

# **Unintentional Fall-Related Injuries Among Massachusetts Older Adults**

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## **Massachusetts Department of Public Health**

Injury Prevention and Control Program, Office of Healthy Aging, and Office of  
Statistics and Evaluation

Bureau of Community Health Access and Promotion

Injury Surveillance Program

Bureau of Health Information, Statistics, Research and Evaluation

**2008**



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Massachusetts Department of Public Health  
2008



## **Acknowledgements**

This report was prepared by Carrie Huisinigh with support from Holly Hackman from the Office of Statistics and Evaluation; Cindy Rodgers and Lewis Howe of the Injury Prevention and Control Program; Anita Albright and Linn Morrill of the Office of Healthy Aging; and Torie Ozonoff, Beth Hume, Maria McKenna and Loreta McKeown of the Injury Surveillance Program.

Special thanks go to Jane Purtill and Maureen McKean of the Registry of Vital Records and Statistics; Susan Keyes and Zi Zhang, formerly of the Health Survey Program of the Division of Research and Epidemiology.

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This report reflects updates made in November 2008.



## **Injury Prevention and Control Program**

The Massachusetts Department of Public Health Injury Prevention and Control Program (IPCP) is one of the nation's oldest and most comprehensive injury prevention programs located within a state health department. Formerly known as the Statewide Comprehensive Injury Prevention Program (SCIPP), the IPCP was established at the Massachusetts Department of Public Health in 1979. The IPCP has a longstanding collaborative relationship with many partners including public and private agencies, the media, policymakers, health care providers, researchers, educators, legislators, law enforcement, fire safety personnel, advocates, survivors, private citizens, and other stakeholders.

The mission of the IPCP is to reduce the severity and rates of injuries at home, on the road, in the community, at schools, and at play, and to improve emergency medical services for children. The program's scope covers unintentional injury and self-inflicted injuries, including suicide. IPCP develops policies and programs and provides services to communities, groups, and individuals. IPCP offers trainings and health education, conducts analyses using current surveillance data sources, generates reports, and provides coalition and task force leadership. Also, IPCP assists with program development and improving public information materials.

## **Injury Surveillance Program**

The Injury Surveillance Program (ISP) at the Massachusetts Department of Public Health seeks to reduce fatal and nonfatal injuries among Massachusetts residents by monitoring the incidence, trends, risk factors and circumstances of these injuries and disseminating this information to injury prevention advocates. These data may be used to inform decisions regarding the development and evaluation of injury prevention initiatives and policies.

The ISP operates two data collection systems in-house; the Weapon Related Injury Surveillance System (WRISS) a data collection system that captures gunshot and assault-related stabbings treated within Massachusetts acute care hospitals and emergency departments and the National Violent Death Reporting System-Massachusetts (NVDRS-MA) a database that contains detailed information on all homicides, suicides, unintentional firearm deaths, and deaths of undetermined intent. In addition, ISP utilizes other data sources to assess and describe the problem of injury in our state. These include: Massachusetts Vital Records, the Massachusetts Inpatient Hospital Discharge Database, the Massachusetts Outpatient Observation Database, the Massachusetts Outpatient Emergency Department Database, the Massachusetts Medical Examiner Data Set, Supplemental Homicide Reports, the Massachusetts Youth Risk Behavior Survey, the Behavioral Risk Factor Surveillance System, and the Fatality Analysis Reporting System.

## **Office of Healthy Aging**

The Healthy Aging and Disability Unit (HADU) at the Massachusetts Department of Public Health encompasses the Office of Healthy Aging and the Office on Health and Disability. The unit promotes the health and well being of older adults and people with disabilities across the lifespan in Massachusetts.

HADU coordinates and supports program and policy development that assure access to quality health care. HADU provides opportunities for older adults and people with disabilities to learn about and manage their health. The unit's mission focuses on the essential activities that support the availability and accessibility of quality health promotion opportunities for older adults and people with disabilities across the lifespan. Efforts are also aimed at collecting and disseminating data related to aging and disability in Massachusetts, as well as improving accessibility and quality of health services, activities, and programs for older adults and people with disabilities. These activities help to build and expand aging and disability constituencies that foster individual and organizational awareness and promote health, well-being, and independent living.



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## Executive Summary

Fall injuries are an enormous threat to the health and well being of older adults in the Commonwealth of Massachusetts. Falls among older adults represent a serious and often preventable public health problem. Falls are the leading cause of fatal and nonfatal injuries among older adults aged 65 years and over in the United States and in Massachusetts. *Unintentional Fall-Related Injuries Among Massachusetts Older Adults* and the related national references in the report serve to inform consumers, policy makers, aging services professionals, health care providers, community planners, and state leaders of the most current fall surveillance data. Many of the recommendations presented in the report are from both national falls related task force initiatives and the experience of experts in Massachusetts. Many falls, fall-related injuries, and deaths can be prevented and ultimately reduce death and disabilities and improve the quality of life for older adults in Massachusetts.

Injuries due to falls are costly to the individual and to the United States and the Massachusetts health care system. Nationally, the total cost of all fall-related injuries for people ages 65 years and older exceeded \$19 billion in 2000.<sup>1</sup> These costs are projected to reach \$54.9 billion by 2020 (adjusted to 2007 dollars).<sup>2</sup> In Massachusetts, hospital charges for fall-related visits among older adults were \$471.95 million in FY2006; public insurance (including Medicare and Medicaid) was the primary source of payment for 90% of the visits. The economic burden of fall-related injuries underscores the need for effective interventions.

The Massachusetts population over 65 years of age is expected to increase from 13.5% in 2000 to 20.9% in 2030.<sup>3</sup> As our aging population increases in size, the negative impact of falls continues to increase. This trend precipitated an increase in falls prevention research and development of prevention strategies at the national, state, and local levels. It is anticipated as the population ages, the number of fall-related injuries will likely continue to increase unless prevention strategies are successfully implemented.

The key data findings on unintentional\* fall injuries and deaths among Massachusetts residents ages 65 years and older, are described below:

### **Magnitude and Trends:**

- In 2006, 16.0% of Massachusetts adults ages 65 and older reported at least one fall in the past 3 months. This is similar to the nationally reported prevalence of falling (15.9%).<sup>4</sup> Of those in Massachusetts who

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\* Although a small number of fall injuries are assault-related or self-inflicted, for the purposes of this report, the term “fall injuries” and “fall deaths” is used to mean only unintentional fall injuries or deaths.

reported fall in the past 3 months, 29.3% were injured as a result of the fall, similar to national estimates (31.3%).

- In 2006, there were 340 fall deaths, 20,209 hospital stays, and 36,751 emergency department discharges associated with nonfatal fall injuries among Massachusetts residents ages 65 years and older.
- For the 7-year period from 2000 through 2006, the crude fall death rate among Massachusetts older adults increased 122% from 17.9 to 39.9 per 100,000. Most of this increase took place from 2005 to 2006 when the crude rate increased 67% (n= 206 to 340). This is felt to be at least partially due to improved identification or ascertainment of this type of death. The increase was not restricted to a particular month, age group, sex, or geographic location.
- General increases in fall death rates among older adults are occurring both nationally and in Massachusetts.<sup>5</sup> Further studies examining the impact of medications, physical activity patterns, obesity and other factors should be considered.

#### **Demographic and Health Risk Factors:**

- In 2006, the crude fall death rate among Massachusetts older adults was highest among men, 41.5 per 100,000, in comparison to 38.7 per 100,000 for women.
- In 2006, the crude rate of hospital stays associated with fall injury among Massachusetts older adults was highest among women, 2,872.3 per 100,000, in comparison to 1,613.9 per 100,000 for men.
- Fall death rates among Massachusetts older adults increase with increasing age. In 2006, the fall death rates ranged from a low of 8.6 per 100,000 among those ages 65-69 years, to a high of 233.5 per 100,000 among those ages 95+ years. Similarly, hospital stay rates increase with increasing age. In 2006, the age-specific rate of hospitalizations for nonfatal fall injuries among residents ages 95-99 years was 12.3 times higher than that of residents ages 65-69 years (8,540.0 per 100,000 vs. 690.9 per 100,000).
- Falls were more prevalent among Massachusetts older adults with disability and needing help (33.6%) than without disabilities (10.9%). The prevalence of reporting an injury from a fall in the past 3 months among older adults with disability and needing help was statistically higher compared to those without disabilities (13.9% vs. 3.4%).
- Falls were more prevalent among Massachusetts older adults who were obese (26.7%) than those not obese (14.0%).

