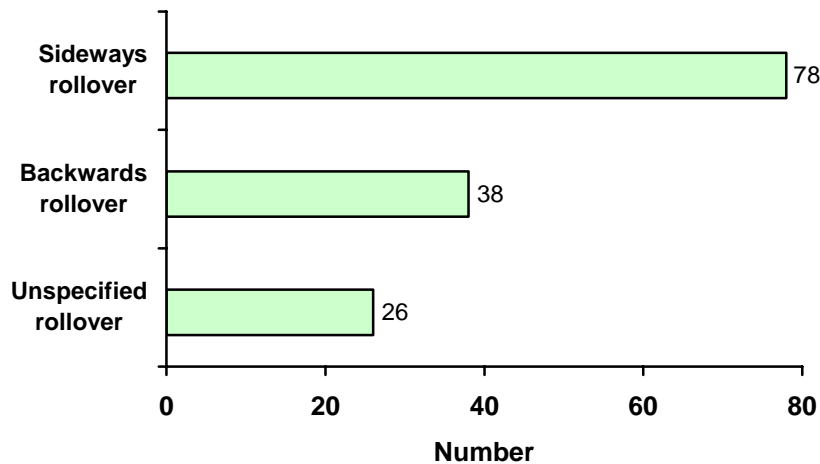
The most common five locations for fatal rollovers in adults aged 15-59 were fields (27.5%), public roads (24.6%), farm roads (17.6%), woodlots (7.7%), and water sources (6.3%). The rollovers in field and road locations mainly occurred in ditches.

FIGURE 7.5 Fatal agricultural rollovers in adults 15-59 by location of injury event, 1990-2000



7.6 TYPE OF ROLLOVER EVENT

FIGURE 7.6 Fatal agricultural rollovers in adults 15-59 by type of rollover event, 1990-2000



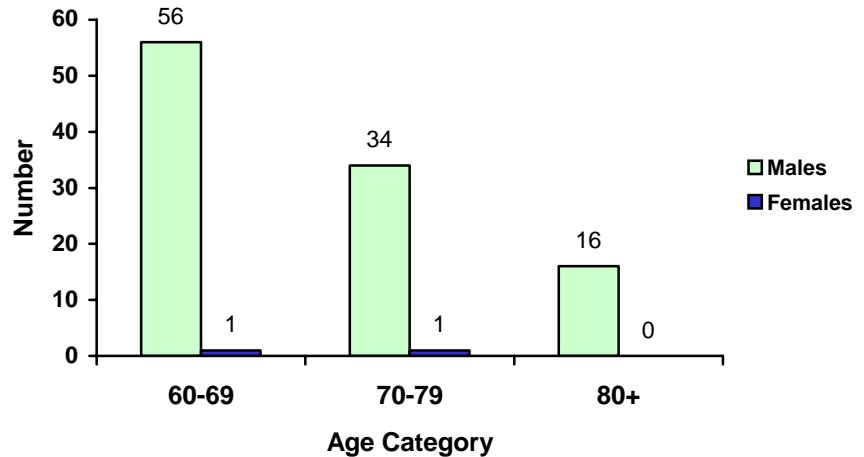
In adults aged 15-59, 54.9% of fatal rollovers were sideways, 26.8% were backwards and 18.3% were unspecified.

8 AGRICULTURAL ROLLOVER FATALITIES: SENIOR ADULTS AGED 60⁺

8.1 AGE AND GENDER

98.1% of the 108 adults aged 60⁺ killed in rollover events were male. 52.8% were in the 60-69 year age category.

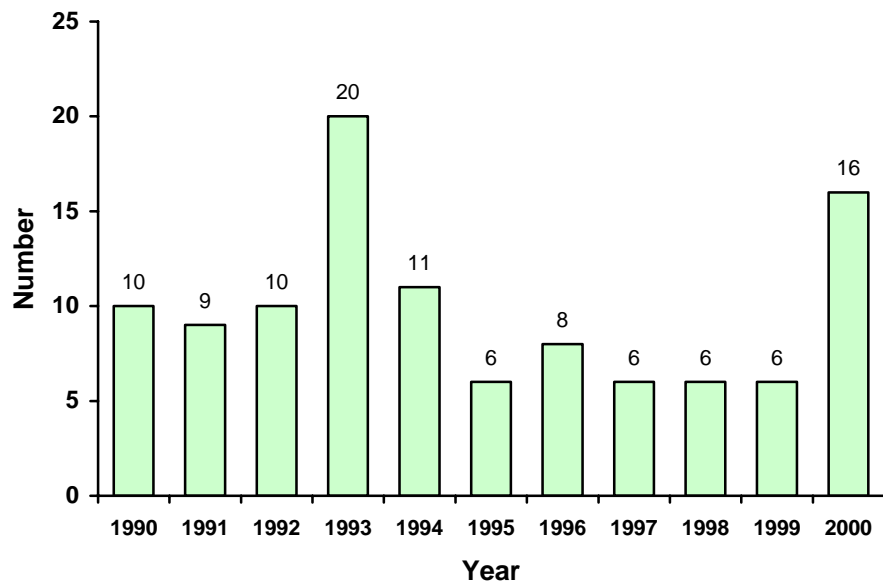
FIGURE 8.1 Fatal agricultural rollovers in senior adults by age and gender, 1990-2000



8.2 FATALITIES BY YEAR

There was great variability in the number of adults aged 60⁺ killed each year in fatal rollovers. The number of deaths per year ranged from 6 to 20. On average, 9.8 adults aged 60⁺ were involved in fatal rollovers annually during the surveillance period.

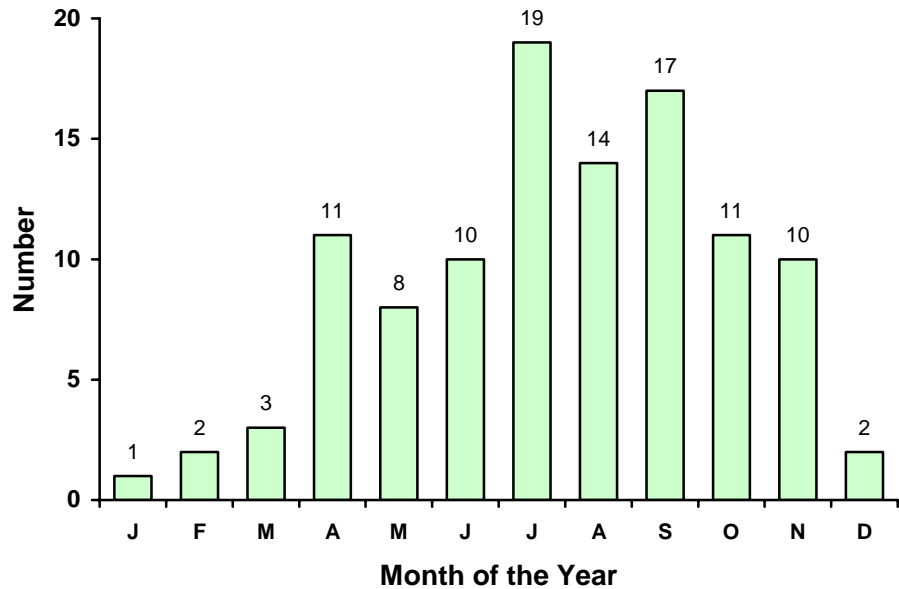
FIGURE 8.2 Fatal agricultural rollovers in senior adults by year, 1990-2000



8.3 FATALITIES BY MONTH

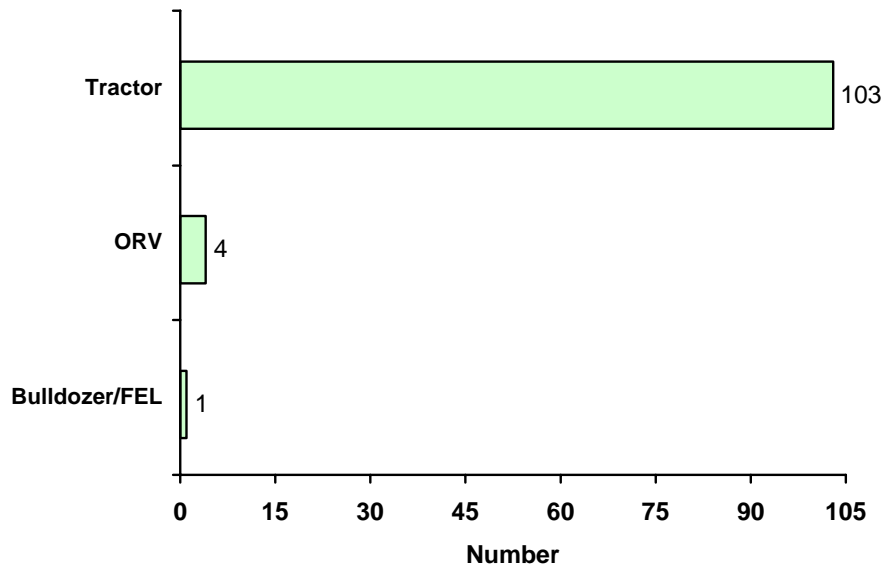
Compared with children and adults aged 15-59, adults aged 60+ were involved more frequently in fatal rollovers in the spring and fall. 92.7% of fatal rollovers in adults 60 and over occurred from April to November, with a peak in the summer months.

FIGURE 8.3 Fatal agricultural rollovers in senior adults by month of the year, 1990-2000



8.4 FATALITIES BY MACHINE TYPE

FIGURE 8.4 Fatal agricultural rollovers in senior adults by machine type, 1990-2000

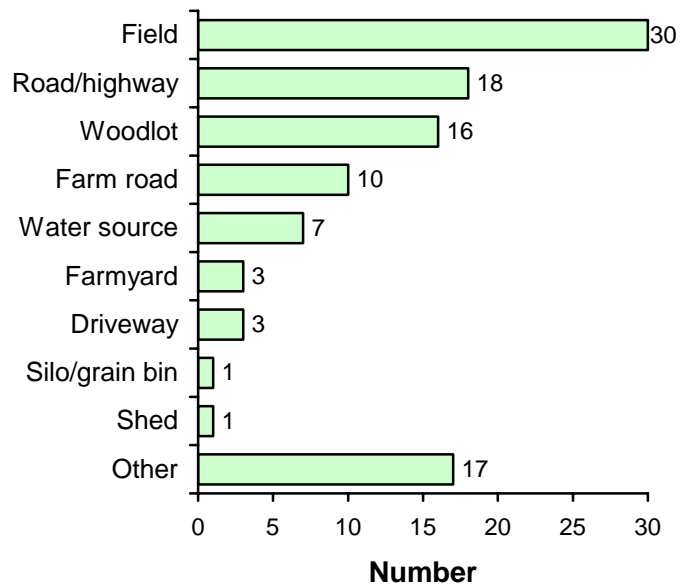


Tractors comprised 95.4% of the machines involved in fatal rollovers among persons aged 60+. The proportion of tractors involved in fatal rollovers among seniors was slightly higher than in adults aged 15-59 (88.7%), and much higher than in children (45%).

8.5 FATALITIES BY LOCATION

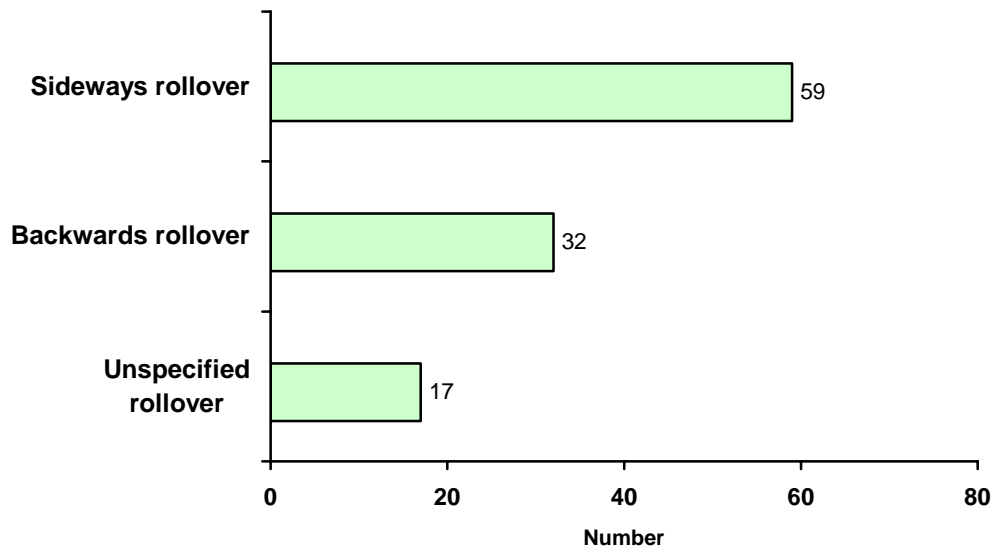
The most common locations for fatal rollovers among adults aged 60+ were fields (27.8%), public roads (16.7%), woodlots (14.8%), farm roads (9.3%), and water sources (6.5%). Most of the rollovers in field and road locations occurred in ditches.

FIGURE 8.5 Fatal agricultural rollovers in senior adults by location of injury event, 1990-2000



8.6 TYPE OF ROLLOVER EVENT

FIGURE 8.6



54.6% of the fatal rollovers among adults aged 60+ were sideways rollovers, 29.6% were backwards and 15.7% were in an unspecified direction.

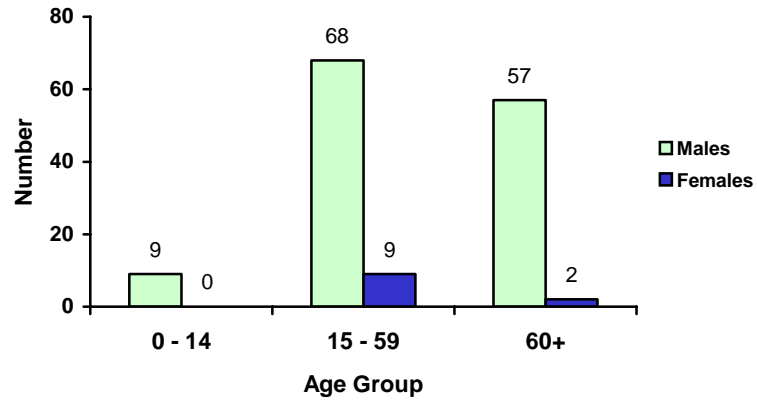
9 AGRICULTURAL ROLLOVER FATALITIES: TYPE OF ROLLOVER EVENT

9.1 SIDEWAYS ROLLOVERS

9.1.1 AGE AND GENDER

92.4% of the 145 persons killed in sideways rollovers were male. 53.1% of fatal sideways rollovers involved adults aged 15-59. No female children were involved in fatal sideways rollovers.

