

# Seniors' Falls in Nova Scotia

A REPORT

  
**NOVA SCOTIA**

Health Promotion  
and Protection

June • 2007

Seniors' Falls in Nova Scotia: A Report

Department of Health Promotion and Protection in collaboration with the Population Health Research Unit, Dalhousie University

Designed by Laura Graham Design

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# Acknowledgments

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*This report represents the collective efforts of many people and organizations who have shared their expertise in seniors' health and falls prevention. All of these people have demonstrated passion and great concern for this issue. In particular, we are grateful for the time and commitment offered by the Falls Injury Profile Advisory Committee. This group provided strategic advice and input throughout the process of developing this report. Their efforts have contributed significantly to shaping this document—the first-ever report on seniors' falls in Nova Scotia.*

*We would also like to acknowledge the assistance and guidance of the Alberta Centre for Injury Research and Control, the British Columbia Ministry of Health, and the Public Health Agency of Canada.*

*Special thanks to Mark Smith, Pam Talbot, and Dingwei Dai of the Population Health Research Unit, Dalhousie University for their work in preparing the data and analysis for this report.*

*Julian B. Young  
Coordinator, Injury Prevention and Control  
Department of Health Promotion and Protection*

# Forward

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*Injury is without any doubt a significant public health issue in Nova Scotia. While most people do not recognize just how common serious injuries are, most of us have experienced some kind of injury in our lifetime, and far too many of us know first hand the incalculable toll that serious injuries and injury-related deaths have on a family, community, school, and workplace. While the human cost is immeasurable, the economic impact of injury exceeds that of smoking or obesity, costing Nova Scotians \$570 million each year. Sadly, we know that almost all injuries are preventable—they are not accidents.*

*During 2003 the Department of Health Promotion and Protection worked with injury prevention partners from across Nova Scotia to develop the Nova Scotia Injury Prevention Strategy. This initiative established a number of strategic goals for addressing injury in Nova Scotia. One goal identifies the prevention of seniors' falls as a key priority. A second identifies the need to improve the monitoring and reporting of injury issues and trends so as to better inform community action and policy development in Nova Scotia. This report, the first in a series of injury profiles being developed by Health Promotion and Protection, represents a critical action in response to the goals laid out in the Nova Scotia Injury Prevention Strategy.*

*As this report illustrates, falls among seniors have a significant impact on the lives of seniors, their families, and the wider health care system resources. Through the establishment of a falls prevention plan as outlined in Preventing Fall-Related Injuries Among Older Nova Scotians: A Strategic Framework, Nova Scotia Health Promotion and Protection will continue to provide leadership across government and across sectors to address this problem. To succeed, however, we need the commitment of health system leaders, communities, and policy makers. The evidence for what causes falls is quite clear and the interventions that will help us address this problem are well known. Through small changes in behaviour, as well as through the policies and practices of health care and other social systems that affect seniors, we will address this issue and begin to reduce the incidence and severity of seniors' fall-related injuries.*

*I encourage all who read this report to make seniors' falls prevention a priority in the work they do. An organized, collaborative effort can reduce not only the pain and suffering, but also the heavy burden on our health system resources.*

*Jeff Scott, MD  
Chief Medical Officer of Health  
Department of Health Promotion and Protection*

# 1 Addressing Seniors' Falls

## Background and Purpose

Nova Scotia's population is aging. Every month, 700 Nova Scotians celebrate their 65th birthday and by 2026 the number of Nova Scotians aged 65 years and older will double. As Nova Scotia's population of seniors continues to grow, new patterns of injury will emerge. Left unchecked, the volume of these injuries will continue to have a dramatic impact on our health care system as well as on the lives of Nova Scotia's families.

### FACT

- The number of Nova Scotians aged 65+ years will double by 2026.
- The risk of being seriously injured in a fall increases with age.

*Nova Scotia Seniors' Secretariat, 2003:8*

In recent years—in Nova Scotia, across Canada, and internationally—the issue of fall-related injuries among seniors has become more recognized. There is now a growing body of evidence surrounding what causes falls and what works to reduce the incidence and severity of fall-related injuries.

The Nova Scotia Injury Prevention Strategy established preventing seniors' falls as a key priority. In early 2007 Nova Scotia Health Promotion and Protection, in collaboration with many partners, completed the development of Preventing Falls Among Older Nova Scotians: A Strategic Framework. The Strategic Framework provides a comprehensive long-term plan for reducing falls and fall-related injuries among older Nova Scotians.

Beyond the human impact of falls, the economic burden is staggering. Based on 1999 data, falls among seniors cost Nova Scotians \$72 million per year. As the rate of falls increases, so will the associated economic costs.<sup>1</sup>

As the data in this report illustrate, falls also create a significant and disproportionate burden on the health care system. Preventing falls among seniors is one concrete way to stem the growing demands for health resources by

- reducing the strain on emergency departments
- lowering the demand for non-elective and emergency surgeries, such as hip replacements, and thus reducing wait times
- reducing the number of hospital admissions among seniors, who often require complex care and discharge to continuing care
- slowing the demand for long-term care

With an aging population, Nova Scotia cannot afford to be complacent about seniors' falls—we must act now to address this problem.

<sup>1</sup> Atlantic Network for Injury Prevention. Economic Burden of Unintentional Injury in Atlantic Canada. Toronto, SMARTRISK; 2003:19

## Causes of Seniors' Falls

As is the case with most incidents that cause injuries, falls are usually the result of a complex interaction of risk factors. The greater the number of risk factors present, the greater the likelihood that a fall and/or fall-related injury will occur. The risk factors associated with falling can be categorized as biological and medical risk factors, behavioural risk factors, environmental risk factors, and socio-economic risk factors.

For more detailed information regarding the causes of seniors' falls, please refer to Preventing Falls Among Older Nova Scotians: A Strategic Framework. This document is available at [www.gov.ns.ca/hpp/injuryprevention.html](http://www.gov.ns.ca/hpp/injuryprevention.html)

## Falls Prevention: Reducing the Risk

The most effective practices to prevent falls and fall-related injuries involve multiple intervention strategies and target a range of risk factors. A comprehensive approach to preventing falls among seniors typically includes assessment combined with interventions such as exercise programs, behaviour change, medication review and modification, treatment of contributing health conditions, assistive and protective devices, environmental modifications, and education.<sup>2</sup> Healthy living throughout life, which can slow the impact of aging, also will reduce seniors' risk of falling.

<sup>2</sup> Abernethy, G.D., Alley, D., Castle, S.C., Diener, D.D., Hooker, S.P., Horton, et al. Preventing Falls in Older Californians: State of the Art. Sacramento, 2003:10. "California Blueprint for Falls Prevention: A background white paper for the conference" available at [http://www.archstone.org/usr\\_doc/2004\\_PreConf\\_WhitePaper2.pdf](http://www.archstone.org/usr_doc/2004_PreConf_WhitePaper2.pdf)

## 2 Methodology

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### Data Sources

Data for this report were obtained from five databases housed at the Population Health Research Unit (PHRU). A brief description of each database is given below.

#### 1. Insured Patient Registry

The Insured Patient Registry contains longitudinal information (e.g., data of birth, patient geography) about every resident of Nova Scotia who is registered as a beneficiary of provincial MSI health care. Records for some citizens who have their health care costs covered under federal plans (e.g., Canadian Armed Forces, RCMP) are not captured in this database. This registry was used to determine the population eligible for health care services in each year of the study.

#### 2. Canadian Institute of Health Information Discharge Abstract Database (CIHI-DAD)

The CIHI-DAD contains comprehensive, patient-level information (e.g., demographics, diagnoses, treatments) for each admission to a Nova Scotia hospital. Diagnostic information is coded using ICD-9-CM codes for 2000 and ICD-10-CA codes for 2001–2004. These data were used to identify Nova Scotia residents hospitalized for injury-related reasons (including falls) and to provide information about the nature of fall-related hospitalizations (e.g., time and location of fall, anatomic site injured as a result of fall, length of fall-related hospital stay).

#### 3. Vital Statistics Deaths Database (VS)

The VS database contains detailed information about all deaths in Nova Scotia, including demographics, causes of death, and underlying causes of death. These data were used to identify Nova Scotia residents who died as a result of injury (including falls).

#### 4. Seniors' Pharmacare Prescriptions Database (PHARM)

The PHARM database contains information about beneficiaries of the provincially funded Pharmacare plan for seniors. Information in this database includes patient demographics, provider information, and type and quantity of pharmaceuticals dispensed. These data were used to identify medications prescribed to seniors in the 110 days preceding a fall-related hospitalization.

#### 5. 2001 Canada Census—Nova Scotia Component (Census)

The 2001 Census contains statistical data from the 2001 Canadian Census, including demographics, household information, and socio-economic indicators. These data were used to assign median household income (at the dissemination area level) to the study sample.



## 6. Patient Geography Database

The Patient Geography Database contains geographic information based on postal code for every patient in each of the other PHRU databases. In areas where postal codes do not map exactly to other geographic boundaries (e.g., in rural areas), the geographic code is assigned probabilistically using the relative population weights of the surrounding areas. This database was used to assign individual records to particular district health authorities (DHAs) and to particular census dissemination areas (DA).

### Study Population

The study population consisted of Nova Scotia seniors, aged 65 years and older, who were eligible for health care services during one or more of the five study years (calendar years 2000–2004). A total of 158,170 unique individuals were identified using the Insured Patient Registry for the five years of study. In any given year, between 125,000 and 131,000 seniors were eligible to receive health care services.

### Calculation of Fall-Related Hospitalization and Fall-Related Death Rates

To ensure maximum sensitivity in detecting fall-related hospitalizations, all diagnostic (Dx) codes listed on CIHI-DAD records were included in the case definition (2000: Dx1–16; 2001–2004: Dx1–25). An admission was flagged as fall-related if an ICD-9-CM code of E880-E88 or an ICD-10-CA code of W00-W19 was present. The rate of fall-related hospitalizations was calculated by dividing the number of fall-related hospital admissions by the number of seniors at risk. In order to compare fall-related hospitalization rates across DHAs, age-standardized rates were calculated using the 2001 Nova Scotia population as the standard population.