- Three-year (2003-2005) average fall-related rates for deaths, hospital stays, and emergency department visits combined varied across Massachusetts communities.

#### **Circumstances and Location of Injury:**

- From 2004 through 2006, where circumstance of injury was known, 41% (n=143) of fall deaths among older adults in Massachusetts involved stairs or steps.
- In 2006, where location of a fatal fall injury was known, 59% (n=190) occurred at home, 19% (n=62) occurred in a nursing home, 3% (n=10) occurred on a street, and 3% (n=10) occurred in a hospital.

#### **Types of Injuries Sustained by a Fall:**

- In 2006, 27% (n=5,544) of all hospital stays associated with a fall injury involved a diagnosis of a hip fracture.
- From 2000 through 2006, the rate of hospital stays with a fall-related hip fracture decreased 16% (769.1 to 647.7 per 100,000).
- In 2006, approximately 10% (n=2,076) of all hospital stays associated with a fall injury involved a traumatic brain injury.
- From 2000 through 2006, the rate of hospital stays associated with a fall-related traumatic brain injury among older adults increased 78% (136.2, n=1,173 to 242.5 per 100,000, n=2,076). The reasons for this increase are not clear.

#### **Public Health Strategies**

The Massachusetts Department of Public Health (MDPH), in collaboration with other state agencies and community partners has taken leadership to reduce the incidence and severity of falls and fall injuries among older adults in Massachusetts. Because the optimal public health approach to fall prevention is multifaceted, the responsibility for reducing and preventing fall injuries among older adults lies with individuals and organizations across a broad range of disciplines.<sup>6</sup> Health care and vision professionals, public health practitioners, researchers, architects, designers, engineers, urban planners, pharmacists, policymakers, older adult consumers, and their family and friends each play an important role in addressing the interacting factors that cause falls. Several strategies undertaken in Massachusetts are:

- A social marketing campaign in collaboration with Emerson College resulting in the development of materials to reach older adults with information to access a 1-800 information line (1-800-227-SAFE) on falls prevention.

- The Massachusetts Falls Coalition made up of over 55 member organizations committed to reduce the incidence of falls among older adults in the community, in facilities, and in health care settings.
- A collaboration of MDPH and the Executive Office of Elder Affairs with national leaders and other states to develop and sustain an infrastructure to implement proven programs to prevent falls and help older adults manage their health.

National,<sup>7 8</sup> state,<sup>9 10 11 12</sup> and local<sup>13 14 15</sup> fall prevention activities, research and publications currently provide a strong foundation for further research, program and policy development.

### **Recommendations:**

The recommendations for falls prevention among older adults outlined in this report are primarily taken from two sources:

1. Falls Free: Promoting a National Falls Prevention Action Plan
2. Massachusetts Traumatic Brain Injury: A Case for Prevention

Most falls are preventable through effective, scientifically tested interventions.<sup>16</sup> Multiple risk factors related to both the individual and the environment are necessary to address falls and fall injuries among older adults.<sup>17</sup> The key components include:

- Staying active and regularly exercising. Exercises should include balance and strength training.
- Reviewing and managing medications that affect balance, vision and cognition with health care professionals.
- Getting regular comprehensive vision exams and bone mass density screenings.<sup>18</sup>
- Making homes safer by installing railings and grab bars where needed, securing all rugs, ensuring good lighting and contrast markings on stairs, and picking up all clutter in walking areas.
- Making community environments safer by ensuring good lighting, contrast markings, and hazard-free railings and sidewalk surfaces.
- Eating regular meals with proper nutrition, including foods rich with calcium and vitamin D to prevent and manage osteoporosis.<sup>19</sup>

Given the magnitude and trends of fall-related injuries among Massachusetts residents ages 65 years and older, the change in the aging demographic, and other social risk factors for falls, death, and injuries, the following recommendations are put forth:

1. Develop a full Strategic Plan for reducing the incidence and severity of falls and fall-related injuries through the Falls Prevention Coalition.

2. The governor and legislature create a sustainable statewide Falls Prevention Program based on evidence-based falls prevention programs.
3. Through the Falls Prevention Coalition, develop a public private campaign to increase public awareness that falls are preventable events and that falls can and do cause serious injury. Provide older adults with the resources of evidence-based prevention programs available to improve physical mobility and skills to evaluate fall risk.
4. MDPH and Elder Affairs provide older adults, caregivers, and aging network organizations with resources for home safety measures including home safety checklists, and information on home modifications that reduce home hazards, improve independent functioning, and lower the risk of falls.
5. Require professional training entities to educate students and health professionals on their role in fall prevention, including screening and management of fall risk factors and medication management.
6. Collaborate with the Falls Prevention Coalition to develop and disseminate guidelines that can be used to improve balance or strength, vision deficits, postural hypotension, and cognitive impairment to reduce falls in multiple settings.
7. Work with the Centers for Disease Control and Prevention/National Center for Health Statistics to identify the causes and contributing factors associated with the increased fall death rate.

In conclusion, fall injuries among Massachusetts older adults are a significant, growing public health problem with enormous societal, health, and economic ramifications. Falls are largely preventable through effective, scientifically proven interventions. Successful implementation of these interventions will require the efforts of a broad range of professionals, from both public and private institutions. Massachusetts is fortunate to have many programs committed to fall injury prevention. While fall prevention activities have gained momentum in Massachusetts in recent years, the data in this report indicates that there is a tremendous amount of work left to be accomplished. The Massachusetts Department of Public Health prepared this report in an effort to document the problem of fall injuries in Massachusetts and identify steps to be taken to more effectively use existing infrastructure for the purpose of prevention.