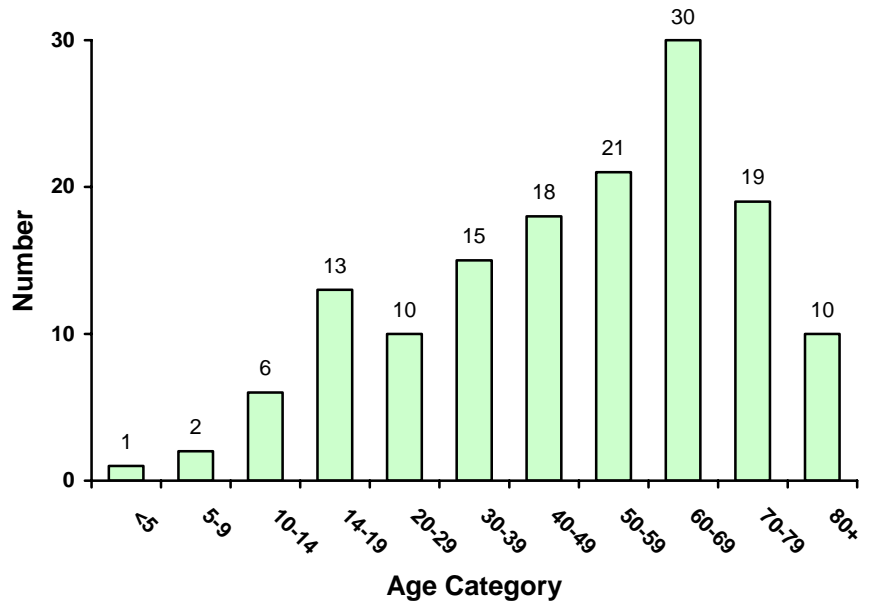
FIGURE 9.1.1 Fatal sideways rollovers by age and gender, 1990-2000



9.1.2 AGE CATEGORY

Fatal sideways rollovers were most common in adults aged 60 to 69. They were infrequent among children under 10.

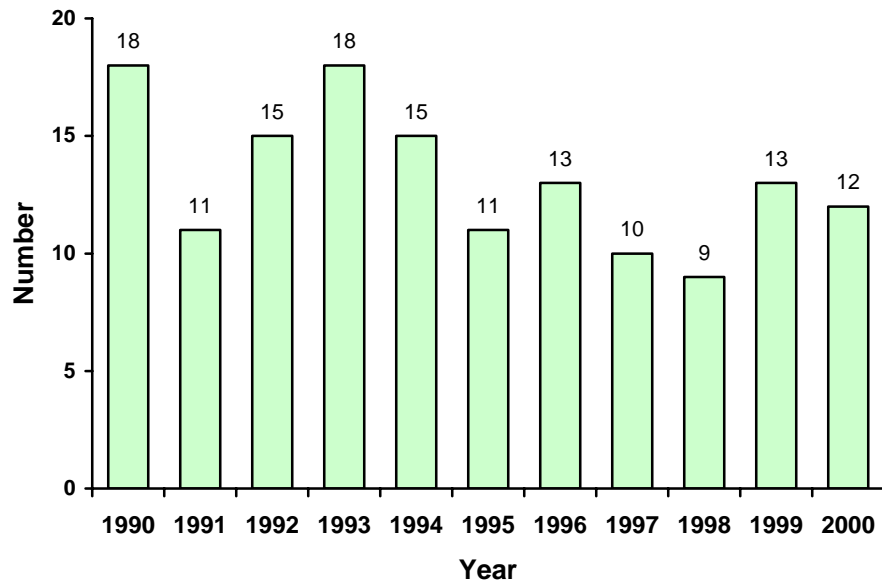
FIGURE 9.1.2 Fatal sideways rollovers by age category, 1990-2000



9.1.3 BY YEAR

On average, there were 13.2 fatal sideways rollovers per year during the surveillance period. There was no clear trend in the annual number of fatal sideways rollovers.

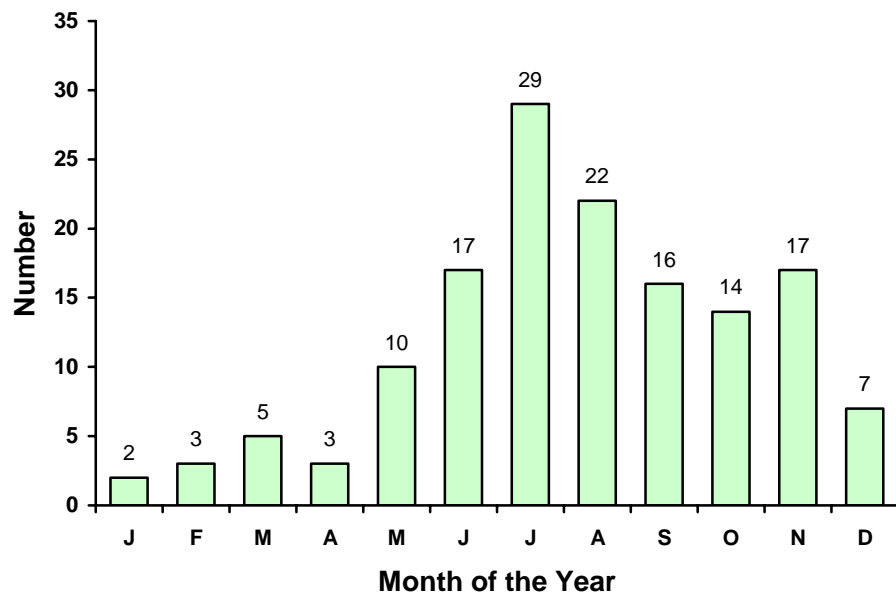
FIGURE 9.1.3 Fatal sideways rollovers by year, 1990-2000



9.1.4 BY MONTH

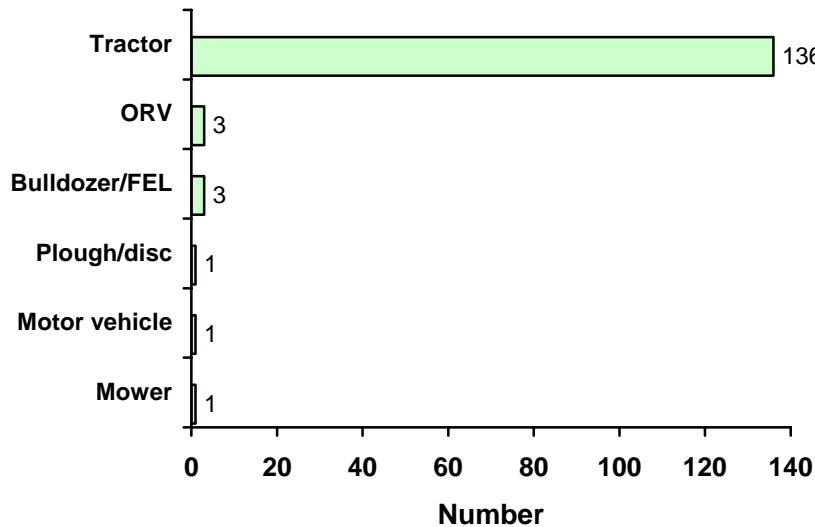
86.9% of fatal sideways rollovers occurred during the months of May to November.

FIGURE 9.1.4 Fatal sideways rollovers by month of the year, 1990-2000



9.1.5 BY MACHINE TYPE

FIGURE 9.1.5 Fatal sideways rollovers by machine type, 1990-2000

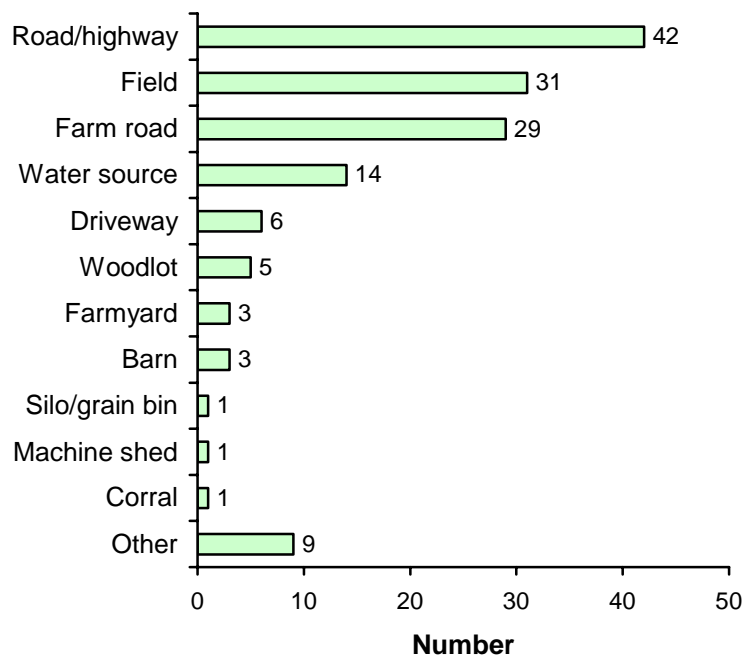


93.6% of fatal sideways rollovers involved tractors.

9.1.6 BY LOCATION

FIGURE 9.2.6 Fatal sideways rollovers by location of injury event 1990-2000

The most common locations for fatal sideways rollovers were public roads (29.0%), fields (21.4%), farm roads (20.0%), water sources (9.7%) and driveways (4.1%). 52.9% of the sideways rollovers in road and field locations occurred in ditches. 18.6% of all sideways rollovers involved hills or slopes.

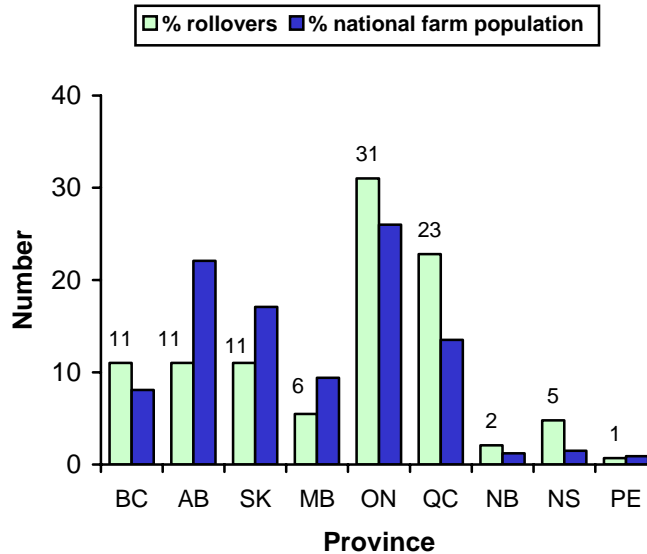


9.1.7 FATALITIES BY PROVINCE

Sideways rollovers took place most frequently in Ontario (31.0%) and Quebec (22.8%).

The percentage of fatal sideways rollovers that occurred in BC, Ontario, Quebec, New Brunswick and Nova Scotia exceeded their proportions of the national farm population.

FIGURE 3.6 Fatal agricultural sideways rollovers by province, 1990-2000

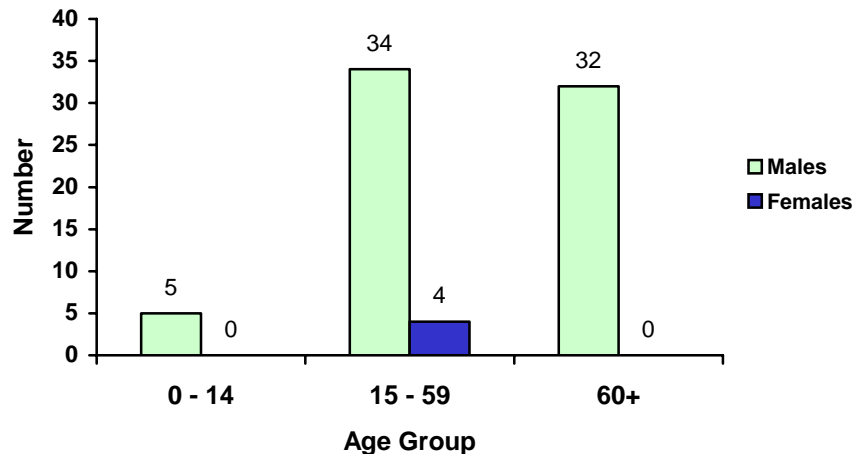


9.2 BACKWARDS ROLLOVERS

9.2.1 AGE AND GENDER

94.7 % of the 75 persons killed in backwards rollovers were male. 50.7% of the victims were aged 15-59. No female children were involved in fatal backwards rollovers.

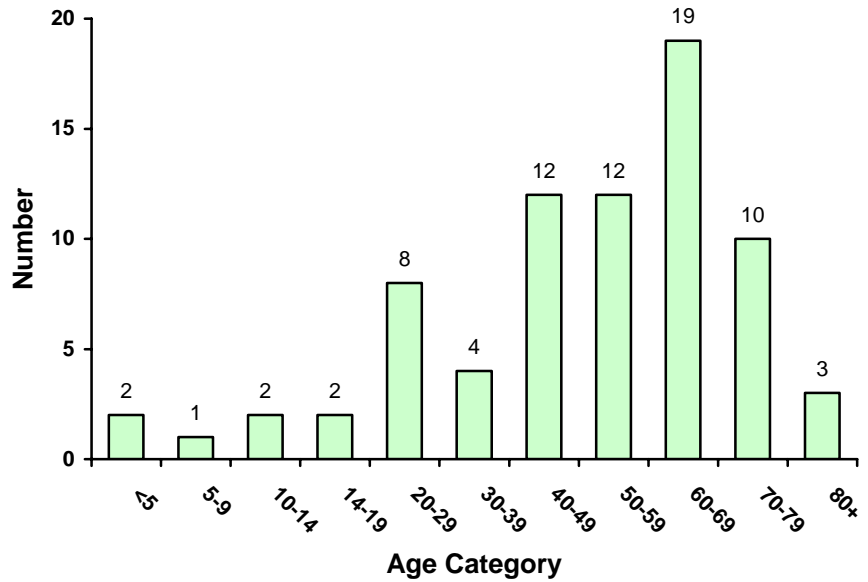
FIGURE 9.2.1 Fatal backwards rollovers by age and gender, 1990-2000



9.2.2 AGE CATEGORY

Fatal backwards rollovers were most frequent in persons aged 60-69. The number of backwards rollovers in that age category was 2.8 times the average number for all age categories.