Example:

In 2000, a total of 2,195 seniors had a fall-related hospital admission while the total number of seniors at risk was 124,586. The rate of fall-related hospital admissions for 2000 was 17.6 per 1,000 ( $2,195/124,586 \times 1000$ ).

A death was flagged as fall-related if an ICD-10-CA code of W00-W19 was present in the Vital Statistics record. The rate of fall-related deaths was calculated by dividing the number of fall-related deaths by the number of seniors at risk (see example).

## Factors Associated with Falls Among Seniors

### 1. Urbanicity

An area was defined as urban if it was designated as a census metropolitan area (CMA) or a census agglomeration (CA) in the Patient Geography database. A CMA is a geographic region that encompasses an urban core with a population of 100,000 or more; a CA is a geographic region that encompasses an urban core with a population of 10,000–99,999.<sup>3</sup> In Nova Scotia, there is one CMA (Halifax) and there are four CAs (Kentville, Truro, New Glasgow, and Sydney).

<sup>3</sup> Statistics Canada. 2001 Census Dictionary. Ottawa: Government of Canada. Online Catalogue 92-378-XIE. Available at <http://www12.statcan.ca/english/census01/Products/Reference/dict/index.htm>

## 2. Household Income

Median household income for census dissemination areas<sup>4</sup> (DA) was obtained from the 2001 Canadian Census and linked to individual records via the DA. The range and quartiles for median household income was computed for each DHA, and then seniors were assigned to either the first, second, third, or fourth quartile for their particular DHA on the basis of the DA in which they lived.

## 3. Drug Use

The relationship between fall-related hospitalizations and each of following five classes of drugs was examined: opioids, antipsychotics, hypnotics/sedatives/benzodiazepines, antidepressants, and antihypertensives. The Anatomical Therapeutic Chemical Classification System (ATC) codes used to identify these drugs are listed below (Table 1).

**Table 1. Drug class and corresponding Anatomical Therapeutic Chemical Classification System (ATC) codes**

Drug Class	ATC Code	
Opioids	N02A	
Antipsychotics	N05AA	Phenothiazines
	N05AB	
	N05AC	
	N05AD	Butyrophenone derivatives
	N05AE	Indole derivatives
	N05AF	Thioxanthene derivatives
	N05AG	Diphenylbutylpiperidine derivatives
	N05AH	Diazepines, oxazepines, thiazepines
	N05AK	Neuroleptics in tardive dyskinesia
N05AL	Benzamides	
Hypnotics/Sedatives/ Benzodiazepines	N05C	Hypnotics and sedatives
	N03AE	Benzodiazepine derivatives
Antidepressants	N06A	
Antihypertensives	C02	Antihypertensives
	C07	Beta blockers
	C03	Diuretics
	C08	Calcium channel blockers
	C09	Renin-angiotensin system agents

A logistic regression procedure was used to calculate the odds ratios for falling while controlling for age and gender.

<sup>4</sup> Dissemination areas (DA) are small geographic regions comprising one or more blocks. There are 1,397 DAs in Nova Scotia.

## Acronyms

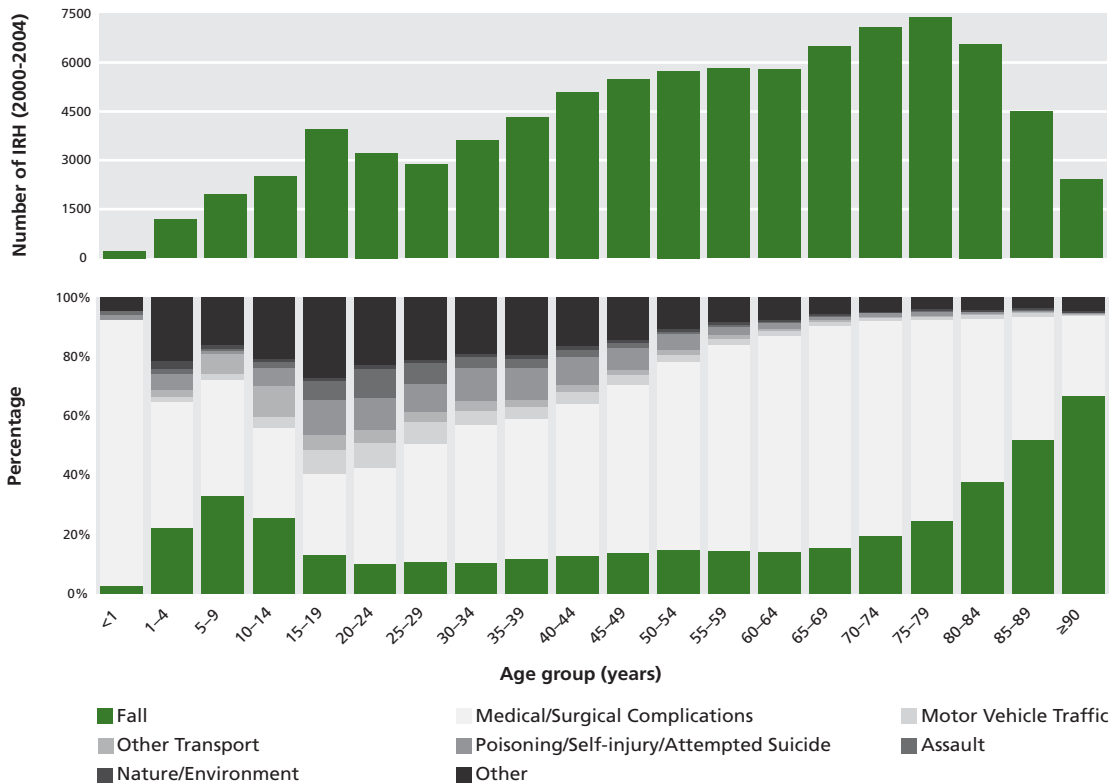
ALC	Alternative level of care
ATC codes	Anatomical Therapeutic Chemical Classification System codes
CA	Census agglomeration
CI	Confidence interval
CIHI-DAD	Canadian Institute for Health Information – Discharge Abstract Database
CMA	Census metropolitan area
DA	Dissemination area (census)
DHA	District Health Authority
Dx code	Diagnostic code
FRD	Fall-related death
FRH	Fall-related hospitalization
FRHD	Fall-related hospital days
ICD	International Classification of Diseases
IRD	Injury-related death
IRH	Injury-related hospitalization
MSI	Medical Services Insurance
MVC	Motor vehicle collision
OR	Odds ratio
PHARM	Seniors' Pharmacare Prescriptions Database
PHRU	Population Health Research Unit
VS	Vital Statistics

### 3 Overview of Injuries in Nova Scotia (2000–2004)

In the five-year study period, there were more than 86,000 injury-related hospitalizations in Nova Scotia. Hospitalizations of this type were uncommon among infants under the age of one year (Figure 1). Throughout the childhood years the number of injury-related hospitalizations increased steadily, reaching a peak during the mid-to-late teens (15–19 years). For this age group, motor vehicle collisions (MVC) and self-harm behaviour accounted for one-fifth of these hospitalizations. In early adulthood (20–29 years) there was a brief decline in the number of injury-related hospitalizations, followed by a progressive increase that reached a peak among individuals aged 75–79 years. Among seniors, falls became an increasingly common cause of injury-related hospitalization. Among those aged 85 years and older, falls accounted for more than half of all such hospitalizations.

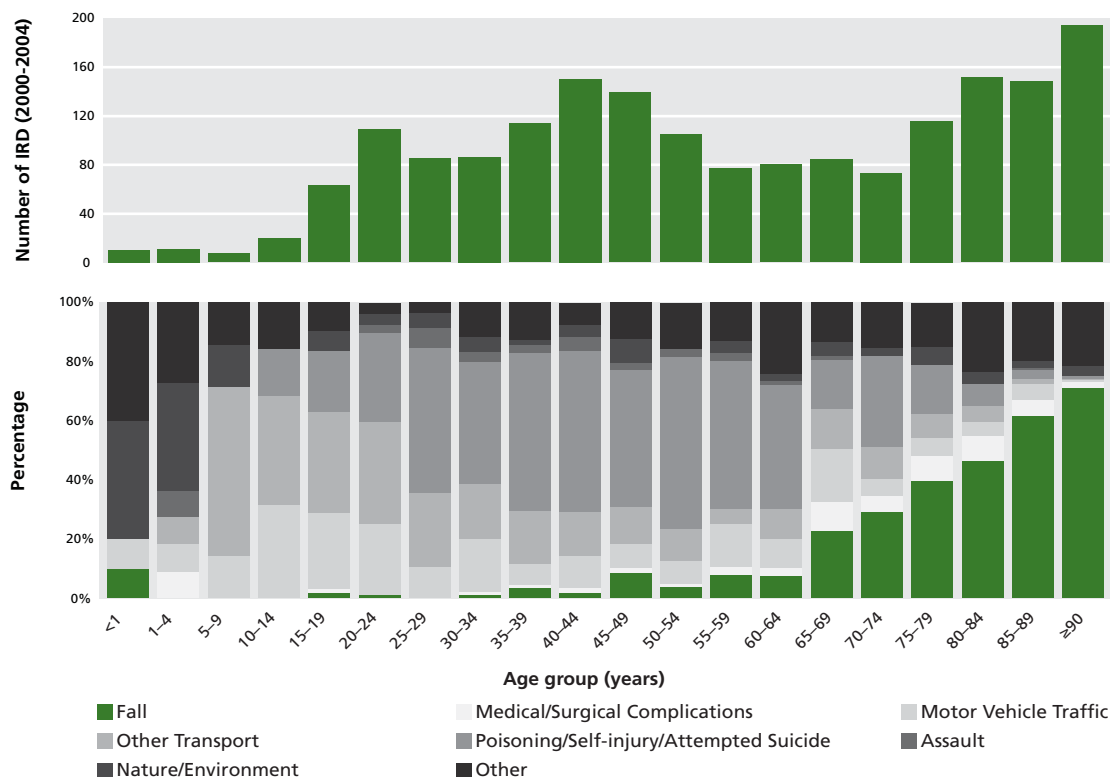
It is important to note that although the number of injury-related hospitalizations declines after age 75–79 years, the rate of injury-related hospitalization increases. The annual rate of injury-related hospitalizations for seniors aged 75–79 years was 58 per 1,000; this rate increased to 70 per 1,000 for seniors aged 80–84 years and increased again to 88 per 1,000 for seniors aged 85 years and older.