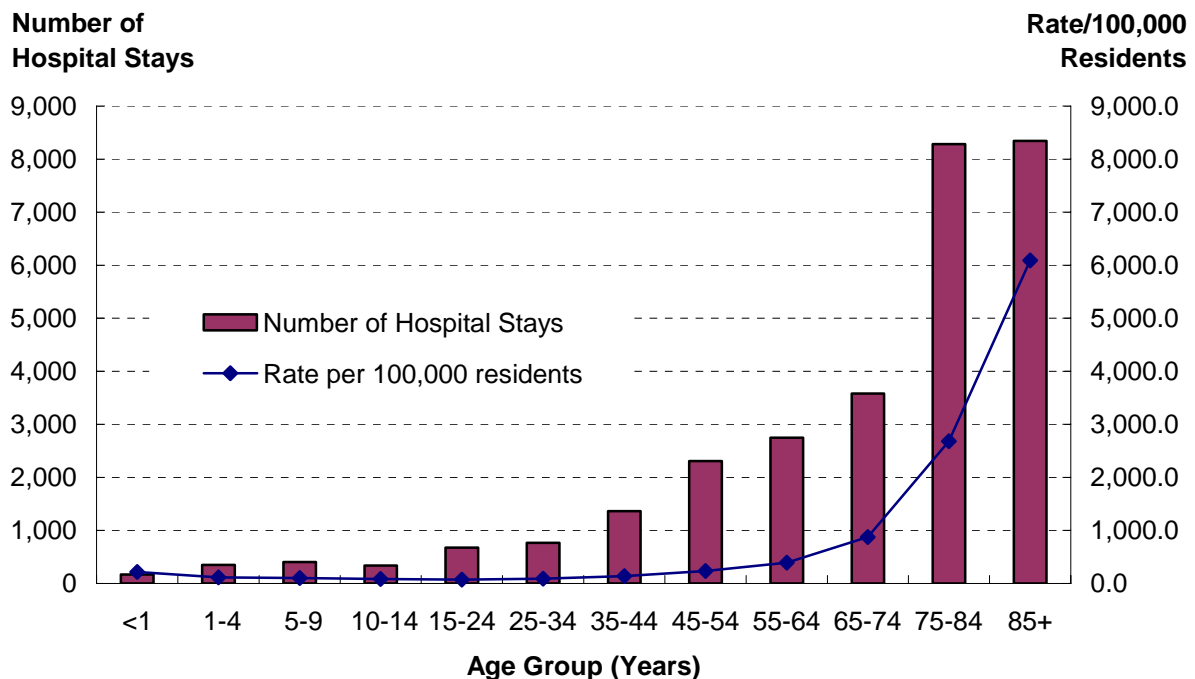


## Introduction

Fall injuries among older adults are a preventable and under-recognized public health problem, imposing an enormous health and economic burden on individuals, families, society, and our health care system. In the United States in 2005, 80% of deaths due to falls occurred among those ages 65 years and over, an age group that comprises 13% of the population.<sup>20</sup> Fall-related injuries are the leading cause of injury death and hospitalization among older adults, ages 65 years and older, in the United States (US) and Massachusetts. Recent reports indicate that the fall death rate in this population is increasing, both nationally and in Massachusetts.<sup>21</sup> Injuries due to a fall disproportionately impact the health of older adults ages 65+ years, especially the very old, compared with children and younger adults (Figure A). Fall injuries, compared to other injury mechanisms, resulted in the greatest total lifetime costs among adults ages 65 and older in the United States in 2000, more than \$19 billion. By 2020, these costs are expected to reach \$54.9 billion (adjusted to 2007 dollars). The economic burden of fall-related injuries underscores the need for effective interventions.<sup>22</sup> Furthermore, as the population ages, the number of fall-related injuries will likely continue to increase unless prevention strategies can be successfully implemented.

The basis of this report was supported by the substantial amount of elder fall surveillance, prevention activities and interest that has been developing at the national, state, and local levels. The purpose of this report is to inform policy and to provide injury prevention practitioners and key leaders with the most currently available surveillance data and prevention resources in order to ultimately reduce death and disabilities and improve the quality of life for older adults in Massachusetts.

**Figure A. Hospital Stays Associated with Nonfatal Unintentional Fall Injuries by Age Group**  
Massachusetts Residents, 2006



N=29,313

Data Sources: FY2006 Massachusetts Inpatient Hospital Discharge and Outpatient Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy.

Falls are defined as an event which results in a person coming to rest on the ground precipitated by a misstep, from loss of grip or balance, from jumping, or from being pushed or bumped by another person, animal or object. The injury might have occurred as a result of tripping on the sidewalk, stumbling down stairs, or falling out of bed. Although some falls can be self-inflicted or assault-related, the vast majority of falls among older adults are unintentional or “accidental” (95% of fatal and 99% of nonfatal). Therefore, data on falls that are self-inflicted or assault-related are excluded from this report.\*

Most people have heard of or known an older adult who has fallen, been injured and suffered from the devastating effects: disability, pain, depression, loss of confidence, social withdrawal, costly medical care, a lower quality of life, or even death. Whether the effects experienced were immediate or triggered a slow downward spiral of health, life can dramatically change for both victims of a fall and friends and family members of someone who has fallen.

\* Although a small number of fall injuries are assault-related or self-inflicted, for the purposes of this report, the term “fall injuries” and “fall deaths” are used to mean only unintentional fall injuries or deaths.

More than one third of older adults living in the community fall each year in the United States. Among those individuals who fall, approximately 1 in 10 falls results in a serious injury, such as a hip fracture or head injury. These injuries can be especially debilitating or increase the risk of premature death for older adults.<sup>23</sup> In fact, up to 25% of adults who lived independently before their hip fracture have to stay in a nursing home for at least a year after their injury.<sup>24</sup> In Massachusetts, there were 340 deaths and over 56,000 acute care hospital stays and emergency department visits (combined) associated with a fall injury among Massachusetts residents ages 65 years and older in 2006 alone (Table A). By comparison, there were approximately 38,000 visits to a hospital or an emergency department in this age group associated with all other causes of unintentional injury combined.

**Table A. Leading Causes of Fatal and Nonfatal Hospital Stays and Emergency Department Visits Associated with Unintentional Injury**  
Massachusetts Residents Ages 65+ Years, 2006

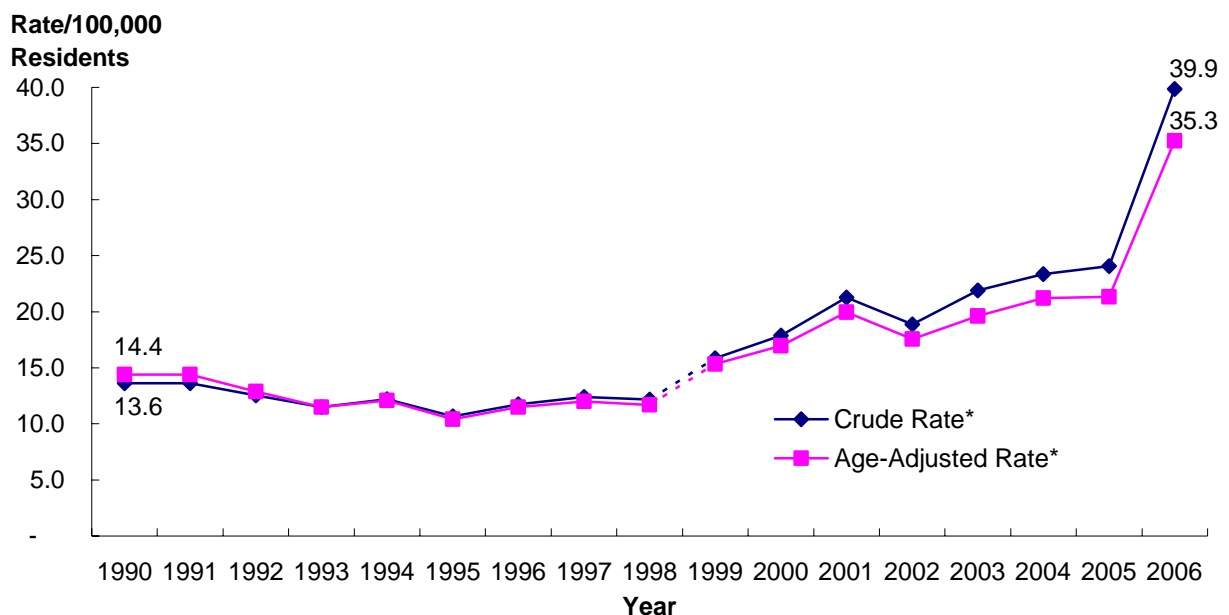
Cause	Injury Deaths	Injury Related Hospital Stays*	Injury Related ED Visits*
1	Fall 45.0%, n=340	Fall 76.0%, n=20,209	Fall 53.9%, n=36,751
2	Suffocation/choking 10.2%, n=77	Poisoning 2.7%, n=714	Cut/pierce 6.7%, n=4,538
3	MV traffic, occupant† 9.1%, n=69	MV traffic, occupant† 2.7%, n=706	Struck by/against 6.6%, n=4,461
4	Pedestrian‡ 2.8%, n=21	Struck by/against 1.3%, n=348	Overexertion 6.4%, n=4,349
5	All other causes of injury 33.0%, n=250	All other causes of injury 17.3%, n=4,627	All other causes of injury 26.5%, n=18,053
<i>Total</i>	<i>N=757</i>	<i>N=26,604</i>	<i>N=68,152</i>

N=94,756

Data Sources: CY2006 Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2006 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay and Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy. \*Nonfatal cases only. †Includes motor vehicle traffic-related occupant, motorcyclist, and unspecified person. ‡Includes motor vehicle traffic-related pedestrian and other pedestrian transport injuries

Current surveillance data indicate rising rates of fatal and nonfatal fall injuries among older adults in Massachusetts and in the United States. Figure B presents trends in Massachusetts crude and age adjusted rates (between 1990 and 1998 comparability modified rates are presented).<sup>25 26</sup> In Massachusetts, comparability modified age-adjusted fall death rates declined 19% from 1990 through 1998 (13.6 to 11.7 per 100,000, respectively). From 1999 through 2006, the age-adjusted fall death rate among Massachusetts older adults increased 130%, from 15.3 to 35.3 per 100,000. In comparison, the US age-adjusted fall death rates for individuals ages 65 years and older increased 88% from 1999 through 2005 (latest year for which national data are available) from 24.4 to 45.9 per 100,000.