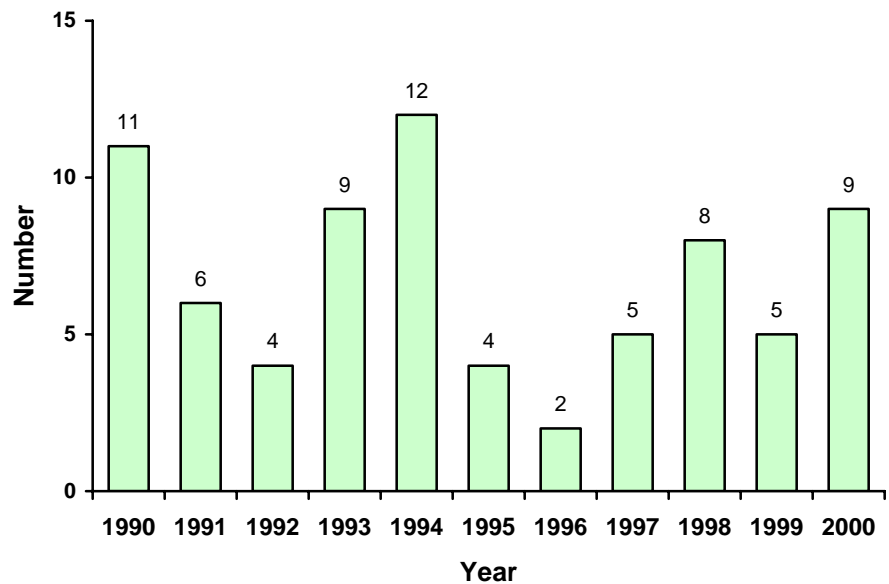
FIGURE 9.2.2 Fatal backwards rollovers by age category, 1990-2000



9.2.3 BY YEAR

The annual number of fatal backwards rollovers varied from 2 to 12. On average, there were 6.8 fatal backwards rollovers per year during the surveillance period. There was no clear trend in the annual number of fatal backwards rollovers.

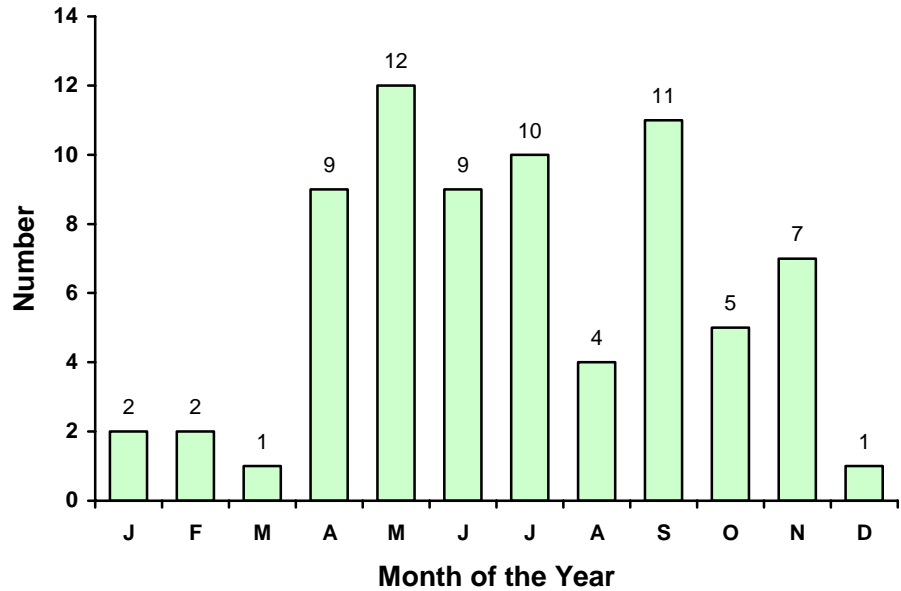
FIGURE 9.2.3 Fatal backwards rollovers by year, 1990-2000



9.2.4 BY MONTH

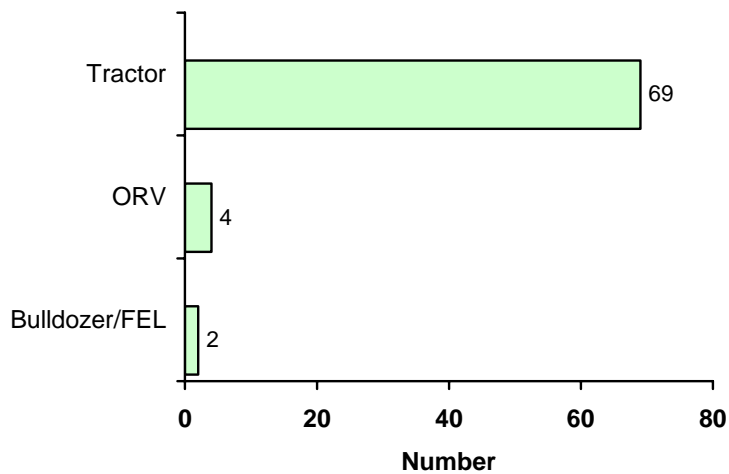
Fatal backwards rollovers occurred most frequently during the months of April to July (53.3%) and in September (14.7%). Only 8% of fatal backwards rollovers took place between December and March.

FIGURE 9.2.4 Fatal backwards rollovers by month of the year, 1990-2000



9.2.5 BY MACHINE TYPE

FIGURE 9.2.5 Fatal backwards rollovers by machine type, 1990-2000

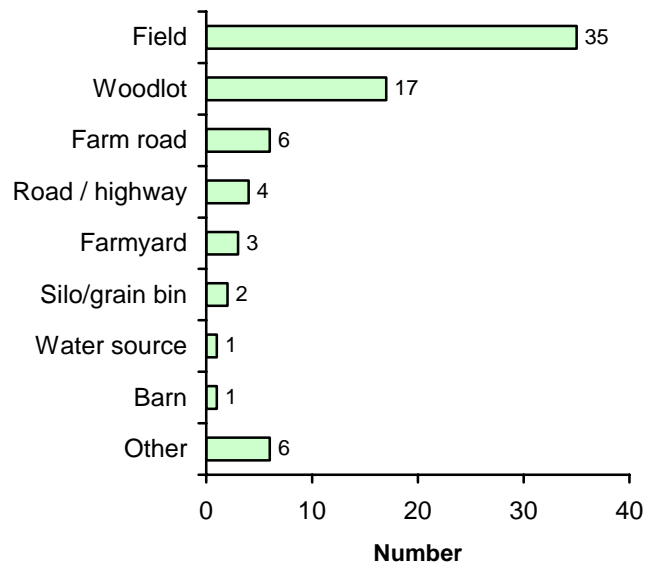


92% of fatal backwards rollovers involved tractors.

9.2.6 BY LOCATION

Fatal backwards rollovers were most common in fields (46.7%), woodlots (22.7%), farm roads (8.0%) and public roads (5.3%). 24% of these events involved wood harvesting activities. 54.7% involved towing, hauling or pulling objects, vehicles or trailers.

FIGURE 9.2.6 Fatal backwards rollovers by location of injury event 1990-2000

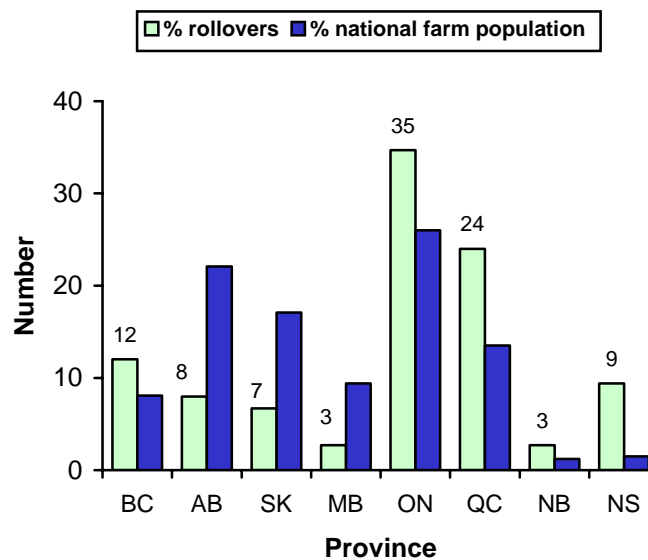


9.2.7 FATALITIES BY PROVINCE

Fatal backwards rollovers took place most frequently in Ontario (34.7%) and Quebec (24.0%).

The percentage of fatal backwards rollovers that occurred in BC, Ontario, Quebec, New Brunswick and Nova Scotia exceeded their proportion of the national farm population.

FIGURE 3.6 Fatal agricultural backwards rollovers by province, 1990-2000



10 AGRICULTURAL ROLLOVER HOSPITALIZATIONS: OVERVIEW

10.1 AGE GROUP

There were 339 hospitalized agricultural rollover injuries during the surveillance period. Adults aged 50 and over were over-represented as victims of hospitalized rollovers relative to their proportion of the farm population. Adults aged 70-79 were particularly likely to be injured. The percentage of adults aged 70-79 hospitalized because of agricultural rollovers was 4.3 times the percentage of adults that age in the general farm population. For fatalities, the highest rate of injury was among adults 80 and over. It may be that rollover events are more likely to cause death in elderly farmers..

TABLE 10.1 Hospitalized agricultural rollovers by age group, 1990-2000

Age Group (Years)	Hospitalized Injuries		Farm Population*		Crude Annual Rate Per 100,000/yr
	No.	%	No.	%	
1 - 4	1	0.3	43,315	6.1	0.2
5 - 9	6	1.8	71,035	8.3	0.8
10 - 14	17	5.0	84,025	9.9	2.0
15 - 19	30	8.8	80,455	9.4	3.7
20 - 29	32	9.4	80,775	9.5	4.0
30 - 39	38	11.2	121,230	14.2	3.1
40 - 49	51	15.0	139,425	16.4	3.7
50 - 59	50	14.7	110,135	12.9	4.5
60 - 69	52	15.3	73,620	8.6	7.1
70 - 79	53	15.6	30,825	3.6	17.2
80 +	9	2.7	7,755	1.0	11.6
Total	339	100.0	842,595	100.0	4.0

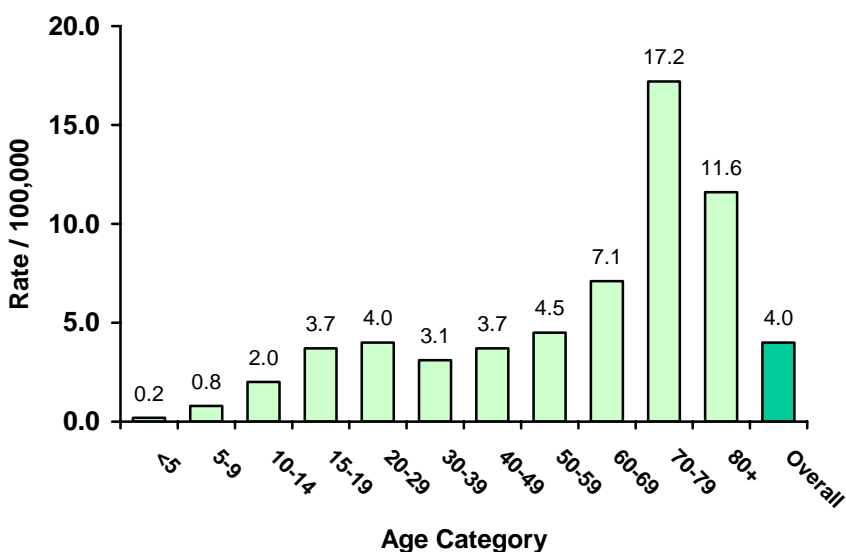
*Statistics Canada, Census of Agriculture, 1996

10.2 ROLLOVER RATE BY AGE

The age specific rates of agricultural rollover hospitalizations were extremely high in adults aged 70+.

Children under 10 had the lowest risk of a rollover hospitalization.

FIGURE 10.1 Age-specific hospitalized agricultural rollover rates in Canada, 1990-2000

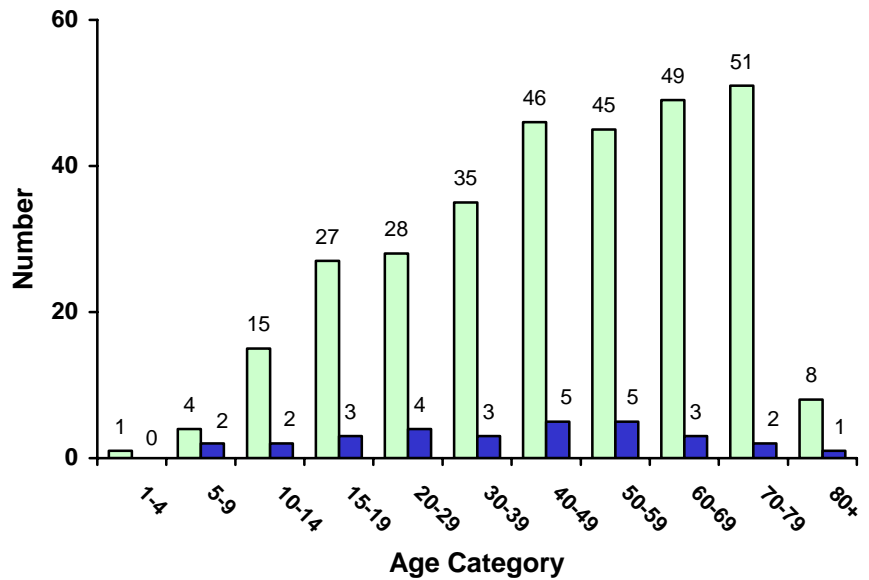


10.3 AGE AND GENDER

91.2% of persons admitted to hospital for agricultural rollover injuries were male. The ratio of males to females injured was lowest in the 5-9 year age category (2:1).

When the total number of fatal and hospitalized rollover injuries were considered, adults 50 and over and children under 5 were more likely to be killed in a rollover than admitted to hospital.

FIGURE 10.2 Hospitalized agricultural rollovers by age and gender, 1990-2000

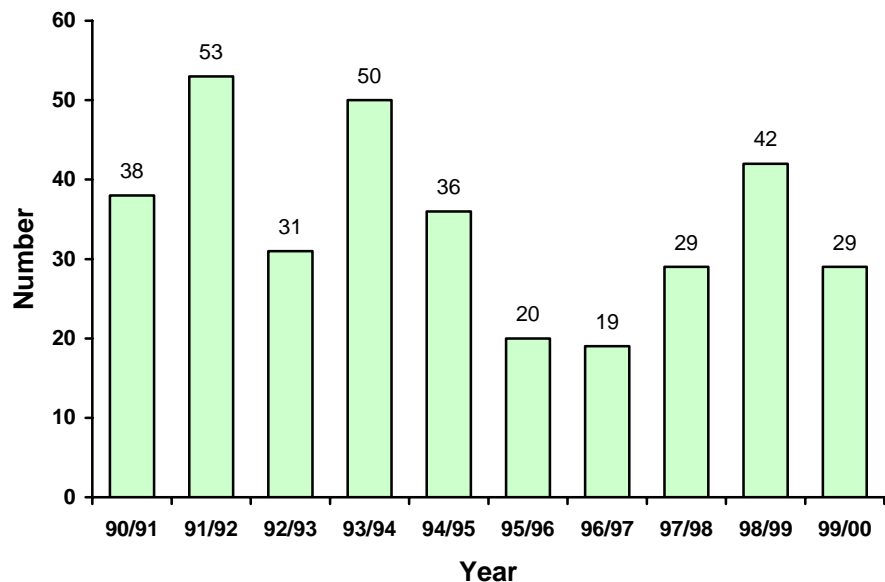


10.4 BY YEAR

Over the surveillance period, there was no clear trend in the number of persons hospitalized to treat rollover injuries per fiscal year. The number of rollover hospitalizations per fiscal year ranged from 19 to 53, with an average of 34.7.