**Figure 1. External cause for injury-related hospitalizations (IRH) in Nova Scotia, 2000–2004**



Overall, the number of deaths due to injury peaked at three points across the lifespan (Figure 2). The first increase occurred at age 20–24 years; over half of the deaths in this age group were attributed to collisions involving motor vehicles or other forms of transport. The second spike in the number of injury-related deaths occurred among those in their 40s. For this age group, the most common cause of death due to injury was suicide (51%), followed by motor vehicle and transport collisions (23%). The third increase in the number of injury-related deaths occurred among seniors, especially those aged 80 years and older. Throughout the senior years, an increasingly higher proportion of injury-related deaths was caused by falls. By age 90 years, falls accounted for more than 70% of all injury-related deaths.

**Figure 2. External cause for injury-related deaths (IRD) in Nova Scotia, 2000–2004**



During the five years studied (2000–2004), 18,220 hospitalizations and more than 400 deaths resulted from a fall. These figures represent an annual average of about 3,644 fall-related hospital admissions and 84 fall-related deaths (Table 2). Notably 59% of all fall-related hospitalizations and 91% of all fall-related deaths occurred among seniors.

**Table 2. Fall-related hospitalizations and deaths by age in Nova Scotia, 2000–2004**

Age in years	Hospitalizations		Deaths	
	No.	%	No.	%
0–4	273	1.50	*	*
5–24	2,145	11.77	*	*
25–44	1,853	10.17	8	1.92
45–64	3,288	18.05	28	6.73
65 and older	10,661	58.51	380	91.35
Total	18,220	100.00	416	100.00

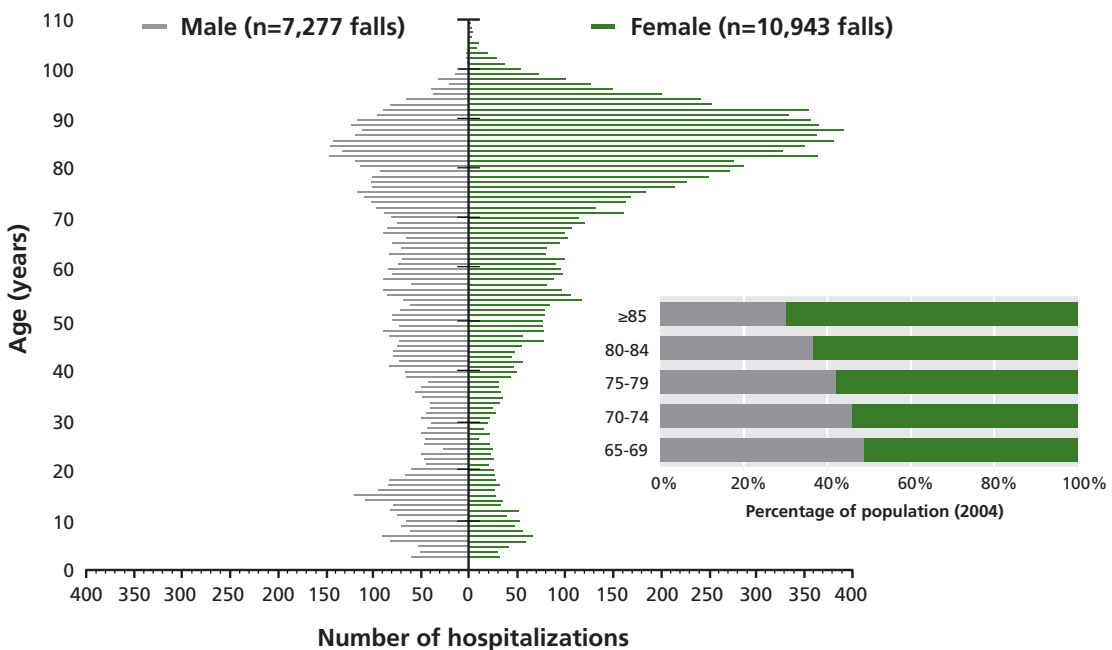
**FACT**

- On average, 76 seniors die from falls each year
- Mortality from falls increases dramatically with age

\* Number suppressed due to small (<5) count (counts for these cells are not included in total)

There was a disproportionate number of fall-related hospitalizations among females (F=60.1% vs M=39.9%). One factor that contributes to this discrepancy is the greater number of female seniors in the population compared to their male counterparts (see inset). In 2004, there were 74,949 female seniors compared to 55,919 males (F= 57% vs M=43%). For the youngest age group, the difference in population size for females and males was negligible (F=19,246 vs M=18,515); however, at age 85 years, there were 2.3 times as many females as males (F=11,649 vs M=5,013). For both males and females, the highest number of falls resulting in hospitalization occurred among seniors (Figure 3).

**Figure 3. Fall-related hospitalizations by age and gender in Nova Scotia, 2000–2004**



**FACT**

Women fall at a significantly higher rate than men. *Public Health Agency of Canada, 2005:12*

## 4 Fall-Related Hospitalizations and Deaths among Nova Scotia Seniors

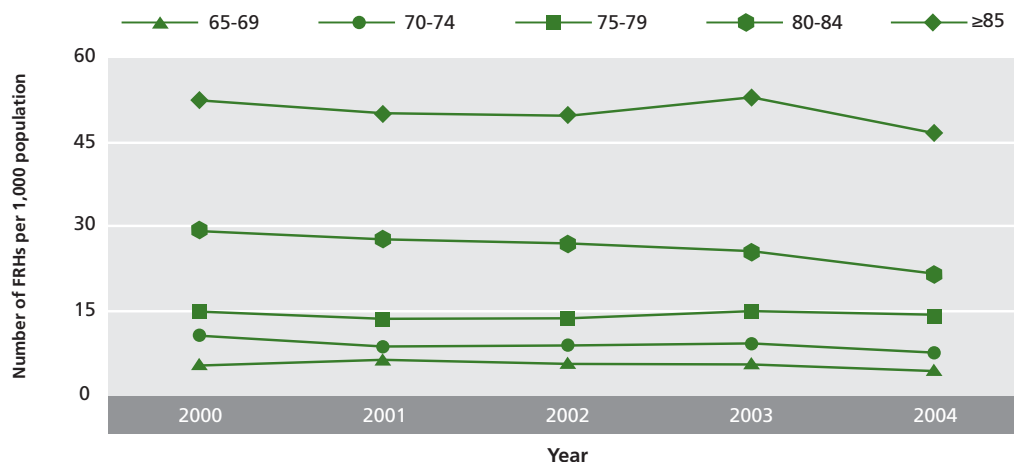
There were 10,661 fall-related hospital separations in Nova Scotia between 2000 and 2004, representing an annual average of 2,132 or an average rate of 16.71 per 1,000 seniors. The hospital separation rates were fairly consistent over the five-year period (Figure 4). The annual number of fall-related hospitalizations per 1,000 seniors was relatively low for the younger age groups:  $\leq 6.3$  for those aged 65–69 years,  $\leq 10.4$  for those aged 70–74 years, and  $\leq 15.1$  for those aged 75–79 years. By age 80–84 years, the annual rate increased substantially to between 22.0 and 29.2 per 1,000 seniors, depending on the year. For this age group, there was a slight decline in the rate of fall-related hospitalizations across the five study years. The annual rate of falls requiring hospitalization increased again for those aged 85 years and older; by this age, 47–53 of every 1,000 seniors had experienced a fall-related hospitalization within a 12-month period.

### FACT

- Women are twice as likely as men to be injured by a fall
- The rate of fall-related hospitalizations for seniors aged 85+ years ranges from 47 to 53 per 1,000

*Public Health Agency of Canada, 2005:11*

**Figure 4. Fall-related hospitalization (FRH) rate per 1,000 population by age in Nova Scotia, 2000–2004**



As illustrated by Figure 5 on the next page, on average, the odds of having a fall-related hospitalization was almost twice as high for females aged 65 years and older than for their male counterparts (OR=1.77, 95% CI=1.61, 1.95).<sup>5</sup> The annual rate of fall-related hospitalization was about 6 per 1,000 population for females aged 65–69 years, increasing to 56 per 1,000 for those aged 85 years and older (Figure 5). For males aged 65–69 years, the annual rate of fall-related hospitalization (5 per 1,000) was similar to that of females; however, by age 85 years and older, the rate among males (37 per 1,000) was approximately 58% lower than that of females.

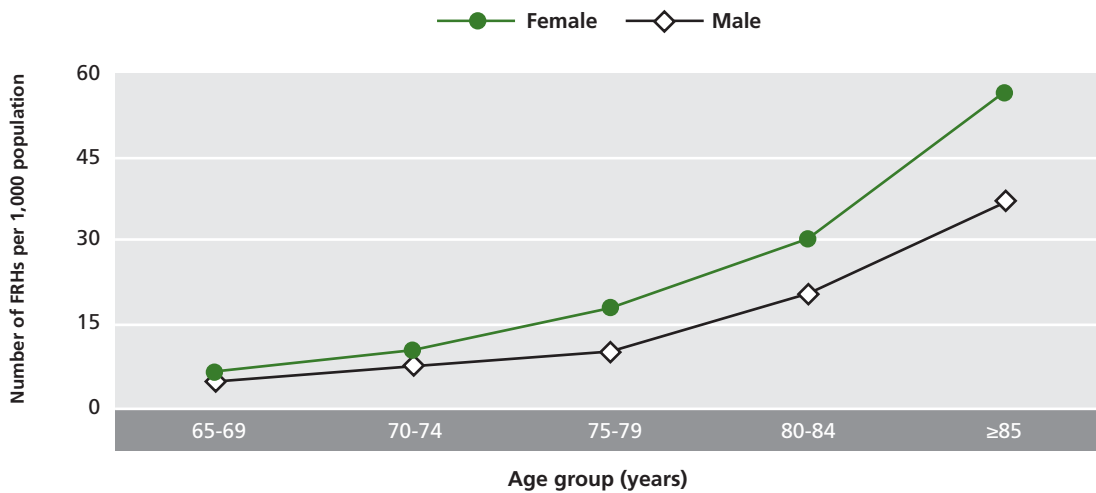
### FACT

Women aged 65+ years are twice as likely to fall as men the same age.