**Figure B. Crude and Age-Adjusted Unintentional Fall Death Rates\***  
Massachusetts Residents Ages 65+ Years, 1990 – 2006



N=2,749

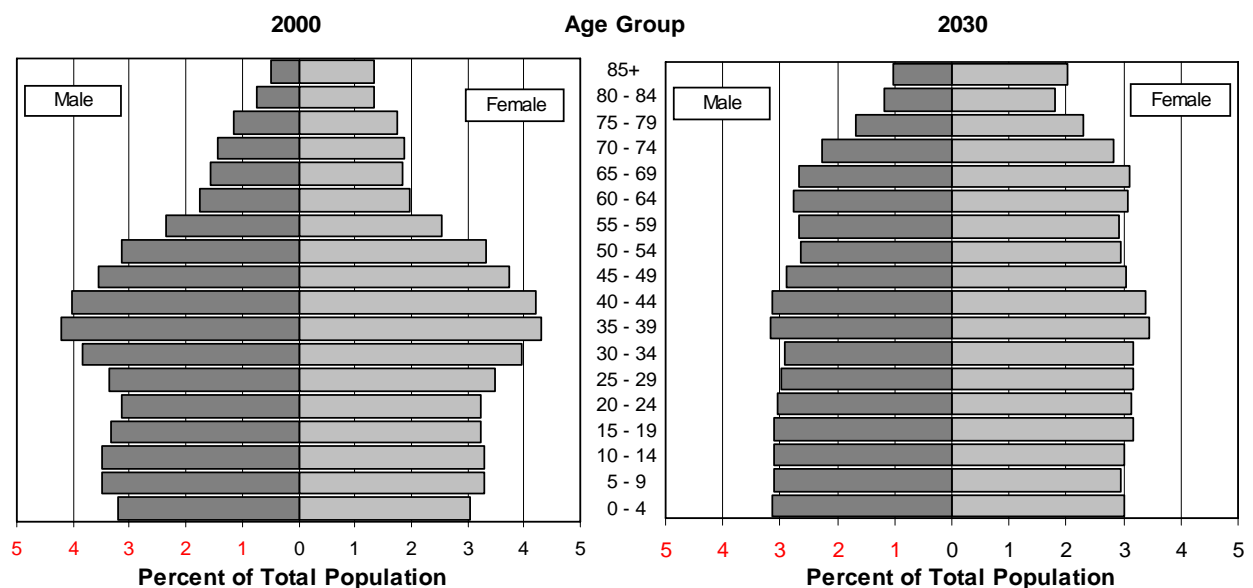
Data Source: CY1990-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health. Rates are per 100,000 residents. Age-Adjusted to US 2000 Census

Note: In 1999 death coding change from the ICD-9 classification to ICD-10 (dotted line). ICD-9 and ICD-10 codes used in this publication are listed in Appendix A.

\*The rates presented from 1990 through 1998 are comparability modified rates. Comparability modified rates are adjusted using the final comparability ratio (CR) from the National Center for Health Statistics in order to account for changes from ICD-9 to ICD-10. Please see Appendix A for a more detailed explanation and for the CR used in this report.

The development of strategies to prevent falls among older adults has become increasingly urgent, given that the population of people in the United States ages 65 years and older is expected to increase significantly from 2010 to 2030, due to the aging Baby Boomer population and increased life expectancy. According to the US Census Bureau, the US population ages 65 years and older is projected to be twice as large in 2030 as it was in 2000, growing from 35 million to 72 million.<sup>27</sup> Over the same time period in Massachusetts, a 70.1% increase is expected among the population ages 65 years and older. The two population pyramids in Figure C compare the age and gender distribution in Massachusetts in 2000 with what is expected in 2030.

**Figure C. Population Pyramid of Massachusetts in 2000 and 2030**  
Massachusetts Residents



Data Source: U.S. Census Bureau, Population Division, Interim State Population Projections, 2005. Available at <http://www.census.gov/population/www/projections/statepyramid.html>

Traditionally, falls have been viewed as “accidents” or as “part of the normal aging process”. In reality, falls are largely preventable. Analogous to the prevention of chronic diseases by addressing known risk factors, fall injuries can also be prevented through the identification and reduction of well documented and modifiable risk factors. The risk factors for fall and fall injuries include, but are not limited to:

- postural hypotension (drop in blood pressure due to a change in body position);<sup>16</sup>
- gait and balance instability;<sup>16</sup>
- low bone and muscle mass;<sup>29</sup>
- deficits in vision, hearing, and cognition;<sup>16</sup>
- taking four or more drugs, including over-the-counter medications;<sup>16</sup>

- home and environmental hazards including unsafe footwear, poor lighting, loose carpets, uneven surfaces, inappropriate fit or use of assistive devices, or lack of bathroom safety equipment.<sup>16</sup>

The presence of multiple risk factors substantially increases one's risk for a fall.<sup>28</sup> A fall-related patient assessment can often identify specific risk factors that are most relevant to the individual and help to develop a successful treatment or other risk-reduction strategies based on the risk factors specific to the individual.<sup>29</sup> Evidence-based interventions and programs focus on changing behaviors and modifying risk factors to prevent falls and fall-related injuries. Intervention strategies vary across the settings in which the patient resides (e.g. community, long-term care, or hospital).

Reducing and preventing falls among a population of older adults can only be achieved through a multifaceted approach that involves individuals and organizations across a range of disciplines. Health care professionals, researchers, architects, designers, engineers, urban planners, policy makers, older adults and their family and friends each play an important role in addressing the interacting factors that cause falls. Existing national, state and local efforts already being directed at elder falls prevention provides a strong foundation for ongoing research, program and policy development.

This report aims to provide injury prevention practitioners and professionals working with older adults with the most currently available surveillance data describing the magnitude and trends of fall related injuries among Massachusetts residents ages 65 years and older, as well as providing demographic and other social risk factors of these events and the types of injuries sustained. In addition, the report provides an overview of evidence-based methods for preventing falls and fall injuries and information on key state and national resources for fall prevention.

The data sources utilized in this report include death certificate data from the Registry of Vital Records, statewide Inpatient Hospital Discharge, Outpatient Observation Stay, and Emergency Department Discharge databases from the Massachusetts Division of Health Care Finance and Policy, and Behavioral Risk Factor Surveillance System (BRFSS) data from the Health Survey Program at the MA Department of Public Health. Figures and analyses presented in this report are based on data from the fiscal (FY) and calendar years (CY) 2000 through 2006.

The report is organized into the following sections: magnitude and trends (including hospital charges), demographic characteristics (including age, sex, race, and geography), contributing circumstances, type of injury sustained and body region injured, and fall prevention strategies and resources. The methods used for analyses and statistical testing of the data are described in detail in Appendix A. Data tables with 95% confidence intervals and city/town level fall

injury data are provided in Appendix B. A list of the current Massachusetts Falls Prevention Coalition members and represented organizations is provided in Appendix C. The geographic location of skilled nursing facilities in Massachusetts is provided in Appendix D, followed by the Reference Section.





## Data Considerations

The data sources selected for use in this report are population-based (i.e. statewide) and represent the best available data for fall injury surveillance at the Massachusetts Department of Public Health. These data sources include death certificate data from the Registry of Vital Records and Statistics, acute care hospital and emergency department data from the Massachusetts Division of Health Care Finance and Policy, and data from the Behavioral Risk Factor Surveillance System (BRFSS). While these data sources are extremely useful for conducting injury surveillance, strengths and limitations exist within each data set. In the interpretation of these data, readers should also be aware of some of the basic methodologies that were applied. These are outlined below.

Strengths and limitations of Vital Records death data:

- Data are provided on all deaths to Massachusetts residents.
- The death database contains extensive demographic information.
- The death database uses a standardized coding system (currently International Classification of Disease, Tenth Revision (ICD-10)) for the cause and the intent of the injury which enables valid cross-state and national comparisons (see Appendix A for complete listing).<sup>30</sup> These codes are generated by the text written on the death certificates. In the case of injury deaths, the text which generates these codes is often completed by the Office of the Chief Medical Examiner.
- These data often lack details on the location of and circumstances surrounding these injuries.