Note: data were imputed for Alberta from April 1, 1998 to March 31, 2000.

FIGURE 10.3 Hospitalized agricultural rollovers by fiscal year, 1990-2000

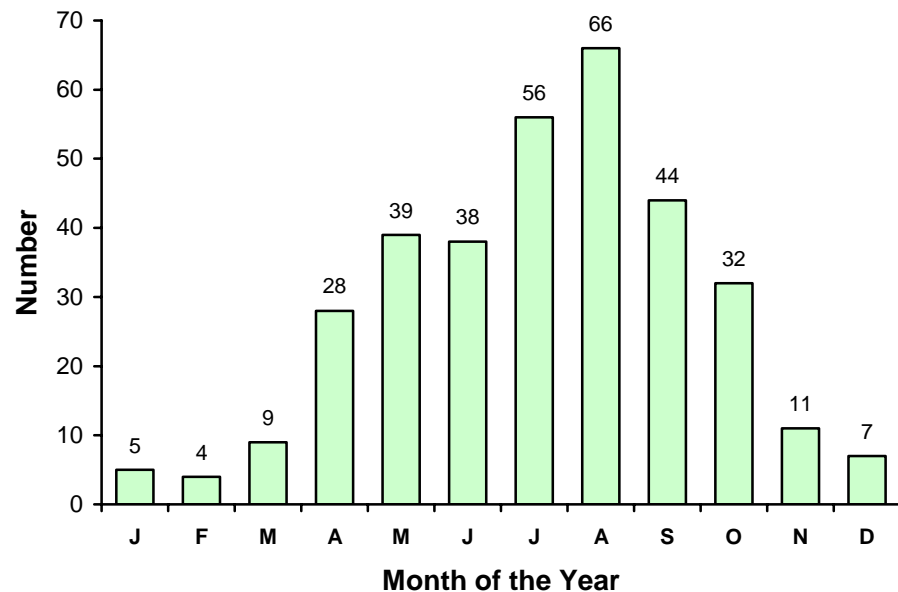


10.5 BY MONTH

The distribution of agricultural rollovers reflects seasonal changes in exposure to rollover hazards. 89.4% of hospitalized rollovers occurred from April to October.

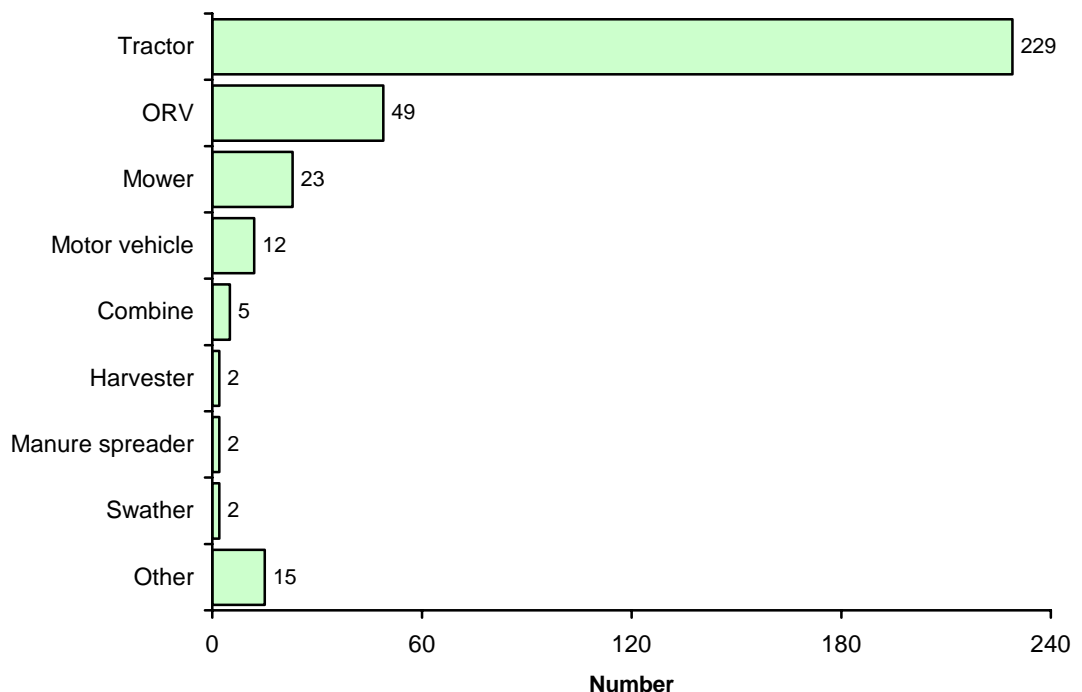
Unlike fatal rollovers, there was no second peak in November. The number of fatal runovers that occurred in November was 2.5 times the number of hospitalized rollovers.

FIGURE 10.4 Hospitalized agricultural rollovers by month of the year, 1990-2000



10.6 BY MACHINE TYPE

FIGURE 10.5 Hospitalized agricultural rollovers by machine type, 1990-2000

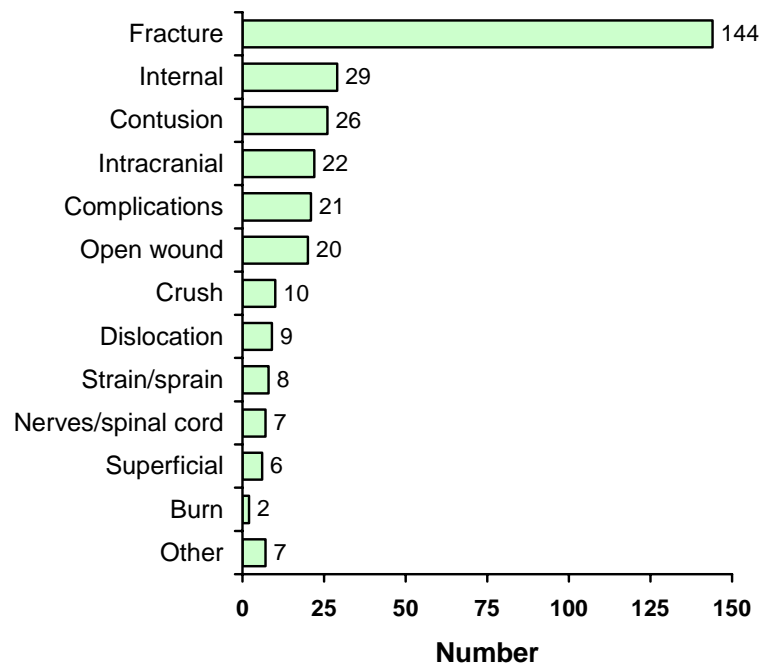


The machine types most frequently involved in hospitalized rollovers were tractors (67.6%), Off Road Vehicles (14.5%), and mowers (6.8%). All other machine types were involved in fewer than 3.5% of hospitalized rollovers. A higher percentage of tractors were involved in fatal runovers (88.1%) compared with hospitalized runovers (67.6%).

10.7 DIAGNOSIS

Overall, 42.5% of the hospitalized rollover injuries were fractures, 8.6% were internal injuries, and 7.7% were contusions, 6.5% were intracranial injuries, 6.2% were due to complications, like infection, and 6% were open wounds. Other diagnosis types each comprised less than 3% of the hospitalized rollover cases.

FIGURE 10.6 Hospitalized agricultural rollovers by diagnosed injury



11 AGRICULTURAL ROLLOVER HOSPITALIZATIONS: TRACTORS AND OTHER AGRICULTURAL MACHINES

11.1 AGE GROUP

There were 290 hospitalized non-ORV rollovers during the surveillance period. Adults in the four oldest age groups were over-represented as victims of hospitalized non-ORV rollovers relative to their proportion of the farm population. This was especially true for adults aged 70-79, where the percentage injured was 4.9 times the percentage of adults that age in the general farm population.

Adults 80 or over were far more likely to be killed in a rollover event than admitted to hospital.

TABLE 11.1 Hospitalized agricultural non-ORV rollovers by age group, 1990-2000

Age Group (Years)	Hospitalized Injuries		Farm Population*		Crude Annual Rate Per 100,000/yr
	No.	%	No.	%	
1 – 4	0	0.0	43,315	6.1	0
5 – 9	4	1.4	71,035	8.3	0.6
10 – 14	9	3.1	84,025	9.9	1.1
15 – 19	19	6.6	80,455	9.4	2.4
20 – 29	24	8.3	80,775	9.5	3.0
30 – 39	32	11.0	121,230	14.2	2.6
40 – 49	47	16.2	139,425	16.4	3.4
50 – 59	49	16.9	110,135	12.9	4.4
60 – 69	48	16.6	73,620	8.6	6.5
70 – 79	51	17.6	30,825	3.6	16.5
80 +	7	2.4	7,755	1.0	9.0
Total	290	100.0	842,595	100.0	3.4

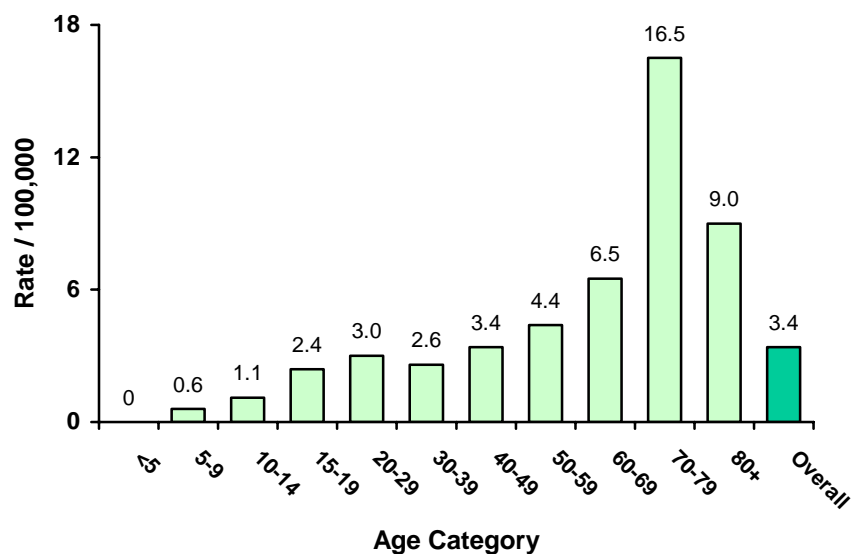
* Statistics Canada, Census of Agriculture, 1996

11.2 ROLLOVER RATE BY AGE GROUP

Age specific hospitalized non-ORV rollover rates were highest in adults aged 70-79. Very few children under age 10 were hospitalized for agricultural rollover injuries.

Children under 5, adults aged 60-69, and adults aged 80 and over had higher rates of fatal non-ORV rollovers compared with their rates for hospitalized non-ORV rollovers.

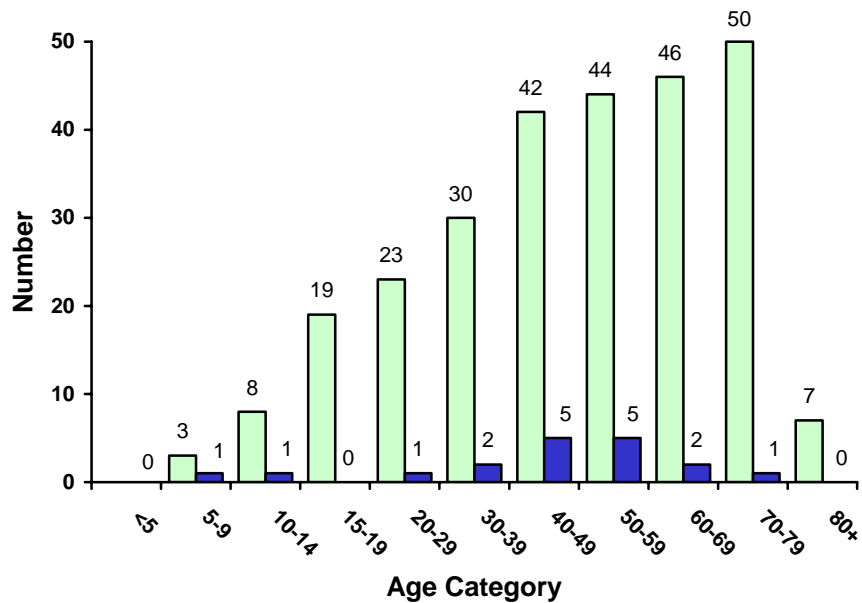
FIGURE 11.1 Age-specific hospitalized agricultural non-ORV rollover rates in Canada, 1990-2000



11.3 AGE AND GENDER

93.8% of non-ORV rollovers involved males. The lowest ratio of male cases to female cases (3:1) was in the 5-9 year age group. Only one female aged 70+ sustained a hospitalized rollover injury compared with 57 males in the same age range.

FIGURE 11.2 Hospitalized agricultural non-ORV rollovers by age and gender, 1990-2000

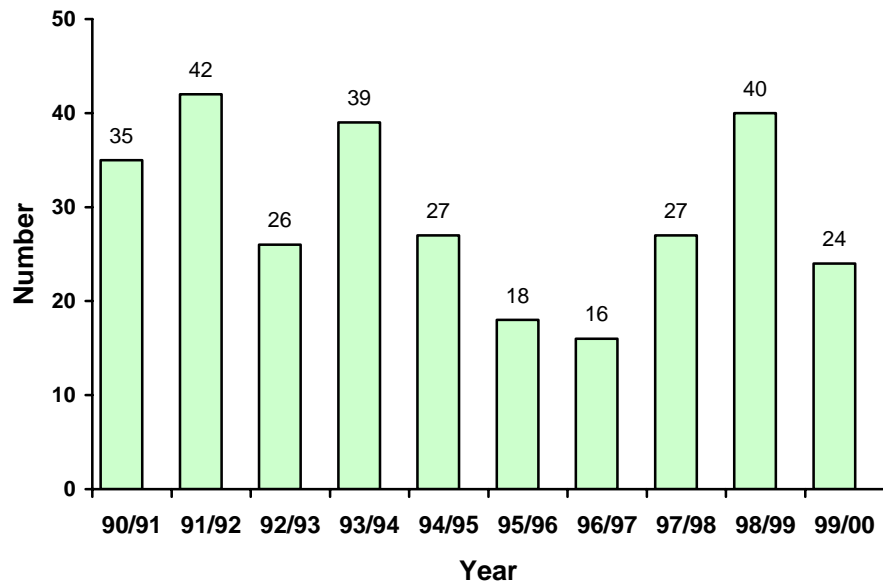


11.4 BY YEAR

Over the surveillance period, there was no apparent trend in the number of persons hospitalized per fiscal year for non-ORV rollover injuries. The number of admissions for non-ORV rollover injuries per fiscal year ranged from 16 to 42, with an average of 29.4.