<sup>5</sup> OR = Odds ratio (i.e., the ratio of two odds). An odds is also a ratio: the probability of an event occurring (e.g., falling) versus the probability of the event not occurring (e.g., not falling). For example, if 75 female seniors fall and 25 do not fall, the odds of falling among female seniors is 75:25 or 3:1. An odds ratio is simply the ratio of two odds. If the odds of falling among male seniors is 3:2 and the odds of falling among female seniors is 3:1, the odds ratio for males versus females is 1:2 – that is, the odds of a female falling is twice as high as the odds of a male falling. Last, J.M., ed. "Odds & Odds ratio" in A dictionary of epidemiology, 4th edition. New York: Oxford University Press; 2001:128

For both females and males, the annual rate of fall-related hospitalizations increased with age. Overall, the odds of having a fall-related hospitalization was 1.40 times higher for seniors aged 70–74 years than for those aged 65–69 years (95% CI=1.17, 1.67). For seniors aged 75–79 years, the odds increased to 2.36 (95% CI=2.00, 2.78), and for aged 80 years or older, the odds increased to 5.73 (95% CI=4.97, 6.62).

**Figure 5. Annual fall-related hospitalization (FRH) rates by age and gender in Nova Scotia, 2000–2004**



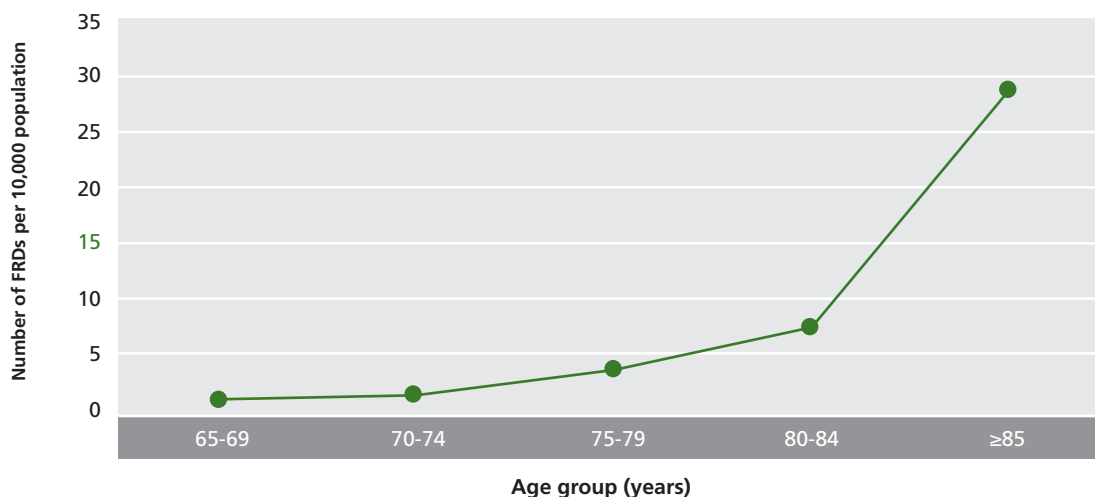
Between 2000 and 2004, there were 380 fall-related deaths among seniors in Nova Scotia. Of these deaths, 226 (59%) occurred among seniors aged 85 years or older. The annual number of falls resulting in death was low ( $\leq 85$ ), making time trends difficult to interpret. As such, the annual death rates across the five years of study are presented on the next page (Figure 6). The annual rate of fall-related deaths increased with age, especially for seniors aged 85 years and older. By age 85 years, the death rate resulting from falls increased threefold over that of seniors aged 80–84 years. On average, 29 out of every 10,000 seniors aged 85 years or older died as a result of a fall.

**FACT**

Among older adults, fall-related injuries account for five times more hospitalizations than any other cause  
*Centers for Disease Control and Prevention, 2006*



**Figure 6. Annual fall-related death (FRD) rate by age in Nova Scotia, 2000–2004**



**FACT**

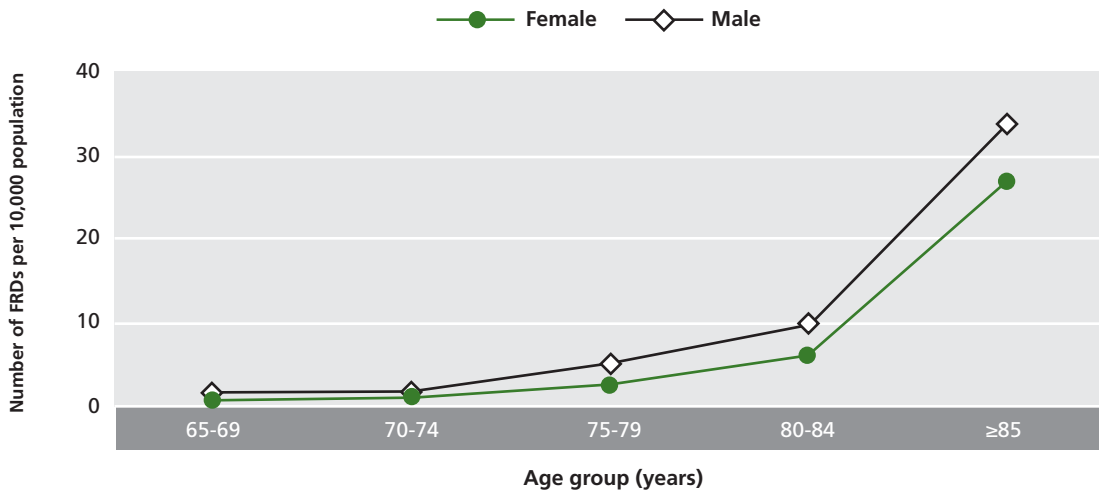
- Falls are the sixth leading cause of death among older adults in Canada
- 380 NS seniors died of fall-related injuries between 2000 and 2004
- At age 65–69 years males are three times more likely to die from a fall than females, but at age 85+ years that rate decreases to 1.3 times

*Lockett et al, 2004*

The annual rate of fall-related deaths differed between males and females and across age groups (Figure 7). In contrast to the higher rates of fall-related hospitalizations among females, the rate of fall-related deaths was higher among males. The proportion of males who died as a result of a fall was three times higher than that of females for the youngest age group,  $\geq 1.7$  times higher for those aged 70–74 years, 75–79 years, and 80–84 years, and 1.3 times higher for those aged 85 years or older.

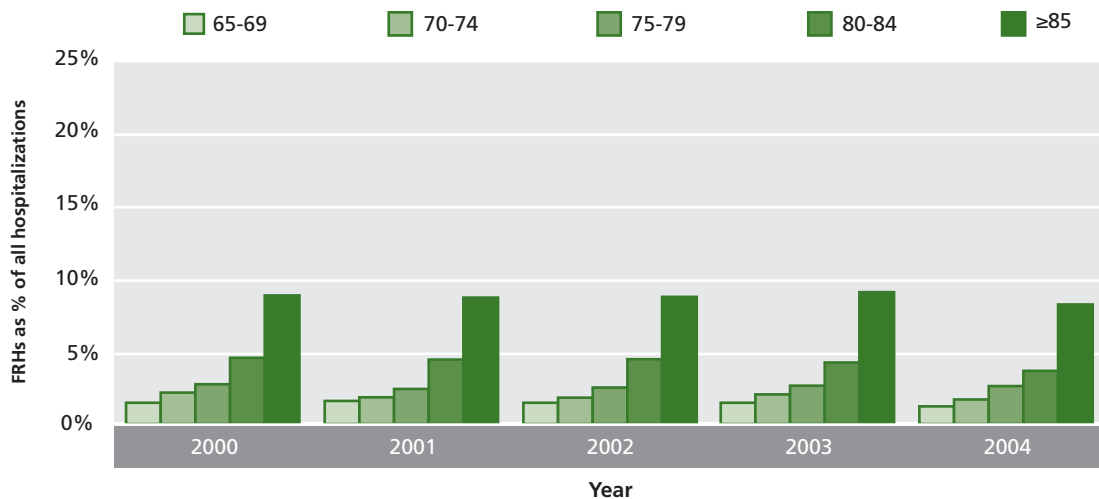
For both genders, the rate of fall-related deaths increased with age. The rates were quite low for the two youngest age groups ( $F \leq 0.9/10,000$ ;  $M \leq 1.8/10,000$ ). By age 75–79 years, these rates increased moderately to 2.4/10,000 for females and 5.1/10,000 for males; by age 80–84 years the rates increased again to 5.9 and 9.9 per 10,000 respectively. Among those aged 85 years and older, the fall-related death rates more than quadrupled for females (26.8/10,000) and more than tripled for males (33.74/10,000).

**Figure 7. Annual fall-related death (FRD) rate by age and gender in Nova Scotia, 2000–2004**



There were 315,642 records for hospitalizations among the senior population in Nova Scotia between 2000 and 2004; 10,661 (3.38%) of these were the result of a fall-related injury. The proportion of hospitalizations resulting from fall-related injuries increased with age (Figure 8). Among seniors aged 65–84 years, less than 5% of all hospitalizations were attributable to fall-related injuries. A substantial increase in this figure occurred by age 85 years, with about 8%–9% of all hospitalizations caused by fall-related injuries.