Strengths and limitations of acute care hospital and emergency department data:

- These are administrative databases which provide data on all inpatient hospital, observation stay, and emergency department discharges that occur within an acute care hospital in Massachusetts. The data are collected primarily for billing and other administrative purposes but are commonly used by states for public health surveillance.
- The acute care hospital databases are mutually exclusive for single episodes of treatment within a particular hospital. For instance, if a person is treated at the emergency department of Hospital A, and then is admitted as an inpatient to Hospital A, the patient's data would only be reported by Hospital A to the state's inpatient hospitalization database, not to the state's emergency department database. However, the data for a patient transferred from the emergency department of Hospital A to the emergency department of Hospital B before being sent home will be reported by both Hospital A and Hospital B to the state's emergency department database.

- These databases do not provide information on the date of injury. Therefore, the counts and rates reported represent events of acute care hospital utilization and not the counts and rates of individual injury episodes. A person can be treated at the hospital multiple times for the same injury.
- These databases use a standardized coding system (currently International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM)) for the cause and intent of the injury which enables valid cross-state and national comparisons.<sup>31</sup>
- These databases provide some demographic information on the person receiving care, including sex and age. For the years reported, there was, however, limited information on the city/town of residence (zip code only). Race and ethnicity are also limited by data quality problems and are not reported. Data collection of both race/ethnicity and city/town of residence fields are currently being improved by the Massachusetts Division of Health Care Finance and Policy, which administers these databases.
- Information on the fall circumstances (e.g. falls from stairs, falls on same level) and the place of injury occurrence (e.g. street, home) are derived through ICD-9-CM codes and are limited by several factors: the documentation of this information in the medical record, the ICD-9-CM code categories, and the completeness and quality of the submission of this information by individual hospitals. In 2006, 42% of acute care hospital stays associated with an unintentional fall injury among older adults were classified as either “unspecified” or “other” fall. Information on the place of injury was present in only 32% of these cases.
- The validity of the data (external cause of injury codes), which enables analysts to identify injury cases associated with falls, has been evaluated in only one local study. The study was restricted to emergency department discharges. This study found a general accuracy of 85% for major injury cause categories.<sup>32</sup>
- Data from federal, psychiatric, or rehabilitation hospitals and private clinics are not included.

Other methodological considerations of acute care hospital data:

- Three years of data (2003-2005) were combined to produce a more stable estimate of the fall-event rate for each city and town in Massachusetts. Data from 2006 were excluded from the geographic analyses as the most current population estimates necessary to calculate rates for all cities and towns were available through 2005.
- Counts of fall injuries by city and town involving patients with zip codes that are shared across city and town borders were weighted using methodology described elsewhere.<sup>33</sup>

- Only nonfatal cases (upon discharge) are reported unless otherwise noted. Transfers to another short term general hospital were deleted from the inpatient hospital database in an attempt to unduplicate episodes of care. This method, however, does not unduplicate the number of injuries as an individual can receive care multiple times for the same injury.
- There are multiple diagnostic fields available for submission for each acute care hospital encounter (16 for an inpatient hospitalization, and 6 for observation stays and emergency department visits). All of these diagnostic fields were used in the definition of a fall-related injury case in the hospital and emergency department databases. A medical visit (e.g. heart attack) with a fall-related injury is counted even if the injury was not the principle reason (first listed diagnosis) for the visit.
- Inpatient hospitalizations and observation stay discharges are summed and termed 'hospital stays'. Observation stays are commonly short stay admissions (less than 24 hours) to a hospital.
- The data are reported for a fiscal year (FY) in order to present the timeliest data. FY2006 reflects October 1, 2005 through September 30, 2006.
- The financial charges of services are provided in both the hospital and emergency department data. The charges for service are based on the billing information as reported by the hospital to the source of payment, such as Medicare. The charges for service are not reflective of the actual cost of the care, nor are they reflective of what was reimbursed to the hospital by the insurer.
- Unintentional falls account for approximately 95% of fatal and 99% of nonfatal fall injuries; therefore, data on falls that are assault-related or self-inflicted are excluded from this report. For the purposes of this report, the terms "fall injury" and "fall death" refer to unintentional falls only.
- Hospital and ED visit totals with fewer than seven observations are suppressed. For all data sets, rates were not generated on counts less than 5. Trends based upon small numbers (<20) should be interpreted with caution as rates can fluctuate greatly from year to year with even a small change in the number of cases.

The Behavioral Risk Factor Surveillance System (BRFSS) is a population-based random digital dial survey and a commonly accepted source for information on a variety of topics. As of 1994, BRFSS is administered in all 50 states, Washington DC and 3 US territories, and results can be compared with national prevalence and frequencies. The 2006 BRFSS data was limited to households with landline phones. BRFSS population estimates represent the prevalence of falls among older adults who live in the community. Individuals who live in institutionalized settings, do not have phone service or have only mobile phone service are unable to participate. Also, adults who have a disability which impairs their ability to speak on a phone are not included. BRFSS is based on self-reported data and as such is subject to the possible bias associated with self-reported data.

The statistics used for reporting falls follow the guidelines similar to those described in *Consensus Recommendations for Surveillance of Falls and Fall-*

*Related Injuries.* Crude and age-adjusted rates are reported for death and hospital data. The crude rate represents the number of occurrences of a health event in a specified time and population per unit time. It is calculated as follows:

$$\text{Crude Rate} = \frac{\text{\# of resident injury deaths (or injuries) in a year}}{\text{resident population for that year}} \times 100,000$$

The age-adjusted rate adjusts for the age differences between populations. These rates answer the question, “What would the death/injury rate be if the populations being compared had identical age distributions?”

Due to changes in the coding of U.S. mortality data that occurred in 1999, a comparability ratio was used to assess if changes in unintentional fall deaths, for time periods before and after this coding change, are due to the differing coding systems. The comparability ratio (comparability ratio of 0.7720 for unintentional fall) used in this reported is based on the final comparability ratios from the National Center for Health Statistics (NCHS). The decrease in fall coding is the result of a change in the treatment of unspecified fractures.<sup>34</sup> In ICD-9, if the term “fracture” is listed on the death certificate without mention of an external cause, the death is classified to Fracture, cause unspecified (E887), which is grouped with Accidental falls (E880-E888). In ICD-10, a fall is not assumed to be responsible for the unspecified fracture, and the death is classified to Exposure to unspecified factor (X59), which while classified as an unintentional injury is not classified as a fall.

Statistically significant differences between rates are noted in the text, where applicable. Data may be presented when the difference is not statistically significant but is worth noting due to the potential public health significance.

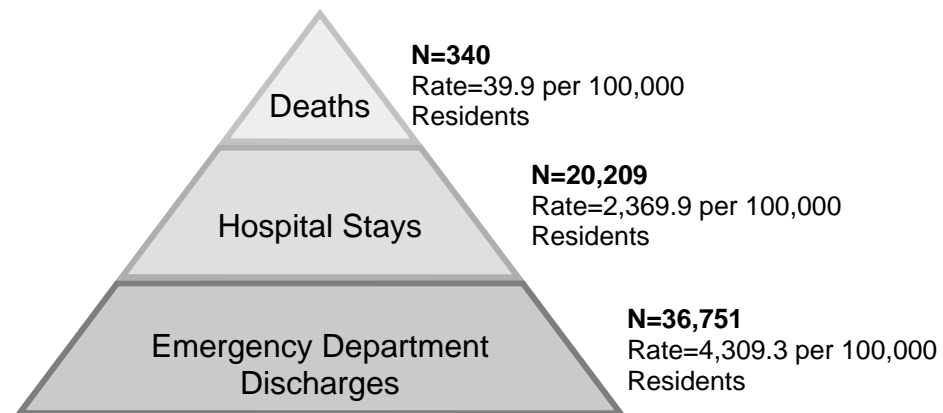
Further methodological details are available in Appendix A.

## **Section I. Magnitude and Trends**

Section 1 provides a summary of the magnitude, trends, and economic burden of fall-related injuries among Massachusetts older adults. The number, rate and trends in fall-related injuries that resulted in death or treatment at an acute care hospital from FY2000 through FY2006 are examined. The hospital and emergency department databases include data on individuals who sustained injuries in the community, a long-term care facility, or other settings and who went to an acute care hospital. It may also contain data on individuals who sustained their injuries at an acute care hospital. Individuals who sustained injuries but did not go to an acute care hospital or emergency department for treatment are not captured. In addition, the prevalence of falls and fall injuries among community-dwelling individuals ages 65 years and older is reported from the Massachusetts Behavioral Risk Factor Surveillance System (BRFSS), a statewide telephone survey.