Note: data were imputed for Alberta from April 1, 1998 to March 31, 2000.

FIGURE 11.3 Hospitalized agricultural non-ORV rollovers by fiscal year, 1990-2000

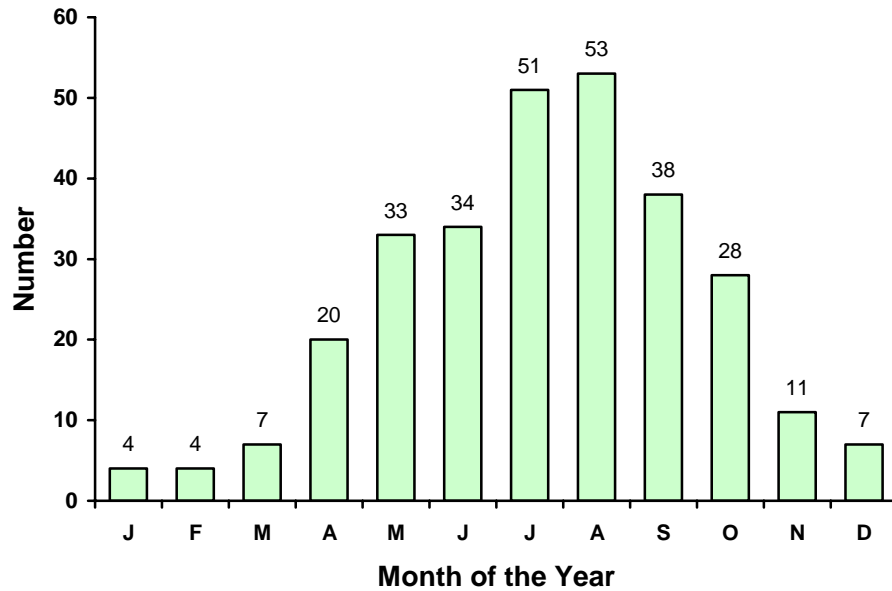


11.5 BY MONTH

FIGURE 11.4

Hospitalized agricultural non-ORV rollovers by month of the year, 1990-2000

35.9% of non-ORV hospitalized rollover injuries occurred in July and August, 81.8% took place from May to October inclusive.

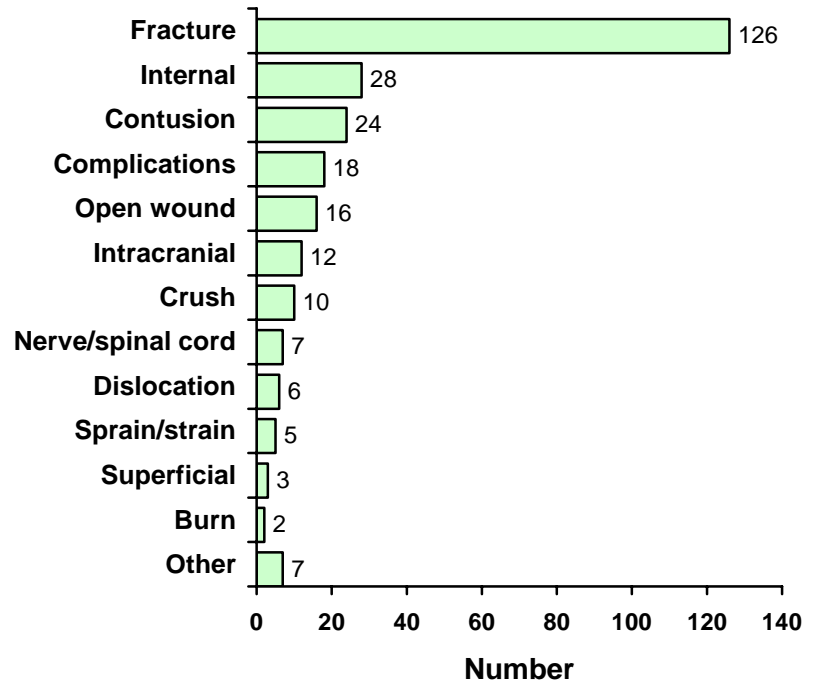


11.6 DIAGNOSIS

FIGURE 11.5

Hospitalized agricultural non-ORV rollovers by diagnosed injury, 1990-2000

43.4% of the hospitalized non-ORV rollover injuries were diagnosed as fractures. A further 9.7% were internal injuries, 8.3% were contusions, 6.2% were complications, 5.5% were open wounds and 4.1% crush injuries. Other diagnosis types each comprised less than 3.5% of the hospitalized non-ORV rollover cases.



12 AGRICULTURAL ROLLOVER HOSPITALIZATIONS: OFF ROAD VEHICLES

12.1 AGE GROUP

Although only 4.5% of those injured in non-ORV rollovers were children, 22.4% hospitalized ORV rollover injuries involved children under 15 years old. A much greater proportion of children under 15 were involved in fatal ORV rollovers (47.1%) than in hospitalized ORV rollovers (23.5%).

89.8% of persons admitted for ORV rollover injuries were riding All Terrain Vehicles (ATVs), sixteen of which were 4-wheeled ATVs.

TABLE 12.1

Hospitalized agricultural ORV rollovers by age group, 1990-2000

Age Group (Years)	Deaths		Farm Population*		Crude Rate Per 100,000/yr
	No.	%	No.	%	
<15	11	22.4	198,380	23.5	0.6
15 - 59	30	61.2	532,020	63.2	0.6
60+	8	16.3	112,200	13.3	0.7
Total	49	100	842,595	100.0	0.6

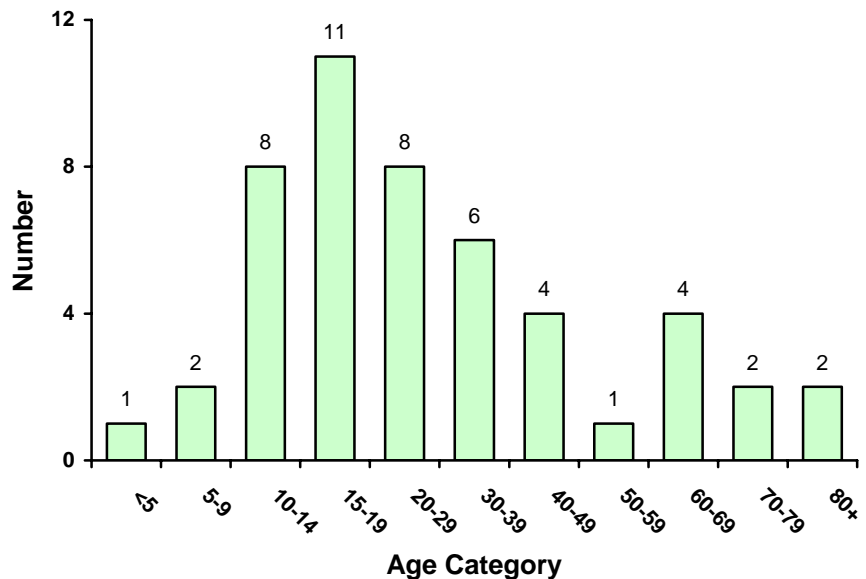
*Statistics Canada, Census of Agriculture, 1996

12.2 AGE CATEGORY

61.2% of those hospitalized for ORV rollovers were under 30 years old. ORV rollover injuries were most frequent in persons aged 15-19 years.

FIGURE 12.1

Hospitalized agricultural ORV rollovers by age category, 1990-2000

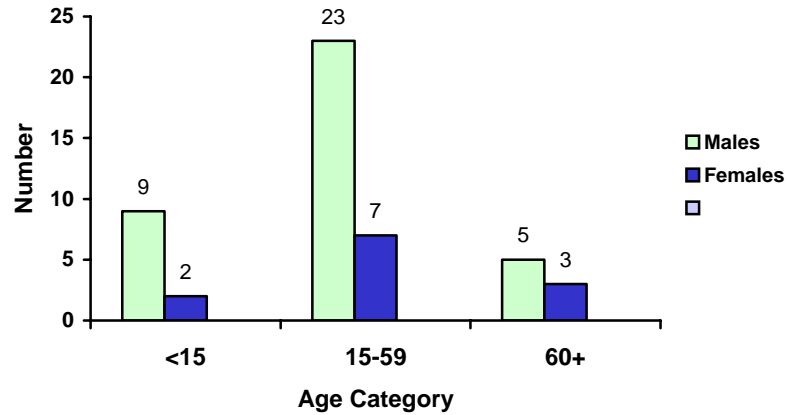


12.3 AGE AND GENDER

Whereas only 6.2% of non-ORV rollovers involved females, 24.5% of those injured in ORV rollovers were female. This is the highest ratio of females to males among machine-related hospitalizations for agricultural injuries.

A much larger proportion of hospitalized ORV rollovers involved females (24.5%) compared with fatal ORV rollovers (5.89%).

FIGURE 12.2 Hospitalized agricultural ORV rollovers by age and gender, 1990-2000

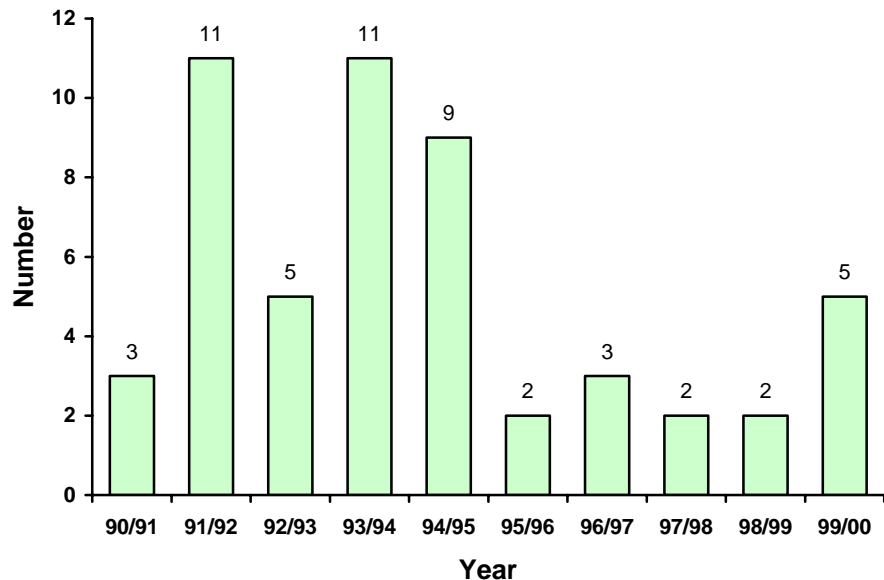


12.4 BY YEAR

There was wide fluctuation in the number of ORV rollover hospitalizations over the surveillance period. The number of ORV rollover hospitalizations per fiscal year ranged from two to eleven, with an average of 5.3.

Note: data were imputed for Alberta from April 1, 1998 to March 31, 2000.

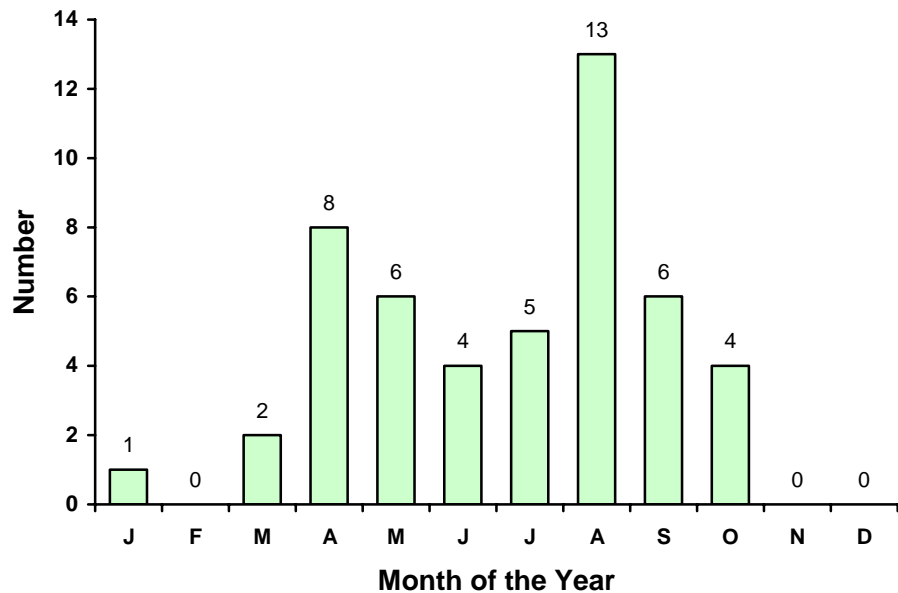
FIGURE 12.3 Hospitalized agricultural ORV rollovers by fiscal year, 1990-2000



12.5 BY MONTH

26.5% of all hospitalized ORV rollovers took place in the month of August. 93.9% of ORV rollover hospitalizations occurred from April to October inclusive. Unlike ORV rollover hospitalizations, there was a consistent number of ORV rollover fatalities per month from June to September.

FIGURE 12.4 Hospitalized agricultural ORV rollovers by month of the year, 1990-2000

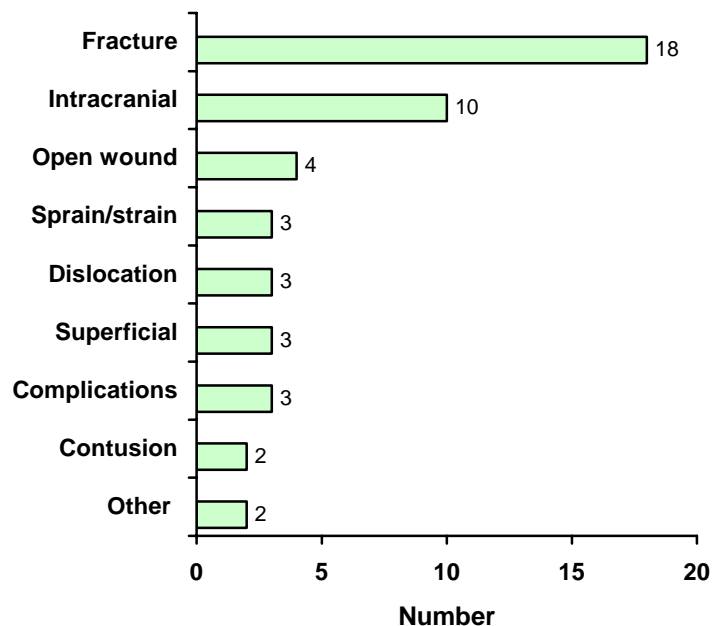


12.6 DIAGNOSIS

36.7% of the hospitalized ORV rollover injuries were diagnosed as fractures. A further 20.4% were intracranial injuries and 8.9% were open wounds. Sprains/strains, dislocations, superficial injuries and complications each comprised 6.1% of the ORV rollover diagnoses.

Five times the number of intracranial injury diagnoses were associated with ORV rollovers compared with non-ORV rollovers. In contrast, only 2% of the ORV rollover diagnoses were classified as internal injuries, whereas 9.7% of the non-ORV rollover diagnoses were internal injuries.