**Figure 8. Fall-related hospitalizations (FRHs) as a percentage of all hospitalizations by age in Nova Scotia, 2000–2004**

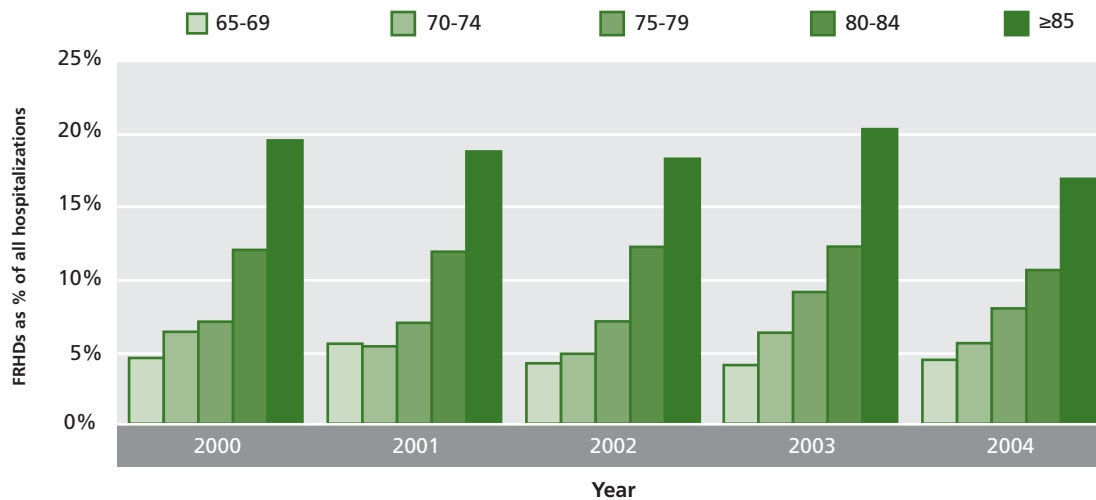


**FACT**

- Between 2000 and 2004, 10,661 seniors in Nova Scotia were hospitalized due to fall-related injuries
- While less than 5% of all hospitalizations of 65–84-year-olds were attributable to fall-related injuries, this rate almost doubled at age 85+ years

Between 2000 and 2004, more than 2.1 million hospital days were used by seniors in Nova Scotia, 10% of which were used by seniors who had a fall-related injury. An age trend was evident for the proportion of all hospital days accounted for by fall-related injuries (Figure 9). Fewer than 10% of hospital days used by seniors between the ages of 65 and 79 years were attributable to fall-related injuries; this proportion increased slightly to 11%–12% for those aged 80–84 years, and increased substantially to 17%–20% for those aged 85 years and older. A fall that requires hospitalization is by its very nature serious, almost always involving at least one broken bone and often involving multiple traumas. Frequently, orthopedic surgery and post-operative rehabilitation therapy are required to treat fall-related injuries; as such, hospital stays for falls tend to be longer than for non-fall-related hospitalizations.

**Figure 9. Fall-related hospital days (FRHDs) as a percentage of all hospital days by age in Nova Scotia, 2000–2004**



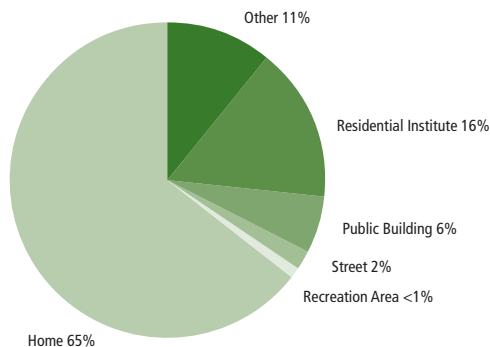
**FACT**

Of the 2.1 million hospital days used by seniors between 2000 and 2004, 10% were due to fall-related injuries

## 5 Nature of Fall-related Injuries

Almost two-thirds of the falls among seniors that required hospitalization occurred in or around the home (Figure 10a). Falls in residential institutions accounted for an additional 16% of the fall-related hospitalizations among seniors aged 65 years or more. The proportion of falls occurring in or around the home was relatively stable across age. The proportion of falls occurring in residential facilities increased with age, from 6% of falls among those aged 65–69 years to 24% of falls among those aged 85 years or older (Figure 10b). According to a 2001 Canadian Census report, approximately 9% of females and 5% of males aged 65 years or older lived in residential facilities<sup>6</sup>; yet 16% of fall-related hospitalizations for this age group occurred in such premises. One possible explanation for this apparent discrepancy may be that a disproportionate number of seniors aged 85 years or older live in residential care facilities.<sup>6</sup> In addition, seniors who are living in residential care facilities are likely to have more health problems and to be more frail than their counterparts who are still living in their own home or in the home of family members.

**Figure 10a. Place of occurrence for falls requiring hospitalization in Nova Scotia, 2000–2004**



Home includes places of residence such as a house, apartment, boarding house, farm house, or other non-institutional dwelling as well as the areas outside the home such as the driveway, garage, garden, walkway, or swimming pool.

**Figure 10b.**



### FACT

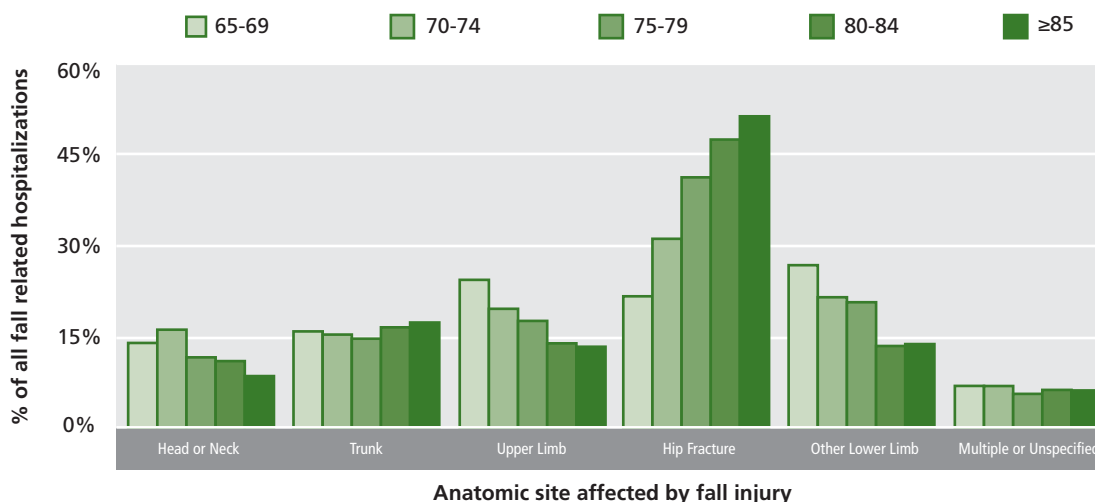
- Two-thirds of all falls requiring hospitalization occur in the home
- 16% of fall-related hospitalizations in Nova Scotia occur in residential care facilities
- The rate of fall-related hospitalization is higher among those aged 85+ years, who are far more likely to live in residential care settings

*Public Health Agency of Canada, 2005:22*

<sup>6</sup> Statistics Canada. "More seniors living with a spouse, more living alone and fewer living in health care institutions." Profile of Canadian Families and Households: Diversification Continues, 2001 Census. Ottawa: Government of Canada. Available at <http://www12.statcan.ca/English/census01/products/analytic/companion/fam/Canada.cfm>

Between April 1, 2001 and December 31, 2004, records for a total of 7,995 fall-related hospitalizations included information about the anatomic site of injury. Just under half of these hospitalizations were for hip fractures. Other areas of the body that were common sites for fall-related injuries included the upper limbs and lower limbs (excluding hip). The proportion of falls resulting in a hip fracture increased dramatically with age, from 22% at age 65–69 years to 53% at age 85 years or older.

**Figure 11. Site of injury† for falls requiring hospitalization in Nova Scotia, 2001-2004**



†The sum of the bars for a given age group exceeds 100% as more than one body region was noted as the site of injury for some fall-related hospitalization cases (i.e., codes for the individual body regions affected were listed rather than the multiple region code).

Data (n=2,666 cases) for fiscal year 2000 (April 1, 2000-March 31, 2001) were omitted as injuries were coded using ICD-9 codes, which are grouped according to type of injury rather than anatomic site. Data for 2001–2004 were coded using ICD-10 codes, which are grouped by anatomic site.

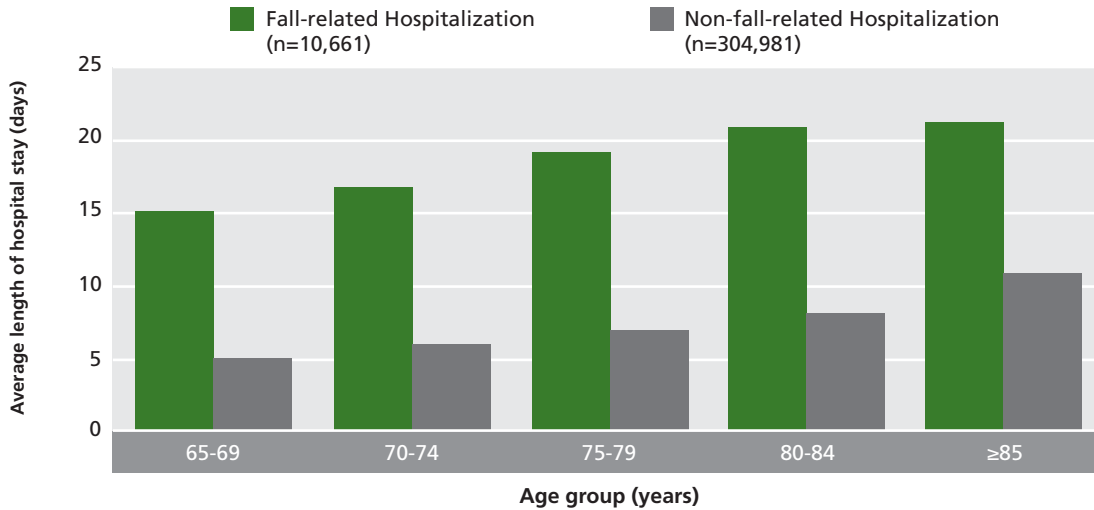
**FACT**

- Nearly 50% of fall-related hospitalizations among seniors are due to hip fractures
- Falls cause more than 90% of all hip fractures in seniors
- 20% of seniors die within one year of a hip fracture
- Falls among those aged 65–69 years result in hip fractures 22% of the time, and by age 85+ years the rate of hip fracture rises to 53%

*Public Health Agency of Canada, 2005:6*

In general, the average length of hospital stay resulting from a fall-related injury increased with age (Figure 12). For those aged 65–69 years, the average duration of a fall-related hospitalization was about 15 days, increasing to 21 days by the age of 85 years. It is important to note that the average length of stay for fall-related hospitalizations was about three times longer than for hospitalizations due to other non-fall-related causes for seniors aged 65–84 years and two times longer for those aged 85 years and older. The average length of hospital stay was stable across the five years of study for both fall-related and non-fall-related hospitalizations.