The statewide acute care hospital databases were analyzed to assess the charges and payment sources in order to gauge the economic burden of fall-related injuries on the health care system and society in Massachusetts from FY2002 through FY2006. In the interpretation of this data the reader should be aware of several issues. First, the charges for service are not reflective of the actual cost of the care, nor are they reflective of what was reimbursed to the hospital by the insurer. Second, some of the charges may be for diagnostic conditions unrelated to the fall injury. Finally, the total direct charges do not include costs associated with the long-term effects of the injuries, such as lost time from work and household duties, reduced quality of life, or long-term care.

**Figure 1.1: Frequency and Crude Rate of Fatal Falls and Nonfatal Acute Care Hospital Events Associated with Unintentional Fall Injury**  
Massachusetts Residents Ages 65+ Years, 2006

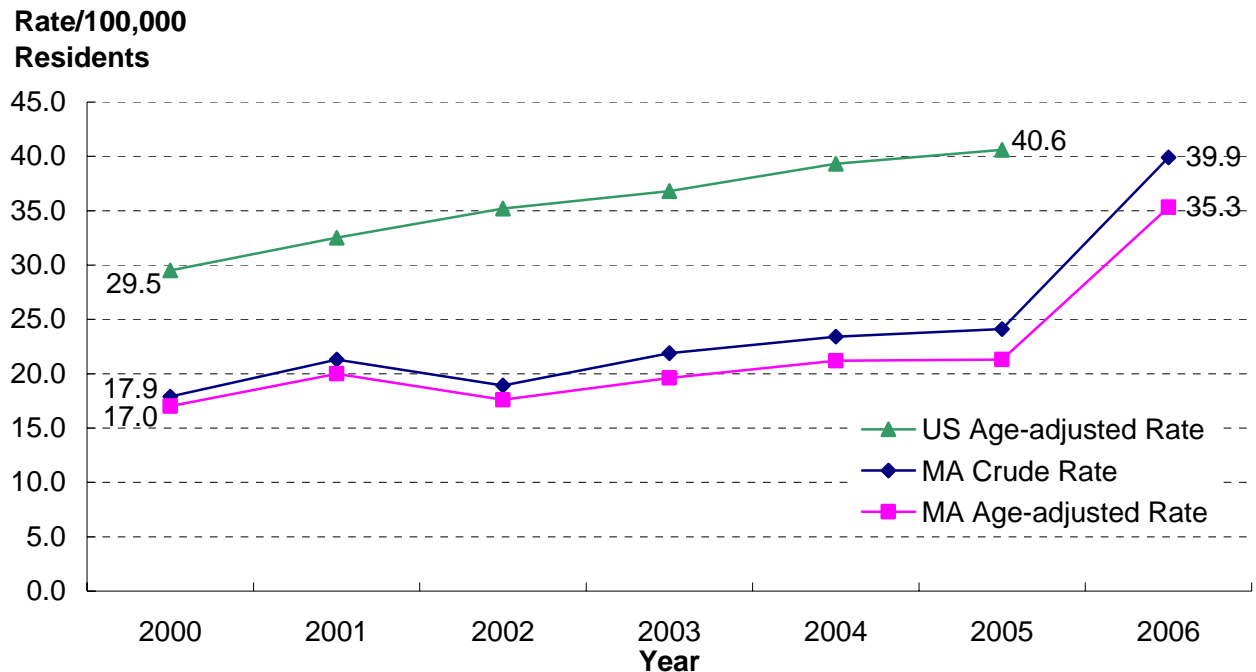


Data Sources: CY2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2006 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay and Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy

- In 2006, there were 340 deaths from a fall and a combined total of over 56,000 hospital stays and ED visits associated with a nonfatal fall injury among Massachusetts residents ages 65 years and older. This means:
  - On average, 6 fall deaths occurred every week, and on an average day there were over 150 hospital discharges (inpatient, observation stay, or emergency department) associated with an fall injury.
  - For every 1 fall death in 2006, there were 59 hospital stays, and 108 emergency department discharges.
  - In 2006 there was minimal monthly variation in the number of fall deaths and inpatient hospital admissions for fall injury (data not shown).
- In 2006, a fall injury diagnosis was the primary reason for the hospital admission in 72.1% of the fall-related hospital stays (14,575 of 20,209).
- In the remaining visits, a medical condition (e.g. heart attack, pneumonia, syncope) was the primary reason for the hospitalization.

- According to the 2006 Massachusetts Behavioral Risk Factor Surveillance System, among non-institutionalized Massachusetts adults 65 years of age and over (data presented in further detail in Section II):
  - Approximately 1 out of 6 reported a fall in the past three months (16.0%).
  - Approximately 1 out of 3, who reported falling in the past three months, were injured as a result of the fall (29.3%) (data not shown).

**Figure 1.2: Massachusetts Crude and Age-adjusted Unintentional Fall Death Rates with US Age-adjusted Comparison Rate**  
US and Massachusetts Residents Ages 65+ Years, 2000-2006



MA N=1,433, US N= 79,135

Data Sources: MA Data: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; US Data: CY2000-2005 Web-based Injury Statistics Query and Reporting System (WISQARS), <http://www.cdc.gov/ncipc/wisqars/>

Rates are per 100,000 residents. Age-Adjusted to US 2000 Census

#### From 2000 to 2006:

- There were 1,433 fall injury deaths to Massachusetts older adults, an average of 205 deaths per year.
- The crude fall death rate among Massachusetts older adults increased 122% from 17.9 to 39.9 per 100,000 (n=154 to 340) (statistically significant, see Appendix A for methodology and Appendix B for confidence intervals). From 2005 to 2006, the crude rate increased 67%.
  - The increase from 2005 to 2006 (n= 206 to 340) is felt to be at least partially due to improved identification or ascertainment of this type of death. The Registry of Vital Records and Statistics conducted a series of trainings with the Office of the Chief Medical Examiner to improve the documentation of information pertaining to the death on the death certificates. Additionally, during this time period there was a decrease (n= 200 to 171) in deaths due to “unintentional injuries of unspecified cause” in this age group.



- The increase from 2005 to 2006 was not restricted to a particular month, age group, sex, or geographic location.
- The longer term increase may be due to the impact of medications, physical activity patterns, obesity and/or other factors. More research is needed.
- The Massachusetts age-adjusted fall death rates increased 108% (17.0 to 35.3 per 100,000) (statistically significant). Therefore, the increased number of fall injury deaths is not entirely explained by an aging population in Massachusetts.

**From 2000 to 2005:**

- The US age-adjusted fall death rate for individuals ages 65 years and older increased 37% (from 29.5 to 40.6 per 100,000) (statistically significant).

**Table 1.1: Age-adjusted and Crude Rates of Fatal Unintentional Falls and Nonfatal Unintentional Fall Injuries Associated with Acute Care Hospital Stays or Emergency Department Discharges**