FIGURE 12.5 Hospitalized agricultural ORV rollovers by diagnosed injury, 1990-2000



13 AGRICULTURAL ROLLOVER HOSPITALIZATIONS: CHILDREN UNDER 15

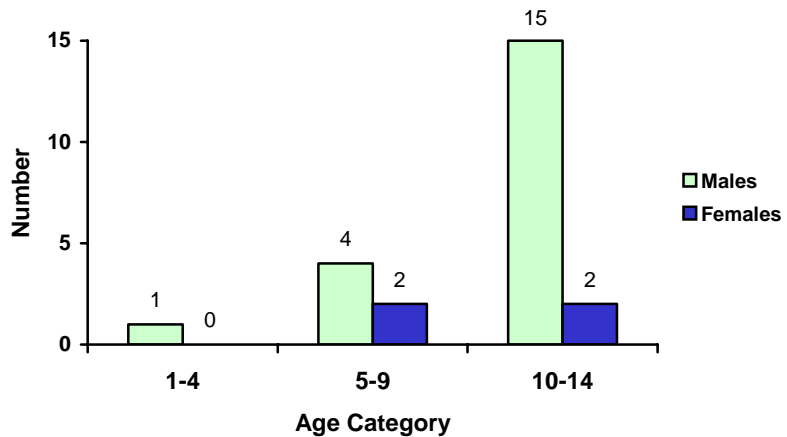
13.1 AGE AND GENDER

83.3% of the 24 children hospitalized for agricultural rollovers were male.

70.8% of all children with hospitalized rollover injuries were 10-14 years old.

In children, a much larger proportion of females were hospitalized for rollover injuries (16.7%) than were involved in rollover fatalities (5%). This may be because no female children were involved in fatal tractor rollovers, which are frequently lethal.

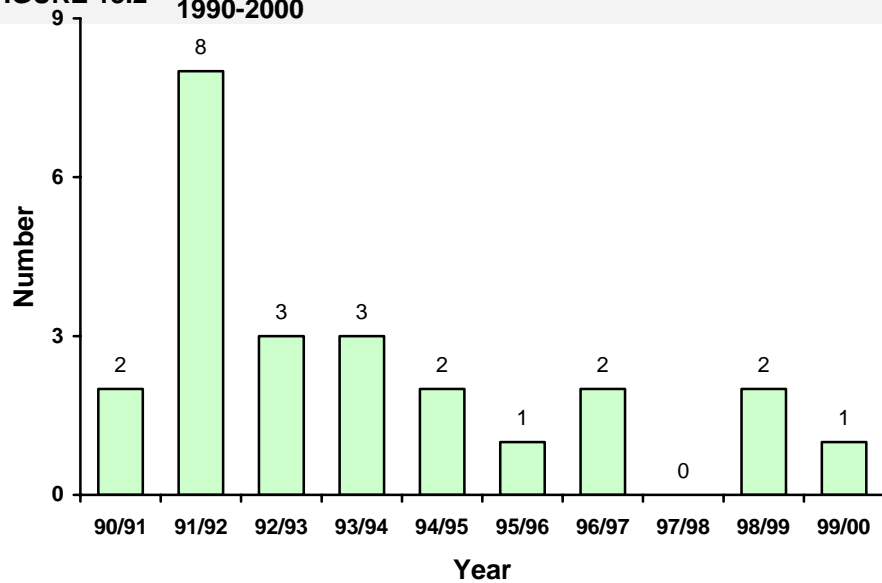
FIGURE 13.1 Hospitalized agricultural rollovers in children by age and gender, 1990-2000



13.2 BY YEAR

In children, the number of agricultural rollover hospitalizations per fiscal year varied widely from eight in 91/92 to none in 97/98, with an average of 2.4 for the surveillance period.

FIGURE 13.2 Hospitalized agricultural rollovers in children by fiscal year, 1990-2000

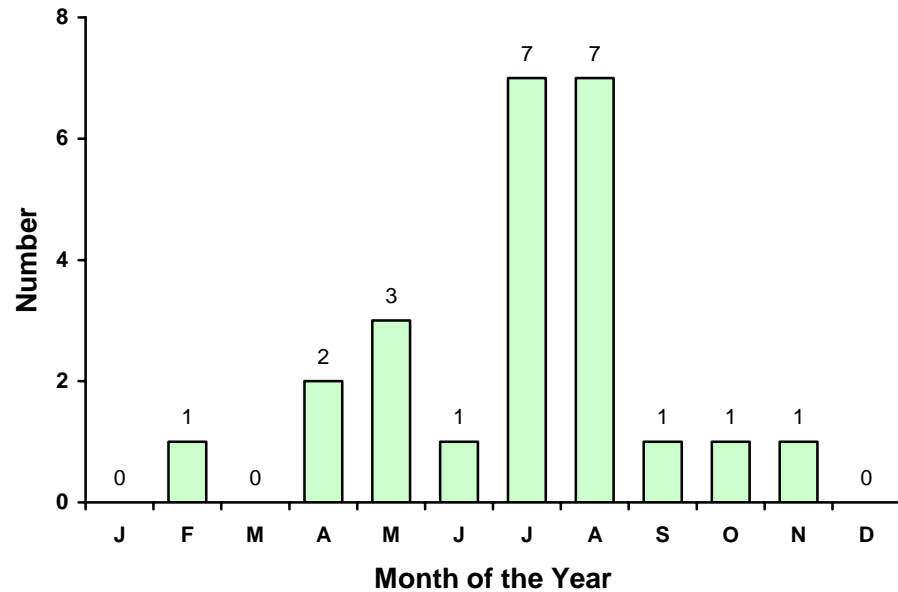


13.3 BY MONTH

58.4% of hospitalized rollovers in children occurred during the summer holidays, in July and August.

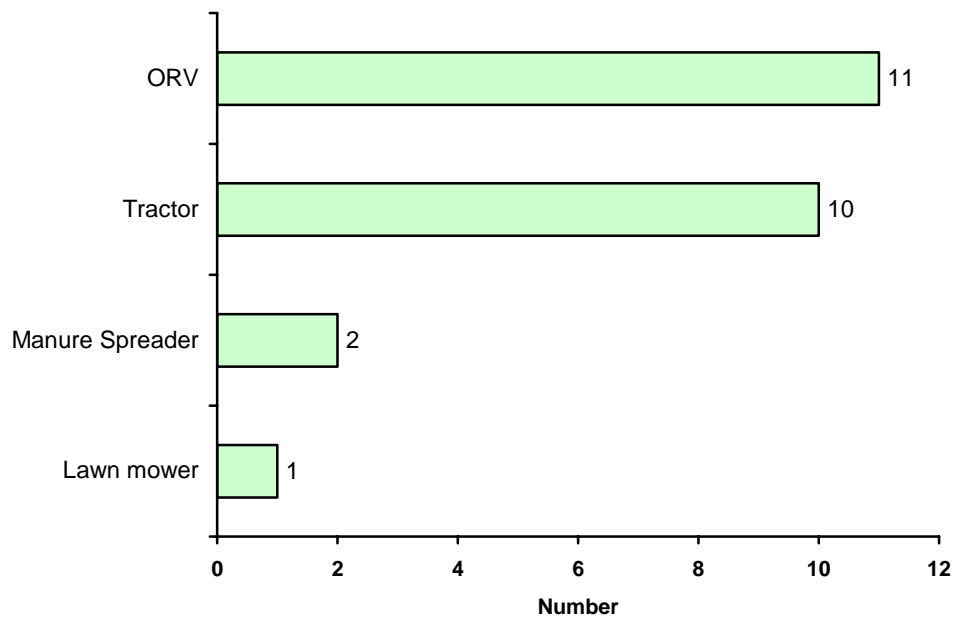
In contrast, 60% of fatal rollovers involving children took place from June to August, with 40% occurring in July and August.

FIGURE 13.3 Hospitalized agricultural rollovers in children by month of the year, 1990-2000



13.4 BY MACHINE TYPE

FIGURE 13.4 Hospitalized agricultural rollovers in children by machine type, 1990-2000

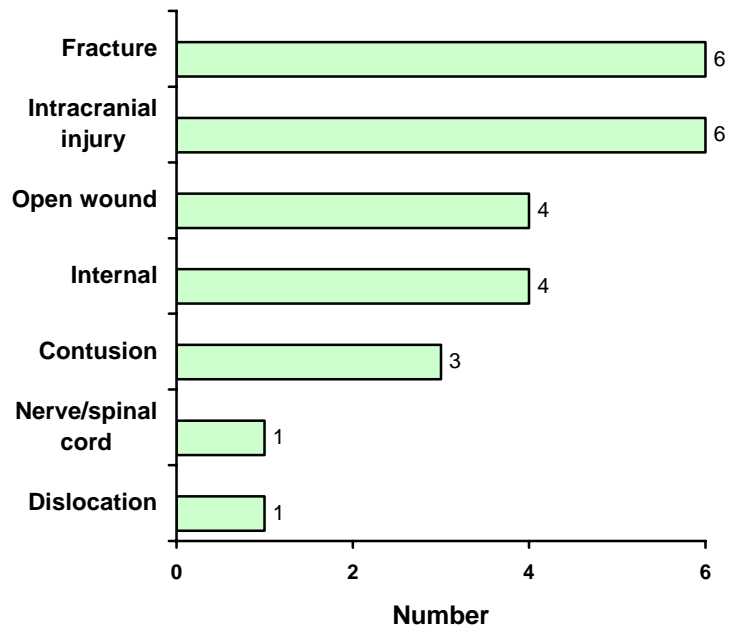


For the older age groups, tractors were by far the predominant machine type associated with rollover hospitalizations. In contrast, 45.8% of rollover hospitalizations in children involved ORVs and only 41.7% involved tractors. For both fatal and hospitalized cases, ORVs were involved in a high proportion of machine rollovers in children.

13.5 DIAGNOSIS

25% of the hospitalized rollover injuries in children were diagnosed as fractures and 25% were diagnosed as intracranial injuries. In older age groups, fractures comprised a much higher proportion of the total diagnoses. In children, other diagnosis types included: 16.7% open wounds, 16.7% internal injuries and 12.5% contusions.

FIGURE 13.5 Hospitalized agricultural rollovers in children by diagnosed injury, 1990-2000

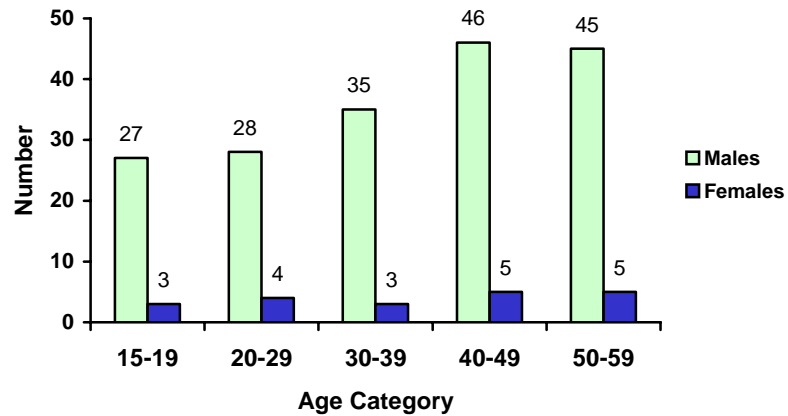


14 AGRICULTURAL ROLLOVER HOSPITALIZATIONS: ADULTS AGED 15-59

14.1 AGE AND GENDER

Of the 201 adults aged 15-59 who sustained hospitalized rollover injuries, 90% were male. Compared with adults in the older age categories, adults aged 15-19 were far more likely to be injured than killed in an agricultural rollover. Only 3.2% of all rollover events involving adults 15-19 were fatal. In adults aged 50-59, 43.2% of all rollovers were fatal. It may be that rollover events are more likely to cause death in older adults than in younger adults.

FIGURE 14.1 Hospitalized agricultural rollovers in adults aged 15-59 by age and gender, 1990-2000

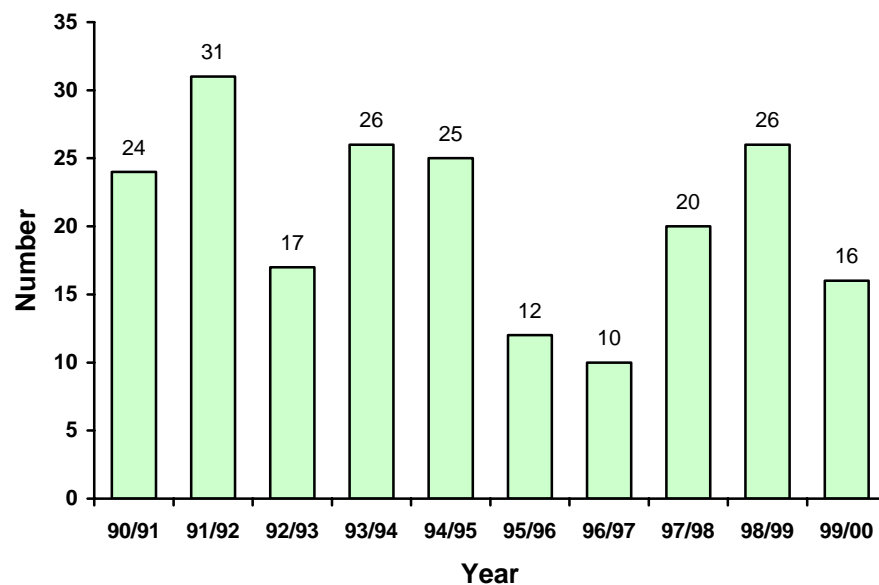


14.2 BY YEAR

Over the surveillance period, there was no consistent pattern in the number of rollover hospitalizations among adults aged 15-59. The number of hospitalized rollover injuries per fiscal year ranged from 10 to 31, with an average of 20.7.

Note: data were imputed for Alberta from April 1, 1998 to March 31, 2000.

FIGURE 14.2 Hospitalized agricultural rollovers in adults 15-59 by fiscal year, 1990-2000

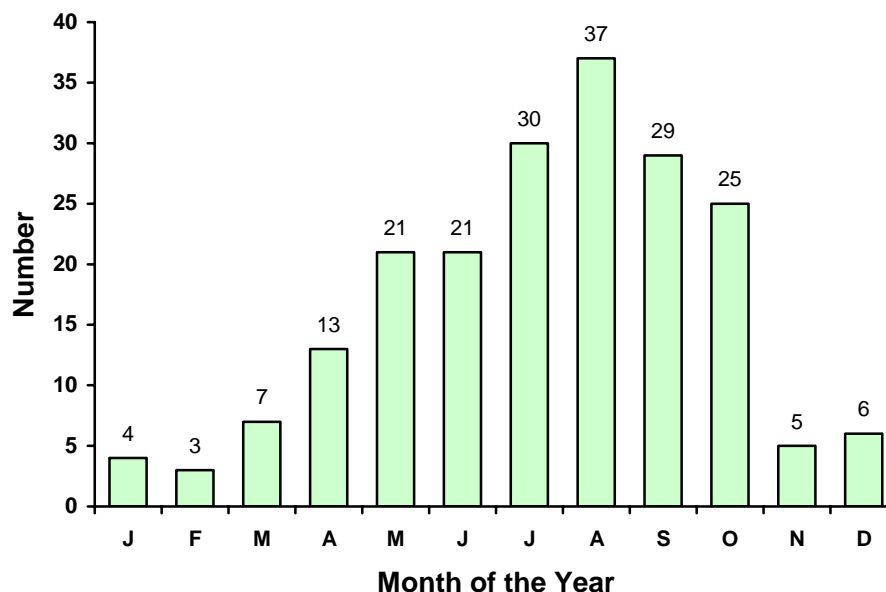


14.3 BY MONTH

In adults aged 15-59, 80.9% of hospitalized rollover injuries occurred from May to October.