**Figure 12. Average length of stay due to falls (versus all other causes) by age for hospitalizations in Nova Scotia, 2000–2004**

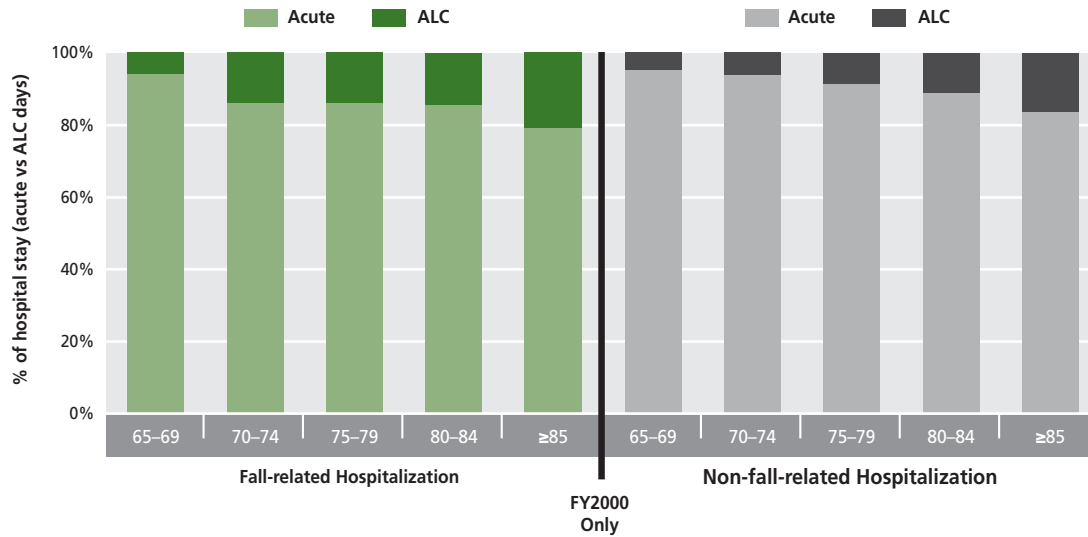


**FACT**

- Among seniors aged 65–84 years, a fall-related hospitalization is approximately three times lengthier than hospital stays for all other causes
- The length of a hospital stay is twice as long for seniors aged 85+ years as for those aged 65–84 years

The number of acute versus alternative level of care (ALC) days was captured only for fiscal year 2000 (April 1, 2000–March 31, 2001). The share of hospital stay accounted for by ALC days increased with age for seniors who were hospitalized for a fall-related injury and for those hospitalized for other reasons (Figure 13). For seniors in the youngest age group, less than 6% of hospital days were ALC days (5.84% for falls, 4.75% for non-falls); these figures increased more than threefold for seniors aged 85 years and older (20.82% for falls, 16.27% for non-falls). The proportion of hospital stay allocated to ALC days was higher for seniors who were hospitalized for a fall-related injury than for those hospitalized for other reasons across all age groups.

**Figure 13. Percentage of hospital days designated as acute versus alternative level of care (ALC) days by age for fall-related and non-fall-related hospitalizations in Nova Scotia, April 1, 2000–March 31, 2001**



**FACT**

- ALC days for hospitalizations from fall-related injuries are disproportionately higher than those for non-falls hospitalizations
- Among those aged 85+ years, ALC days due to falls increase threefold
- 40% of all nursing home admissions are related to falls

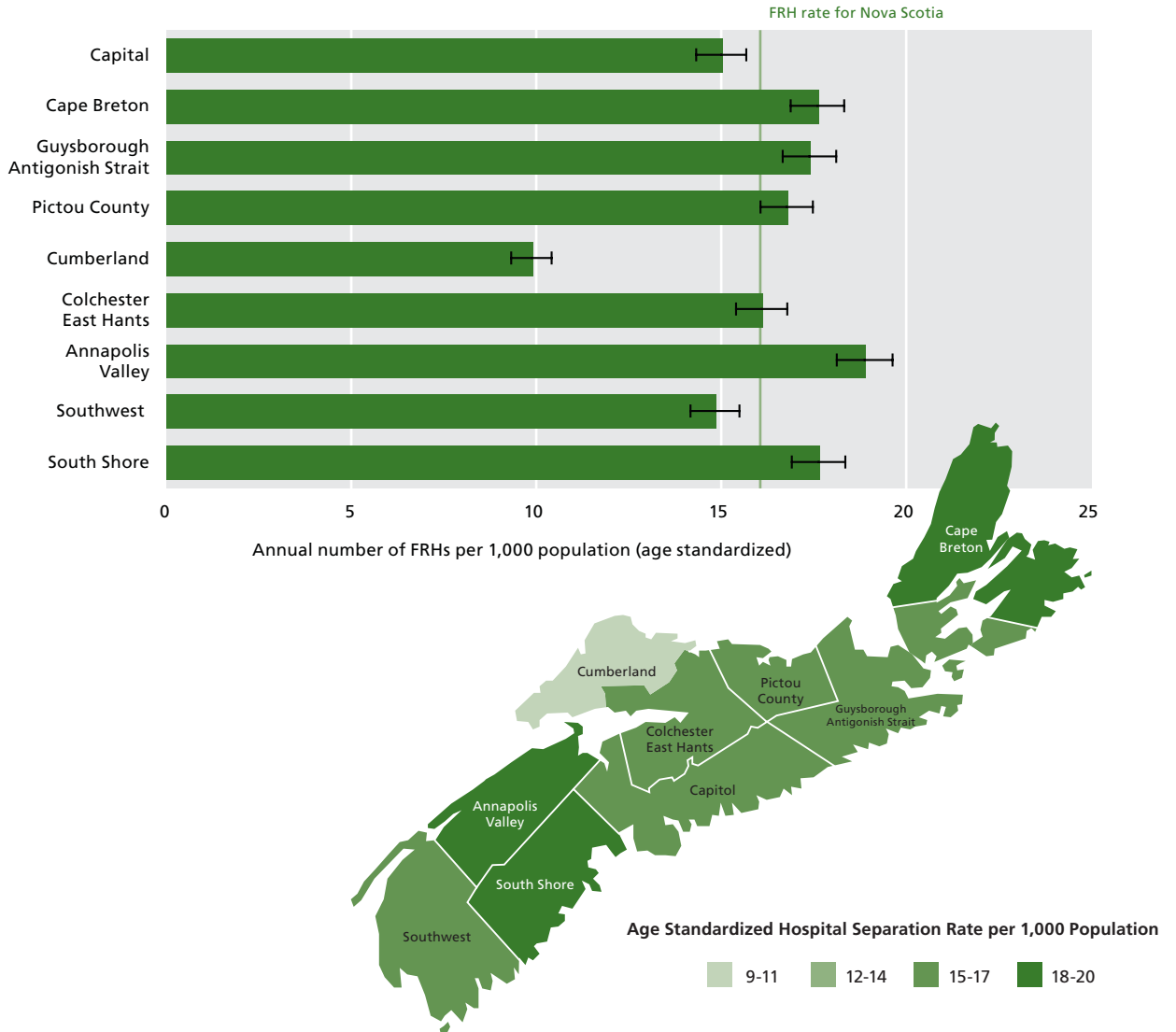
*Public Health Agency of Canada, 2005:6*

# 6 Socio-demographic Factors Associated with Falls among Seniors

## District Health Authority (DHA)

Fall-related hospitalization rates for the South Shore, Annapolis Valley, Pictou, Guysborough-Antigonish-Strait, and Cape Breton DHAs were higher than the provincial average of 16.06 per 1,000 standard population (Figure 14). The rates for the Capital, Cumberland, and South West DHAs were lower than the provincial rate. It is important to note that residents of Cumberland County often access hospital services in Moncton, N.B. Currently out-of-province hospitalizations are not captured in the provincial administrative data; accordingly, the hospitalization rates for Cumberland County are underestimated.

**Figure 14. Annual age standardized rates with 95% confidence interval boundaries for fall-related hospitalizations (FRHs) by DHA in Nova Scotia, 2000–2004**



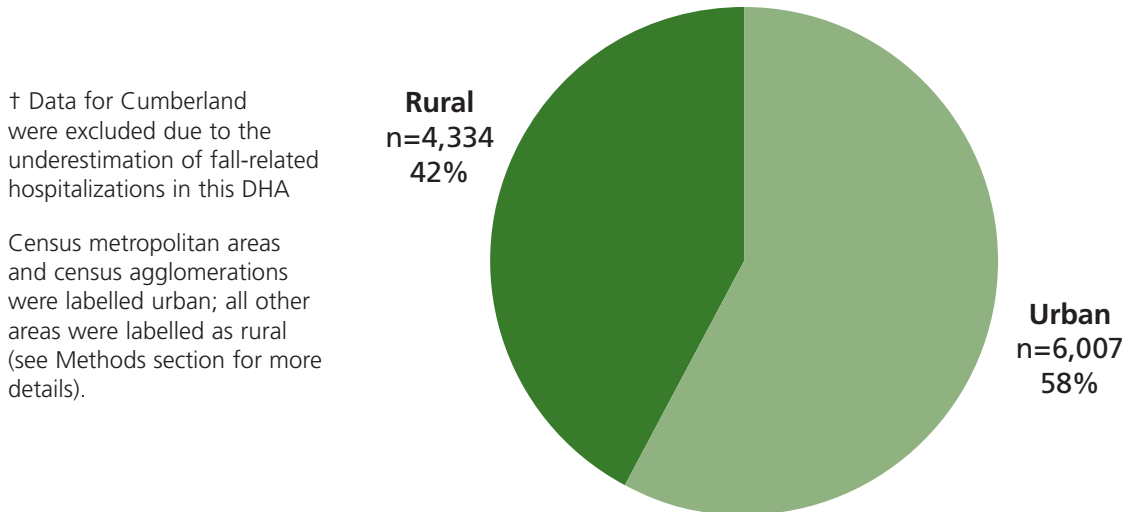
Of the 10,661 fall-related hospitalizations, 257 (2.4%) were missing information required to assign DHA



## Rural/Urban

Although a greater percentage of falls occurred in urban areas compared to rural areas (Figure 15), the annual hospitalization rate for fall-related injuries in urban areas was lower. Approximately 16 of every 1,000 seniors living in an urban setting were hospitalized as a result of a fall, whereas 18 of every 1,000 seniors living in a rural<sup>†</sup> setting were hospitalized for a fall-related injury (p=0.001).