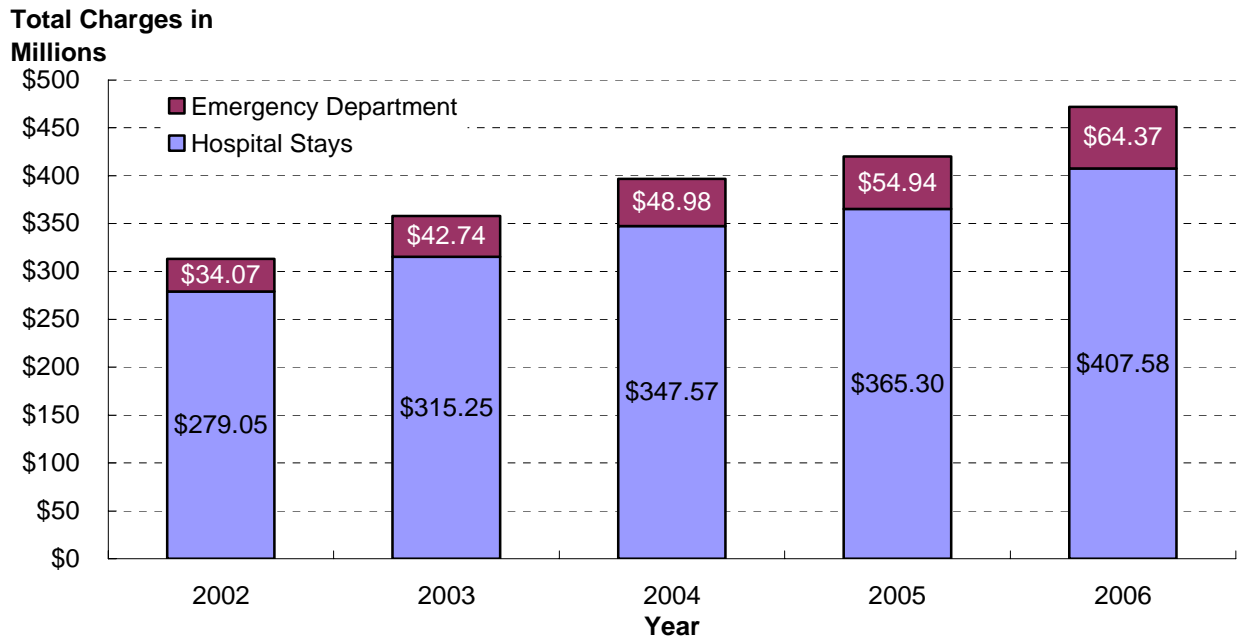
Massachusetts Residents Ages 65+ Years, 2000 – 2006

Year	Deaths			Hospital Stays			ED Visits		
	Count	Crude Rate	Age-Adjusted Rate	Count	Crude Rate	Age-Adjusted Rate	Count	Crude Rate	Age-Adjusted Rate
<b>2000</b>	154	17.9	17.0	18,352	2,131.0	2,031.5	NA	NA	NA
<b>2001</b>	183	21.3	20.0	18,179	2,113.4	1,978.3	NA	NA	NA
<b>2002</b>	162	18.9	17.6	18,031	2,099.8	1,940.5	35,043	4,080.9	3,896.4
<b>2003</b>	188	21.9	19.6	19,136	2,229.6	2,030.7	36,297	4,229.1	4,032.9
<b>2004</b>	200	23.4	21.2	19,340	2,259.2	2,033.1	36,283	4,238.3	4,009.9
<b>2005</b>	206	24.1	21.3	19,351	2,259.8	2,009.5	35,628	4,160.7	3,912.1
<b>2006</b>	340	39.9	35.3	20,209	2,361.0	2,132.2	36,751	4,293.5	4,053.8

Data Sources: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2000-2006 Massachusetts Inpatient Hospital Discharge and Outpatient Observation Stay Databases and FY2002-2006 Emergency Department Discharge Database, Massachusetts Division of Health Care Finance and Policy. Rates are per 100,000 residents. Age-Adjusted to US 2000 Population. Emergency Department data are not available (NA) prior to 2002.

- There were 56,960 hospital stays and emergency department visits (combined) associated with a fall injury among Massachusetts residents ages 65 and older in 2006, with an average of 55,214 episodes of care per year between 2002 and 2006.
- From 2000 through 2006, the crude rate of hospital stays associated with a fall injury among Massachusetts older adults increased 11% from 2,313.0 to 2,361.0 per 100,000 (statistically significant). During the same time period, the age-adjusted rates increased 5% from 2,031.5 to 2,132.2 per 100,000 (statistically significant).
- From 2002 through 2006, the crude rates for fall injuries associated with an emergency department visit among Massachusetts older adults increased 5.6% from 4,080.9 to 4,293.5 per 100,000 (statistically significant). During the same time period, the age-adjusted rates increased 4.0% from 3,896.4 to 4,053.8 per 100,000 (statistically significant).
- Nationally, in 2006 the age-adjusted rate of hospitalization for nonfatal fall injuries was 1,223.0 per 100,000. The age-adjusted rate of emergency department visits was 3,476.9 per 100,000. These rates are not directly comparable to the MA rates (due to differing data collection systems and case inclusion criteria).

**Figure 1.3: Total Charges for Acute Care Hospital Stays and Emergency Department Visits Associated with Unintentional Fall Injuries**  
Massachusetts Residents Ages 65+ Years, 2002-2006

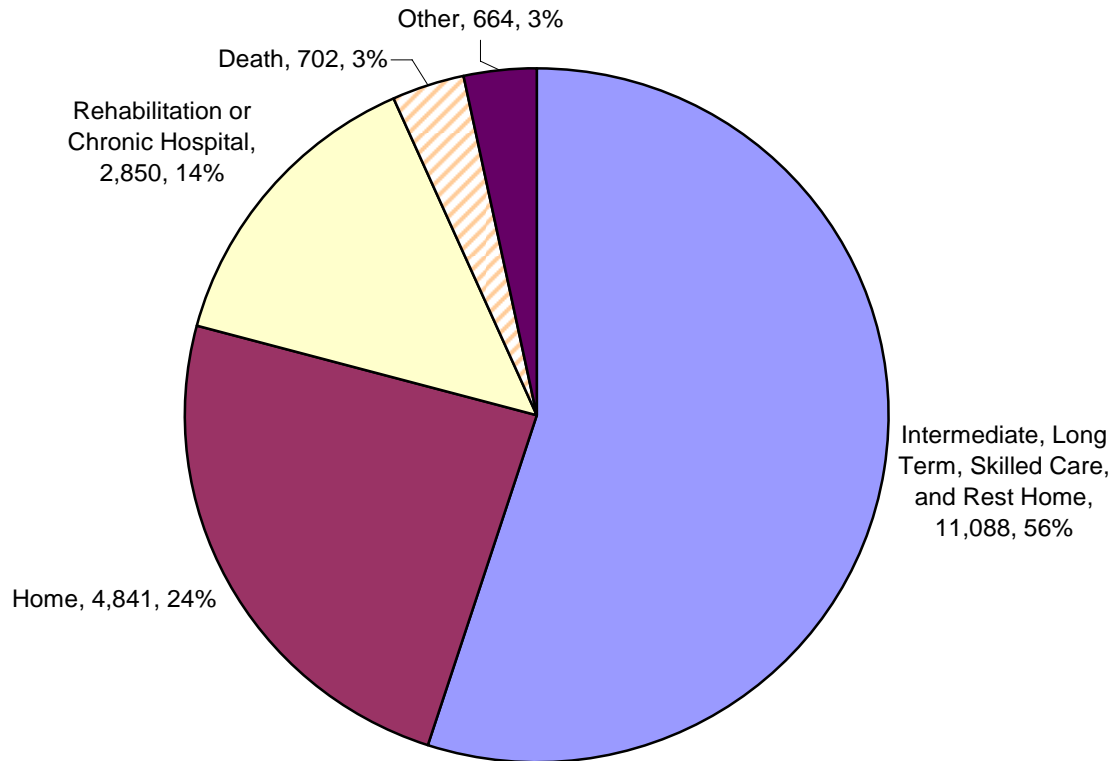


Data Source: FY2002-2006 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay and Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy. Hospital cases resulting in death or transfer are included in the charges. Mean charges are based on total charges as reported by hospitals.

- From 2002 through 2006 in Massachusetts, the total charges for hospital stays associated with a fall-related injury increased approximately 46% from \$279 million to \$407 million (unadjusted for inflation).
  - Mean charges per visit increased 31.0% from \$14,577 to \$19,103.
  - Median charges per visit increased 26.5% from \$10,738 to \$13,589.
- From 2002 through 2006 in Massachusetts, total charges for emergency department visits associated with a fall-related injury increased 89% from \$34 million to over \$64 million.
  - Mean charges per visit increased 80.3% from \$971 to \$1,751.
  - Median charges per visit increased 84.2% from \$691 to \$1,273.
- In 2006, public insurance (including Free Care, Medicare and Medicaid) was the expected payer for 90% of acute care hospital events associated with a fall injury among Massachusetts older residents.
- Nationally, the total cost of all fall-related injuries for people ages 65 years and older exceeded \$19 billion in 2000. These costs are expected to reach \$54.9 billion by 2020 (adjusted to 2007 dollars).