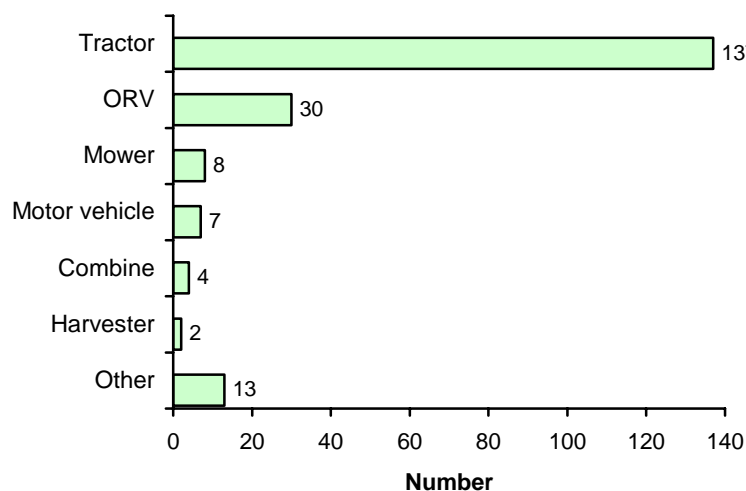
In contrast with the fatality data, there were no marked peaks for hospitalized rollovers in the months of July and November. Also, there were 3.6 times more fatal rollovers in the month of November than there were hospitalized rollovers.

FIGURE 14.3 Hospitalized agricultural rollovers in adults 15-59 by month of the year, 1990-2000



14.4 HOSPITALIZATIONS BY MACHINE TYPE

FIGURE 14.4 Hospitalized agricultural rollovers in adults 15-59 by machine type, 1990-2000



In adults aged 15-59, the machine types most frequently involved in agricultural rollover hospitalizations were tractors (68.2%) and ORVs (14.9%). Other machine types were each associated with fewer than 4% of the hospitalized rollovers over the surveillance period. In adults, the number of tractor rollover hospitalization events was 4.6 times the number of rollover hospitalizations involving ORVs. In comparison, ORVs were cited in 4.1% more child hospitalized rollover cases than tractors were.

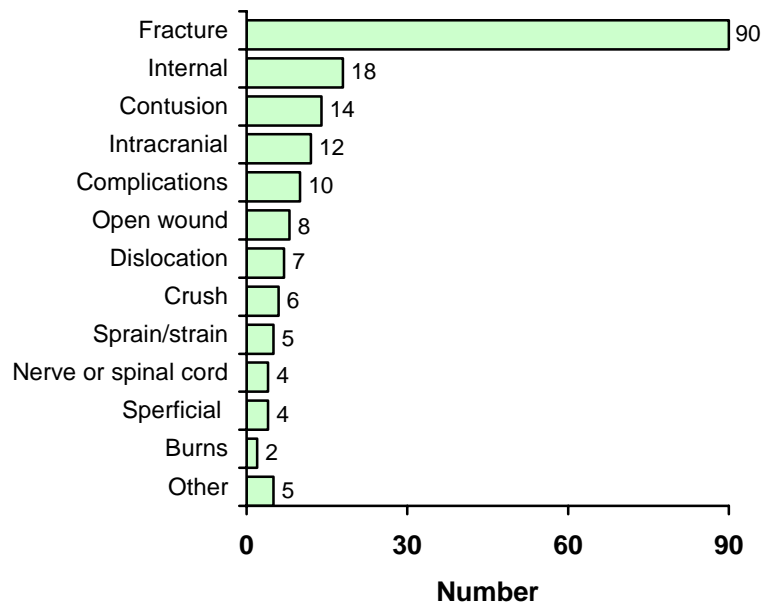
Although tractors were involved in only 68.2% of the hospitalized rollovers in adults aged 15-59, they were associated with 88.7% of the fatal rollovers in that age group.

14.5 DIAGNOSIS

44.8% of the hospitalized rollover injuries in adults aged 15-59 were diagnosed as fractures. A further 9% of the injuries were internal injuries, 7% were contusions, and 6% were intracranial injuries. Other diagnosis types each comprised less than 5% of the hospitalized rollover cases.

Intracranial injuries were cited as the main diagnosis in only 6% of adult rollover cases compared with 25% of the hospitalized rollovers involving children.

FIGURE 14.5 Hospitalized agricultural rollovers in adults 15-59 by diagnosed injury, 1990-2000

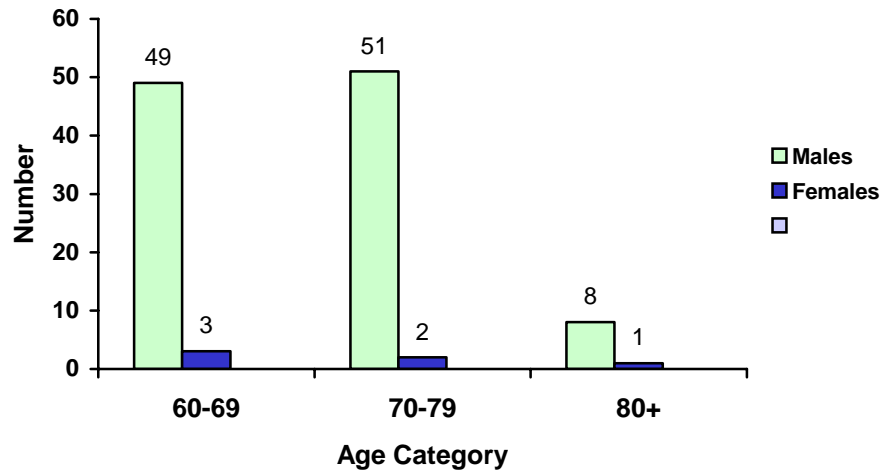


15 AGRICULTURAL ROLLOVER HOSPITALIZATIONS: SENIOR ADULTS AGED 60+

15.1 AGE AND GENDER

94.7% of the 114 senior adults who sustained hospitalized rollover injuries were male. Most of the seniors injured in hospitalized rollovers were aged 60-79.

FIGURE 15.1 Hospitalized agricultural rollovers in senior adults by age and gender, 1990-2000

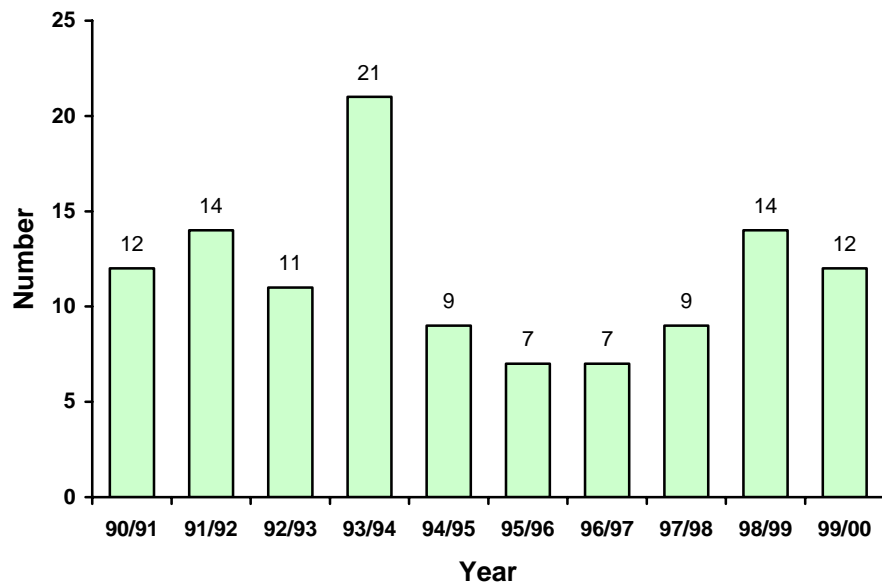


15.2 BY YEAR

There was no consistent pattern in the number of rollover hospitalizations among senior adults over the surveillance period. The number of hospitalizations per fiscal year ranged from 7 to 21, with an average of 11.6.

Note: data were imputed for Alberta from April 1, 1998 to March 31, 2000.

FIGURE 15.2 Hospitalized agricultural rollovers in senior adults by fiscal year, 1990-2000



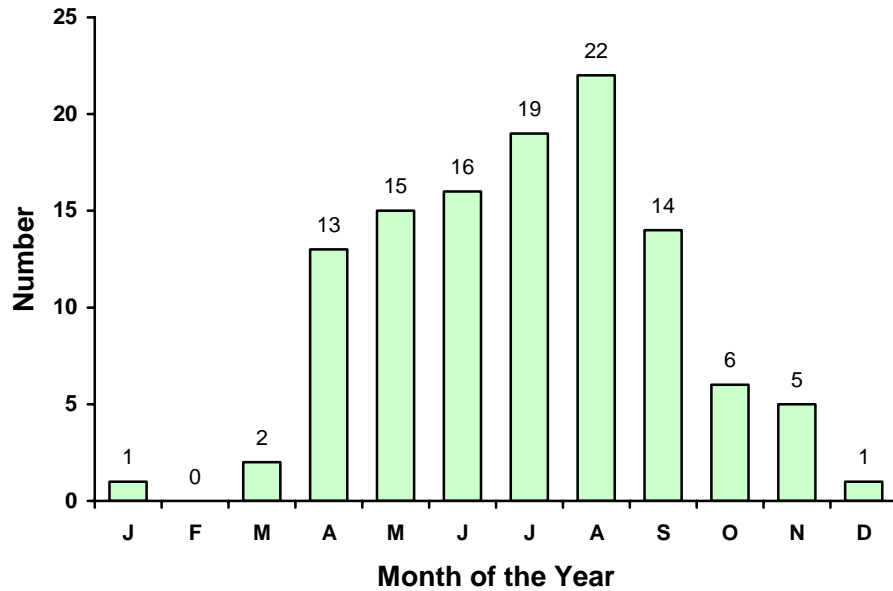
15.3 BY MONTH

FIGURE 15.3

Hospitalized agricultural rollovers in senior adults by month of the year, 1990-2000

86.9% of the hospitalized rollovers in senior adults occurred from April to September inclusive.

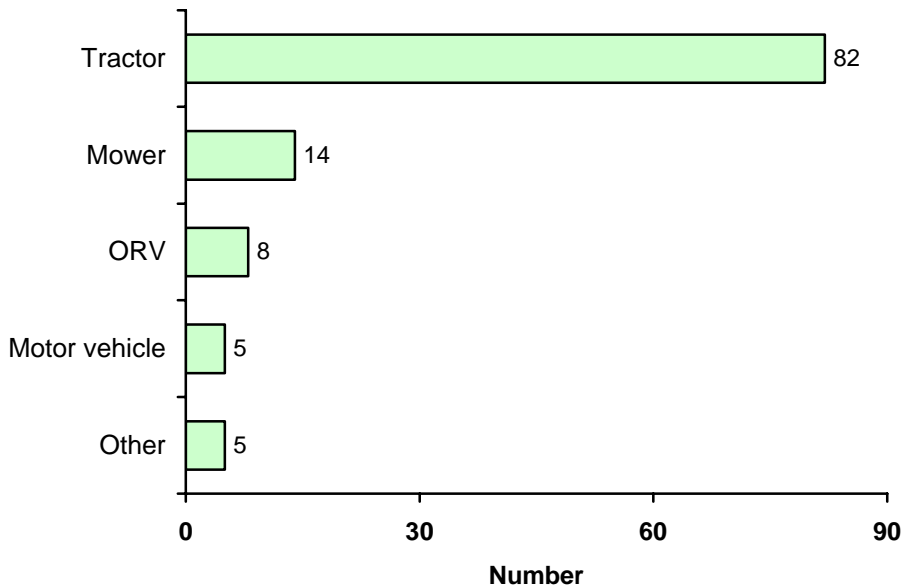
Whereas, 9.6% of hospitalized rollover injuries in senior adults occurred in October and November, 19.5% of the rollover fatalities in seniors occurred during those two months.



15.4 BY MACHINE TYPE

FIGURE 15.4

Hospitalized agricultural rollovers in senior adults by machine type, 1990-2000



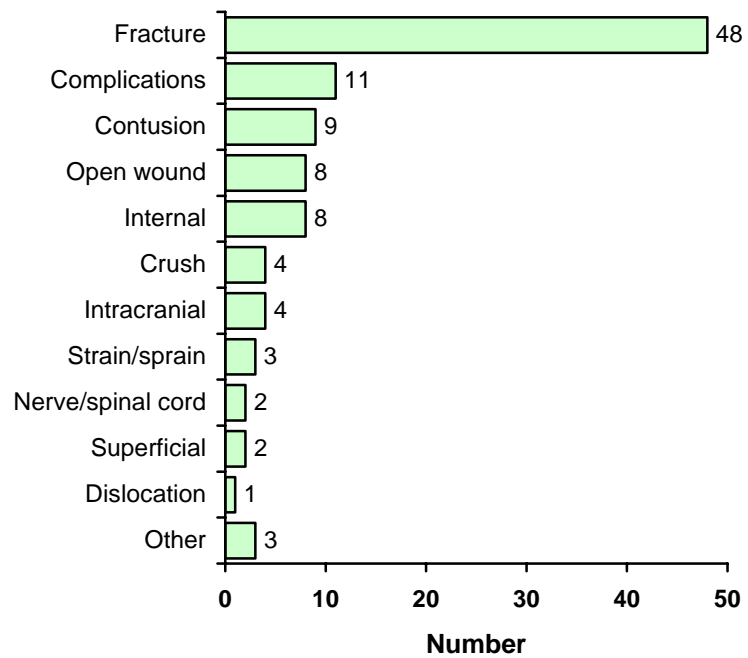
As with younger adults, tractors were the machine type most commonly involved in hospitalized rollover injuries in senior adults (71.9%), followed by mowers (12.3%), ORVs (7.0%) and motor vehicles (4.4%). Compared with children and younger adults, ORVs were involved in far fewer rollover hospitalizations among seniors.

Tractors were associated with far more rollover fatalities in seniors (95.4%) than rollover hospitalizations (71.9%).