**Figure 15. Percentage of fall-related hospitalizations occurring in urban versus rural<sup>†</sup> regions of Nova Scotia, 2000–2004**



## Seniors' Household Income

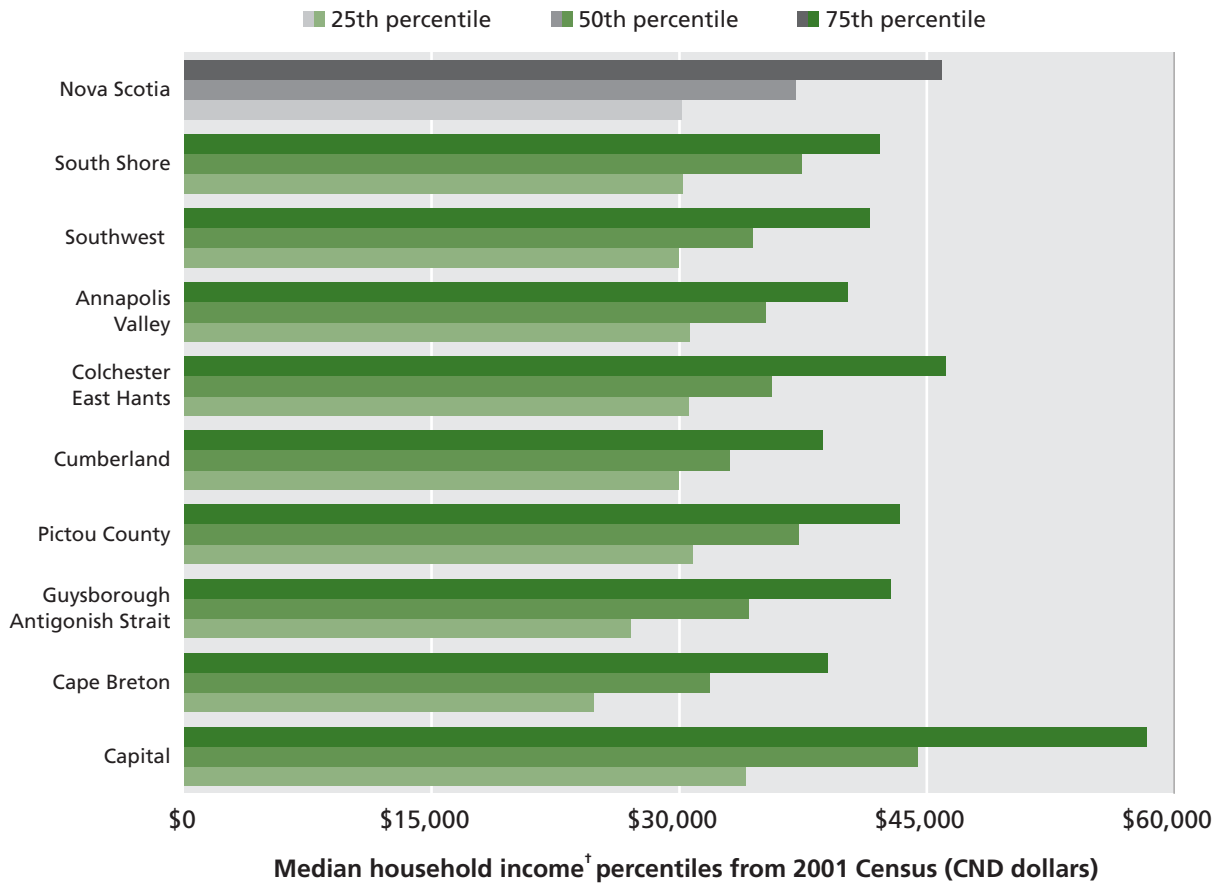
Median household income, obtained from the 2001 Canadian Census, varied across DHA (Table 3). The highest incomes were observed in Capital DHA, where median household incomes in the 50th percentile were higher than those in the 75th percentile for all other DHAs except Colchester East Hants (Figure 16).

**Table 3. Median household income<sup>†</sup> quartiles from 2001 Census by DHA**

District Health Authority	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
Nova Scotia	\$0 – \$30,127	\$30,128 – \$37,088	\$37,089 – \$45,891	≥ \$45,892
South Shore	\$0 – \$30,253	\$30,254 – \$37,437	\$37,438 – \$42,171	≥ \$42,172
South West	\$0 – \$29,949	\$29,950 – \$34,473	\$34,474 – \$41,543	≥ \$41,544
Annapolis Valley	\$0 – \$30,599	\$30,600 – \$35,266	\$35,267 – \$40,226	≥ \$40,227
Colchester-East Hants	\$0 – \$30,582	\$30,583 – \$35,631	\$35,632 – \$46,139	≥ \$46,140
Cumberland	\$0 – \$29,969	\$29,970 – \$33,080	\$33,081 – \$38,701	≥ \$38,702
Pictou County	\$0 – \$30,851	\$30,852 – \$37,235	\$37,236 – \$43,377	≥ \$43,378
Guysborough-Antigonish-Strait	\$0 – \$27,033	\$27,034 – \$34,204	\$34,205 – \$42,842	≥ \$42,843
Cape Breton	\$0 – \$24,859	\$24,860 – \$31,832	\$31,833 – \$39,024	≥ \$39,025
Capital	\$0 – \$34,053	\$34,054 – \$44,482	\$44,483 – \$58,328	≥ \$58,329

† Median household income for neighbourhood was assigned to seniors at the level of dissemination area (DA).

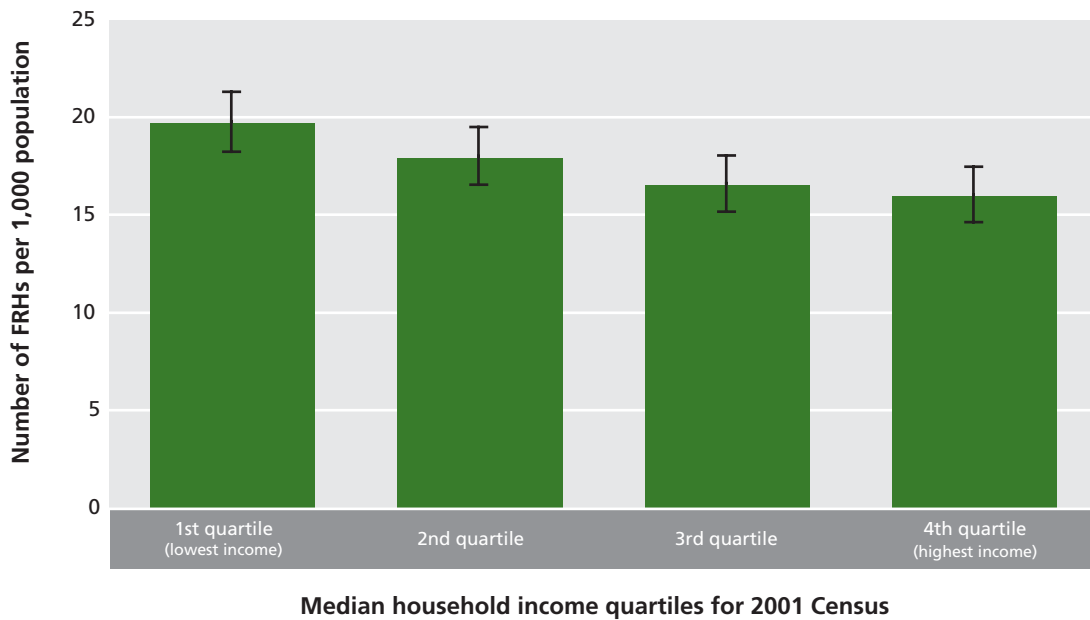
Figure 16. Median household income percentiles from 2001 Census by DHA



† Median household income for neighbourhood was assigned to records at the level of dissemination area (DA).

Median household income was inversely associated with rates for fall-related hospitalizations (Figure 17). The fall-related hospitalization rate for the first (lowest) income quartile differed significantly from the rates for the third and fourth quartiles. In 2000 the fall-related hospitalization rate for seniors was 20 per 1,000 for the first income quartile (95% CI: 18.2, 21.2), 17 per 1,000 for the third income quartile (95% CI: 15.1, 18.0), and 16 per 1,000 for the fourth income quartile (95% CI: 14.5, 17.4).

**Figure 17. Annual rates for fall-related hospitalizations (FRHs) by median household income quartile in Nova Scotia, 2000†**



†Fall-related hospitalization rates for 2000 were used, as the median household income figures for the 2001 Census were based on income earned in 2000.

**FACT**

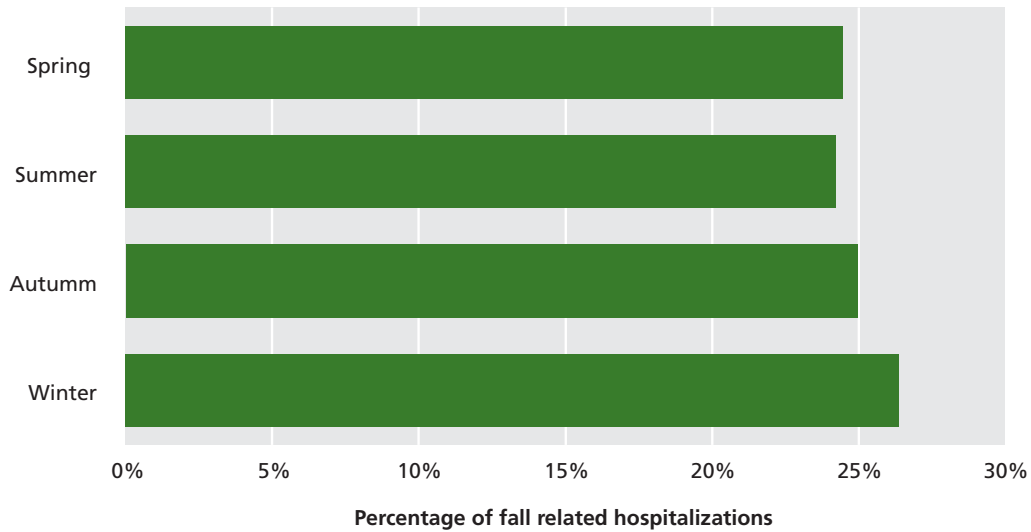
- Lower income is associated with increased rates of falls
- Low education levels, inadequate housing, lack of support networks, lack of access to health or social services, and chronic health conditions also are associated with increased risk of falls among seniors

*Public Health Agency of Canada, 2005:36*

### Seasons

Approximately 26% of all fall-related hospitalizations occurred in the winter months (Figure 18). Although the number of fall-related hospitalizations was slightly higher in the winter (n=2,812) than the spring (n=2,606), summer (n=2,583), or autumn (n=2,660), the differences were not statistically significant (p>0.05).

**Figure 18. Fall-related hospitalizations by season<sup>†</sup> in Nova Scotia, 2000–2004**

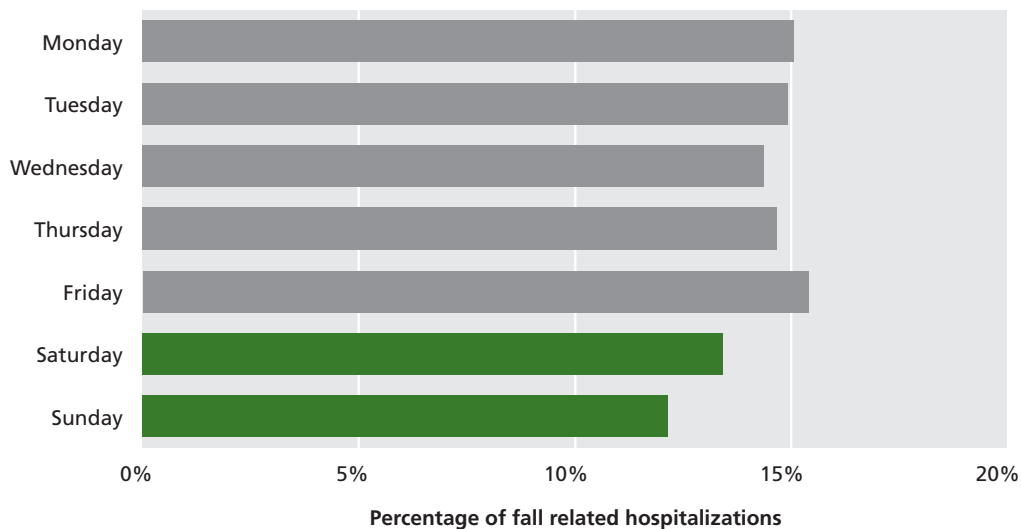


<sup>†</sup>Spring = March–May Summer = June–August Fall = September–November Winter = December–February

### Weekday

The rate of fall-related hospitalizations varied by day of week (Figure 19). The number of fall-related hospital admissions was significantly lower (p<0.01) during the weekend (n=1,296–1,431) than during the weekdays (n=1,532–1,641). One explanation for the lower proportion of fall-related hospitalizations on the weekend is that family and friends may be more available to help seniors manage day-to-day tasks that put them at an increased risk of falling (e.g., using a step-ladder to reach a high shelf).

**Figure 19. Fall-related hospitalizations by day of week in Nova Scotia, 2000–2004**



## 7 Clinical Factors Associated with Falls Among Seniors

### Drug Use

Five commonly prescribed classes of drugs among seniors are opioids, antipsychotics, hypnotics/sedatives/benzodiazepines (hyp/sed/benzo), antidepressants, and antihypertensives. About 37% of female patients and 25% of male patients hospitalized for fall-related injuries were prescribed one or more of these medications within the 110 days preceding their fall-related admission (Table 4).

**Table 4. Number and per cent of patients with fall-related hospitalizations (FRH) who were prescribed specified medications<sup>†</sup>; by gender, in Nova Scotia 2000–2004**

	Population with FRH			
	Female No. (%)		Male No. (%)	
Opioids	940	(12.3%)	287	(9.6%)
Antipsychotics	402	(5.3%)	102	(3.4%)
Hypnotics/sedatives/benzodiazepines	735	(9.6%)	217	(7.2%)
Antidepressants	1,780	(23.3%)	404	(13.4%)
Antihypertensives	787	(10.3%)	144	(4.8%)
Any medication listed above	2,848	(37.2%)	759	(25.3%)

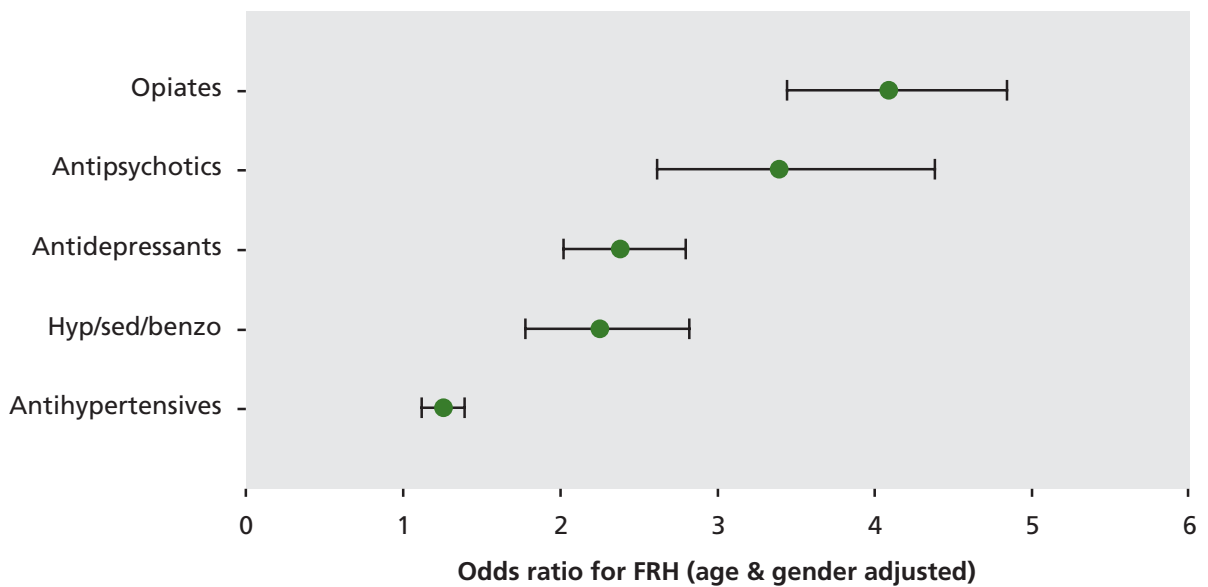
<sup>†</sup>Drug use was extracted from NS Seniors' Pharmacare Database by prescription date within 110 days before hospital admission date.

### FACT

Seniors who are prescribed opioids, antipsychotics, hyp/sed/benzo, antidepressants, or antihypertensives are more likely to experience a fall-related hospitalization

After adjusting for age and gender, seniors who were prescribed opioids, antipsychotics, hyp/sed/benzo, antidepressants, or antihypertensives were more likely to experience a fall-related hospitalization than seniors who were not prescribed these medications (Figure 20). It is important to note that these data do not necessarily demonstrate a causal link between medication use and falling. The data do suggest, however, that seniors who are taking these medications are more likely to fall—although the cause of the fall may be an underlying illness that the medication is being used to treat. Further research is needed to explore the nature of the relationship between medication use and falls among seniors.

**Figure 20. Adjusted odds ratios for fall-related hospitalization (FRH) among seniors receiving specific prescription medication in Nova Scotia, 2000–2004**



# The Way Forward

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As stated at the beginning of this report, the Nova Scotia Injury Prevention Strategy established the prevention of seniors' falls as a key priority. Preventing Falls Among Older Nova Scotians: A Strategic Framework lays out a comprehensive, long-term plan to reduce falls and fall-related injuries among our population of seniors.

Having established some of the key facts that detail the magnitude of the issue of seniors' falls, our attention must now focus on a commitment to the Strategic Framework, which includes the following five goals:

## **Strategic Goal 1 – Leadership, Infrastructure, and Partnership**

Appropriate and adequate leadership, infrastructure, and partnerships sustain all aspects of the Strategic Framework.

## **Strategic Goal 2 – Awareness and Understanding**

Nova Scotians are aware of the issue of seniors' falls and fall-related injuries and understand how to prevent them.

## **Strategic Goal 3 – Education**

Seniors, care providers, organizations, and communities have the skills and knowledge to reduce the risk of falls and fall-related injuries.

## **Strategic Goal 4 – Supportive Environments**

Supportive environments are created and nurtured by healthy public policies that promote health and reduce the risk of falls and fall-related injuries.

## **Strategic Goal 5 – Knowledge Development and Transfer**

Community action and the decisions of policy makers are informed by timely collection, analysis, and dissemination of data and research on seniors' falls.

There is already excellent work under way in Nova Scotia that will support the achievement of these goals. Some examples include the work of the South Shore Health District Health Authority, the efforts of Community Links' Preventing Falls Together initiative, the Provincial Intersectoral Falls Prevention Committee, the Department of Health Falls Assessment Framework, and the Seniors' Secretariat's Strategy for Positive Aging.

We look forward to continuing to work with our partners to address seniors' falls, and to help make our province a healthier and safer place to grow, live, work, play, and age.

For more information about the falls prevention Strategic Framework, visit [www.gov.ns.ca/hpp/injuryprevention.html](http://www.gov.ns.ca/hpp/injuryprevention.html)