15.5 DIAGNOSIS

42.1% of the hospitalized rollover injuries to senior adults were diagnosed as fractures. A further 9.6% of the injuries were complications, 7.9% were contusions, 7% were open wounds and 7% were internal injuries. Other diagnosis types each comprised less than 4% of the hospitalized rollover injuries in seniors. Intracranial injuries comprised only 3.5% of the hospitalized rollover injury diagnoses in senior adults compared with 25% in children.

FIGURE 15.5 Hospitalized agricultural rollovers in senior adults by diagnosed injury, 1990-2000



Appendix A Decision Rules

Inclusion of deaths and injuries in the fatality and hospitalization databases

Alcohol Involvement

Deaths and injuries where the victim was under the influence of alcohol were included in the databases if they involved agricultural work or an agricultural hazard.

Rollovers on Highways

Deaths and injuries due to rollovers on public highways that involved agricultural vehicles or agricultural machinery were included in the databases.

Inclusion of deaths in the fatality database

Pre-existing Medical Conditions

Deaths attributed to pre-existing medical conditions (e.g., seizure, heart attack) are excluded from the fatality database. Deaths where an agricultural injury was immediately preceded by a significant medical event such as a stroke, seizure or heart attack, are also excluded.

Secondary Complications

Deaths that occurred in hospital from secondary complications of agricultural injuries (e.g., embolism, respiratory distress) are included in the fatality database. Note: New Brunswick does not identify these cases as farm-related if the death occurred more than two weeks after the agricultural injury.

Designation as work-related deaths in the fatality database

Off Road Vehicles

Deaths involving off road vehicles such as ATVs, dirt bikes and dune buggies were not designated as work-related fatalities unless the RV was being used for agricultural work at the time of the event.

Children at Play

Deaths of children who were playing in the agricultural work place were designated as work-related if their deaths occurred because someone was engaged in agricultural work. This included cases where a person engaged in agricultural work was unable to supervise a child that he/she had taken to the agricultural work place and cases where a child was killed as a direct result of someone engaged in an agricultural work activity (e.g., extra rider deaths.)

Appendix B Glossary

General Terms

Agricultural Fatalities

CAISP defined an agricultural injury fatality as: 1) Any unintentional injury resulting in death that occurred during activities related to the operation of a farm (as defined below) or ranch and/or 2) Any unintentional injury resulting in death 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 deaths that took place away from agricultural work locations if agricultural work was being done. Deaths where victims were killed because a third party was engaged in agricultural work are also included. CAISP further sub-divides agricultural injury fatalities into two types: work-related agricultural fatalities and non work-related agricultural fatalities.

Denominator data

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

Farm

Any farm or other agricultural holding that produces at least one of the following agricultural products intended for sale: crops, livestock, poultry, animal products, greenhouse or nursery products, mushrooms, sod, honey, or maple syrup products. (*Census of Agriculture, Statistics Canada.*)

Non work-related agricultural fatalities

Deaths that, while occurring on a farm or ranch, or caused by some aspect of the agricultural environment, were either not directly related to agricultural work or not collected in a consistent manner across the country. For the purposes of clarity, they are analyzed separately from work-related agricultural fatalities. Examples of these fatalities include deaths on agricultural vehicles being used for recreational purposes.

Numerator data

Data used as numerator values in rate calculations. If presented as a fraction, the top half of an injury or illness rate refers to the number of cases (events).

Rates

In the context of injuries or fatalities, this means the number of cases per time period or per population group over a given time period; for example, the number of persons injured per 100,000 agricultural workers per year.

Surveillance

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

Work-related agricultural fatalities

Work-related agricultural fatalities are deaths that occurred during the course of agricultural work. This includes deaths that took place away from the farm or ranch if agricultural work was being done. Deaths where the victim(s) were killed while a third party was engaged in agricultural work are also included.

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 object
- 5 struck against object
- 6 caught in, under or between objects
- If 4, 5 or 6, specify object: _____
- 7 fall from height. Specify 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
- 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

E. IMMEDIATE LOCATION OF INJURY

- 1 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
- 77 Other location. Specify: _____
- 88 Unknown

H. METHOD OF DISCOVERY

Who found the deceased? (i.e. relationship to deceased) _____ Was the fatality witnessed? (circle) Y N
(Indicate if information not available)

I. NATURE OF INJURY BY BODY PART e.g., N11 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: _____
 NATURE OF INJURY 3: _____ BODY PART 3: _____

J. WAS AN EXTERNAL CAUSE OF INJURY CODE GIVEN? If so, specify: _____

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

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, machine component, collapsing machine
- 6 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 runover of alighted operator
- 12 runover of alighted passenger
- 13 runover of bystander
- 18 struck by object falling/propelled from machine.
- 77 other machine related. Specify: _____
- 88 unknown machine related
- 99 not applicable
- If 5 or 18, specify object/component: _____

F. LOCATION OF DEATH

- 1 Found dead
- 2 Died en route
- 3 Died in hospital
- 77 Other location of death. Specify: _____
- 88 Unknown

D. TYPE OF MACHINERY

- (Circle appropriate number if the injury event was machinery or vehicle related)
- 1 tractor
 - 2 auger. Specify whether attached to machine or not attached to machine
 - 3 mower
 - 4 power take off, specify machine PTO attached to: _____
 - 5 baler
 - 6 farm wagon
 - 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: _____
 - 18 swather
 - 77 other farm implement/machine. Specify: _____
 - 88 unknown
 - 99 not applicable

G. RELATION OF INJURED PERSON TO FARM OWNER

- 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

Draft 09/2005





CAISP HOSPITALIZED FARM INJURIES – DATA ABSTRACTION FORM

ID: XX-XX-XXXX

Prov yr number

Instructions:

The <respective provincial agency> has provided us with the hospital separation record for the following patient treated in your hospital for an agricultural injury. Please confirm the information below and provide us with the additional information requested on the back of this form. Thank you for your help.

Hospital Information

Chart number:
Year:
Institution code:

Patient Information

Date of birth:
Sex:

Services

Date of admission:
Date of discharge:
Length of stay:
Admission category:
Ambulance required:

Injury Information

Main diagnostic code:
External cause of injury code:

Is the above information correct? (circle number)

- 1 YES
- 2 NO Please comment on any corrections:

Was this patient transferred from another hospital? (circle number)

- 1 YES Please tell us which hospital: _____
- 2 NO

Was this a readmission for a previous injury? (circle number)

- 1 YES Date of original injury: ____/____/____ (yy/mm/dd)
- 2 NO

If this was not a farm-related injury, please describe with as much detail as possible what type of injury this was:

1. Please describe in detail the circumstances surrounding the injury event and what the injured person was doing at the time of the injury:

2. Did the injury event involve a machine or vehicle?

- No complete section 1.
- Yes complete section 2, parts A and B.

09/2005



SECTION 1 – NON-MACHINE	SECTION 2 – MACHINE/VEHICLE RELATED	
	Part A Cause of injury	Part B Machine type
Cause of injury Animal-related Specify animal: _____ 1 crushed or struck by animal 2 other type of animal injury 3 fall from animal Struck/caught by object(s) Specify object: _____ 4 struck by object 5 struck against object 6 caught in/under/between objects Fall/Jump Specify fall from where: _____ 7 fall from height 8 fall on same level 9 jumped to lower level 10 Overexertion 11 Drowning Specify where: _____ 12 Exposure to fire Contact with: 13 temperature extremes 14 electric current 16 toxic substances Specify substance: _____ Contact by: (circle) inhalation ingestion absorption 19 firearms 77 other non-machine cause, Specify: 88 Unknown, not machine related 99 Does not apply (machine-related)	Machine/vehicle rollover 1 sideways rollover 2 backwards rollover 3 unspecified rollover 4 Entangled in machine Struck by/against or pinned by Specify: _____ 5 pinned or struck by machine, machine component, collapsing machine 18 struck by object propelled or falling from machine 23 struck against machine/machine component 6 Traffic collision (public road) Fall from moving machine, not run over 7 operator 9 passenger 15 person unspecified Fall from moving machine, then run over 8 operator 10 passenger 16 person unspecified Run over by moving machine (no fall) 11 alighted operator 12 alighted passenger 13 bystander 17 person unspecified 21 Overexertion 22 Jumped from machine 77 Other cause, specify: _____ 88 Unknown machine-related 99 Does not apply	1 Tractor 2 Auger Specify: freestanding, attached to machine or unknown. 3 Mower 4 Power take off. Specify machine PTO attached to: _____ 5 Baler 6 Farm wagon 7 Combine 8 Power tool (not chainsaw) 9 Chainsaw 10 Welder 11 Harvester 12 Plough/disk 13 Hay elevators/conveyors 14 Manure spreader 15 Bulldozer, bobcat, skid steer, FEL 16 Motor vehicle, Specify type: _____ 17 Off-road vehicle, Specify type: _____ 19 Fencing equipment 20 Spraying equipment 21 Lawn mower 22 Garden equipment 24 Planting equipment 25 Swather 77 Other type, specify: _____ 88 Unknown machine 99 Does not apply

Location

1 Field	8 Farm house
2 Barn	9 Farm road
3 Silo/grain bin	10 Woodlot
4 Shed	11 Water source (any kind), manure lagoon, sewage pit etc. (specify)
5 Farm yard	12 Corral/outdoor animal enclosure
6 Road/highway	77 Other (specify)
7 Driveway	88 Unknown

REVIEW FOR CONSENSUS? (circle) Yes No If yes, please explain points needing consensus of opinion.

09/2005

Appendix D Denominator Data

Canadian Farm Population by Age Group and Province: Statistics Canada, Census of Agriculture 1996

Province	Age Group											Total	
	< 1 yr	1 - 4	5 - 9	10 - 14	15 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79		80+ yrs
NL	5	10	115	130	200	170	225	405	210	105	85	25	1680
PE	65	335	620	660	725	1040	1110	1080	1095	580	420	80	7810
NS	100	580	1040	1260	975	1335	1690	2200	1960	1245	475	205	13060
NB	110	380	725	1020	995	1030	1320	1890	1290	925	485	185	10350
QC	1225	6205	9820	11315	11460	12380	18195	18485	14690	7165	2780	880	114605
ON	2165	10925	17510	21180	20440	23005	29635	34840	29020	20650	9510	2345	221225
MB	935	4575	7265	8170	7155	7950	11585	13015	9680	6260	2545	700	79835
SK	1295	6645	11335	14855	15055	11635	19860	25255	18180	14260	5930	1245	145560
AB	2250	10570	16835	18700	17540	16670	28085	30020	24065	16205	6185	1370	188510
BC	670	3085	5765	6735	5895	5550	9535	12240	9940	6220	2415	725	68770
CANADA	8810	43315	71035	84025	80455	80775	121230	139425	110135	73620	30825	7755	851405

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

Number of Farms by Province: Statistics Canada, Census of Agriculture 1996

Province	Number
Newfoundland	742
Prince Edward Island	2,217
Nova Scotia	4,453
New Brunswick	3,405
Québec	35,991
Ontario	67,520
Manitoba	24,383
Saskatchewan	56,995
Alberta	59,007
British Columbia	21,835
CANADA	276,548

Statistics Canada information is used with the permission of Statistics Canada. Users are forbidden to copy the data and disseminate them, in an original or modified form, for commercial purposes, without the expressed permission of Statistics Canada. Information on the availability of the wide range of data from Statistics Canada can be obtained from Statistics Canada's Regional Offices, its World Wide Web site at <http://www.statcan.ca>, and its toll-free access number 1-800-263-1136.

Appendix E Contact Information

National Office/Ontario	Dr. Rob Brison, CAISP Co-Director Dr. Will Pickett, CAISP Co-Director Deborah Emerton, Administrative Coordinator Catherine Isaacs, CAISP National Coordinator/Data Manager c/o Department of Emergency Medicine Kingston General Hospital 76 Stuart Street Kingston, Ontario K7L 2V7 Tel. (613) 548-3232 Fax. (613) 548-1381 E-mail: emertond@kgh.kari.net
British Columbia	Dr. Helen Ward University of British Columbia Department of Medicine, Vancouver General Hospital 390-828 W. 10 th Ave Vancouver, British Columbia V5Z 1L8 Tel. (604) 875-4813 Fax. (604) 875-4695 E-mail: Helen.Ward@vch.ca
Alberta	Kathy Belton, MA, CAISP Co-Director Alberta Centre for Injury Control and Research 4075 RTF 8308-114 Street University of Alberta Edmonton, Alberta T6G 2V2 Tel. (780) 492-6019 Fax. (780) 492-7154 E-mail: kathy.belton@ualberta.ca
Saskatchewan	Dr. Neils Koehncke or Louise Hagel Institute of Agricultural Rural and Environmental Health University of Saskatchewan Wing 3E, Royal University Hospital Saskatoon, Saskatchewan S7N 0W8 Louise Hagel's tel. (306) 966-6648 Fax. (306) 966-8799 E-mail: niels.koehncke@sask.usask.ca E-mail: hagell@sask.usask.ca
Manitoba	Dr. Ted Redekop Manitoba Department of Labour and Immigration Workplace Safety and Health Division, Occupational Health Branch 200 - 401 York Avenue Winnipeg, Manitoba R3C 0P8 Tel. (204) 945-5765 Fax. (204) 945-4556 E-mail: tredekop@labour.gov.mb.ca
Québec	To be arranged.

New Brunswick

Dr. B. Christofer Balram
Director, Provincial Epidemiology Service,
Provincial Epidemiologist
Department of Health and Community Services
P.O. Box 5100
Fredericton, New Brunswick E3B 5G8
Tel. (506) 453-3092
Fax. (506) 453-2780
E-mail: christofer.balram@gnb.ca

Nova Scotia

Dr. Judy Guernsey
Department of Community Health and Epidemiology
5849 University Avenue
Dalhousie University
Halifax, Nova Scotia B3H 4H7
Tel. (902) 494-3860
Fax. (902) 494-1597
E-mail: Judy.Guernsey@dal.ca

Prince Edward Island

Marilyn Affleck
P.E.I. Federation of Agriculture
420 University Avenue
Charlottetown, P.E.I. C1A 7Z5
Tel. (902) 368-7289
Fax. (902) 368-7204
E-mail: marilyna@peifa.ca

Newfoundland and Labrador

Billy Woods
Farmers with Disabilities NL
17 Ryan's Rd,
Torbay, Newfoundland A1K 1G9
Tel. (709) 437-1480
E-mail: billyw@nl.rogers.com

Appendix F References

Canada Census of Agriculture 1996. Statistics Canada, Ottawa.

Canada Census of Agriculture 2001. Statistics Canada, Ottawa.

Leigh, JP, McMurdy SA, Schenker MB. Costs of Occupational Injuries in Agriculture. *Public Health Rep.* 2001; 116:235-248.

Locker, R., Dorland JL and Hartling L. Economic Burden of Agricultural Machinery Injuries in Ontario, 1985 to 1996. *Rural Health Research.* Summer 2003, 285-291.

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