**Figure 1.4 Disposition Status for Inpatient Hospital Discharges  
Associated with Unintentional Fall Injuries**  
Massachusetts Residents Ages 65+, 2006

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N=20,145

Data Source: FY2006 Massachusetts Inpatient Hospital Discharge, Massachusetts Division of Health Care Finance and Policy.

\*'Home' includes discharges to home or self-care (routine discharge), home under care of a home IV drug therapy program, hospice home, and home under the care of an organized home health service organization. 'Intermediate, Long Term, Skilled Care and Rest Home' includes discharges to a skilled nursing facility, intermediate care facility, another type of institution for inpatient care or referred for outpatient services to another institution, or to rest home. 'Rehabilitation or Chronic Hospital' includes discharges to rehabilitation and chronic hospitals. 'Other' includes discharges and transfers to another short-term general hospital, shelter or a mental hospital, the patient left against medical advice, discharge status code missing, discharges to other facility, or hospice medical facility.

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- Of those requiring inpatient management for a fall-related injury in 2006, only 24% were discharged to home; 56% were discharged to an intermediate, long term care or similar facility; and 14% were discharged to a rehabilitation or chronic hospital.
  - Among individuals ages 85+ years who require inpatient hospitalization for a fall injury, 64% were discharged to a long term facility, intermediate care facility, skilled nursing facility, or a rest home (data not shown).
- In FY2006, 702 older adults with a fall-related injury diagnosis died during the course of their inpatient hospitalization. In contrast, only 340 death certificates listed a fall as the underlying cause of death in CY2006.

## **Section II. Demographic Characteristics and Health Risk Indicators**

This section presents rates of fall-related injuries by age, gender, race, and geography among cases identified through the acute care hospital and death databases. This section also includes findings from the 2006 Massachusetts Behavioral Risk Factor Surveillance System (BRFSS), a self-reported telephone survey of community-dwelling adults. The 2006 survey included questions on the occurrence of falls and fall injuries in the past three months. The proportion of older adults reporting a fall and injurious fall are reported by selected health risk indicators including disability status, educational level, marital status, obesity, and level of exercise. Maps of fall-related events are presented by Executive Office of Health and Human Services (EOHHS) Regions, six geographical regions used to provide coordination of care and administrative services throughout the Commonwealth. The regions include: Western, Central, Northeast, Metro West, Boston, and Southeast.

Among older adults, many risk factors for falls and injuries resulting from falls have been identified. In addition to identifying risk factors, it is important to recognize the interaction and probable synergism between multiple risk factors as research has shown that one's risk of falling increases as the number of these risk factors increases.<sup>28</sup> For example, Tinetti et al found that the risk of falling was 8% among a cohort of community-dwelling older adults with no risk factors compared to 78% among those with four or more risk factors. From a prevention perspective, risk factors can be grouped into four categories: biological and medical, behavioral, environmental and socio-economic.<sup>35</sup> Many of the risk factors in each of these categories are modifiable, although some, such as age or irreversible medical conditions are not.

### **Biological and Medical Risk Factors**

Biological and medical risk factors can play a large role in fall prevention depending on the spectrum of the aging process. Often these risk factors can not be treated. Biological risk factors include age and gender, a key factor as women sustain injuries from a fall more often than men. Conditions often associated with aging such as neurological conditions and strokes increase the risk of falls and fall-related injury. Older adults are living longer with chronic disease, have a greater risk for falling, and are less likely to survive an injury resulting from a fall.

Other medical risk factors may include:

- postural hypotension (a drop in blood pressure due to a change in position),<sup>16</sup>
- bone and muscle weakness,

- balance and gait instability,<sup>16</sup>
- deficits in vision (e.g. myopia, cataracts, or new glasses), hearing and cognition (e.g. dementia),
- arrhythmia,<sup>16</sup>
- certain chronic illness (e.g. arthritis, Parkinson's disease, osteoporosis),
- physical disability,<sup>36</sup>
- recent hospitalizations,<sup>16</sup>
- side effect from use of certain drugs and medications (e.g. any central nervous system/psychotropic drugs, or cardiovascular drugs such as antiarrhythmics or diuretics) can affect alertness, judgment and coordination,<sup>16</sup>
- taking four or more medications, including over-the-counter.<sup>16</sup>

### **Behavioral Risk Factors**

Behavioral risk factors may include:

- a history of previous falls,
- risk-taking behaviors (e.g. climbing, bending or rushing while performing activities of daily living),<sup>37</sup>
- consuming excessive amounts of alcohol (consumption of 14 or more drinks per week),<sup>38</sup>
- poorly fitting footwear or clothing,
- inadequate diet,
- restricting physical activity levels due to a fear of falling.<sup>39</sup>

### **Environmental Risk Factors**

Home and public environment risk factors may include:

- hazardous stairs due to uneven, too high or narrow steps, slippery surfaces, or stairs without handrails,<sup>40</sup>
- poor lighting,<sup>16</sup>
- loose rugs or uneven surfaces,<sup>41</sup>
- lack of bathroom safety equipment (e.g. grab bars, slip-resistant flooring),
- electrical cords in walking paths,<sup>42</sup>
- cracked or uneven sidewalks,
- slippery surfaces.

### **Socioeconomic Risk Factors**

Socioeconomic risk factors have a strong relationship to one's health. People of lower socioeconomic status are at a greater risk for chronic health conditions that, in turn, are risk factors for falls. The role that the social and economic factors play in fall prevention is not well understood, but may contribute to poor literacy, lack of nutritional foods, and other risk factors for falls. These socioeconomic risk factors may include:

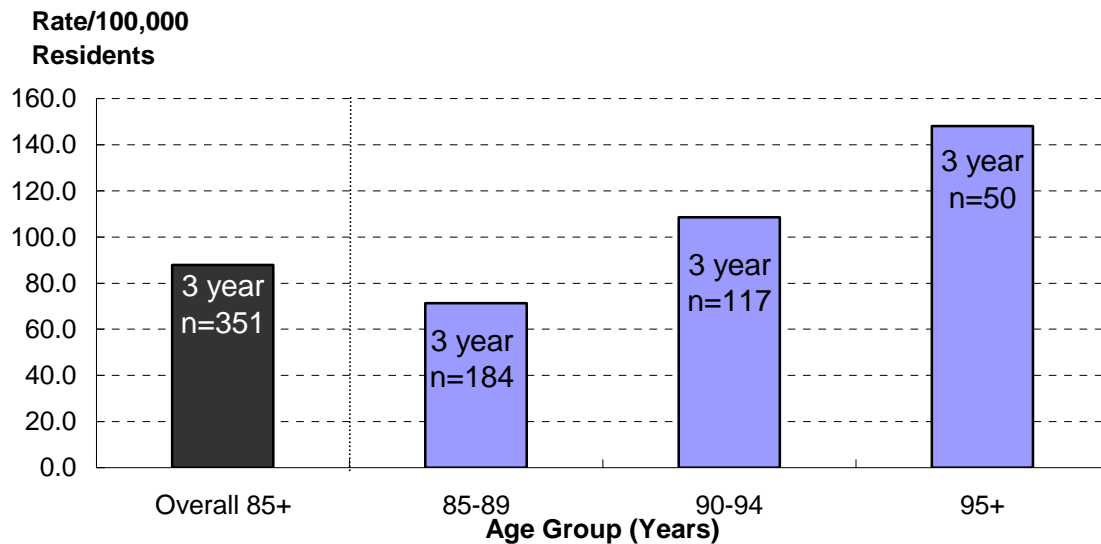
- low income,
- low education,
- inadequate housing,

- lack of access to appropriate health or social services

The risk of falling with injury increases substantially with age. The data on falls and fall injuries can be better understood by breaking out the population 65+ years of age into smaller age categories. Traditionally, public health surveillance and research combine individuals ages 85 years and older into one age group. For this report, this age group was divided into smaller age groups to better inform readers of the differences in fall injuries within the Massachusetts population 85+ years of age. The average annual age-specific death rate for unintentional falls among Massachusetts residents ages 95+ years (148.1 per 100,000) is 2 times higher than those ages 85-89 years (71.3 per 100,000), and 1.7 times higher than the overall 85+ age group (87.8 per 100,000) (Figure 2.1).

**Figure 2.1: Three-year Average Annual Unintentional Fall Death Rate by Age Group**

Massachusetts Residents Ages 85+ Years, 2004-2006



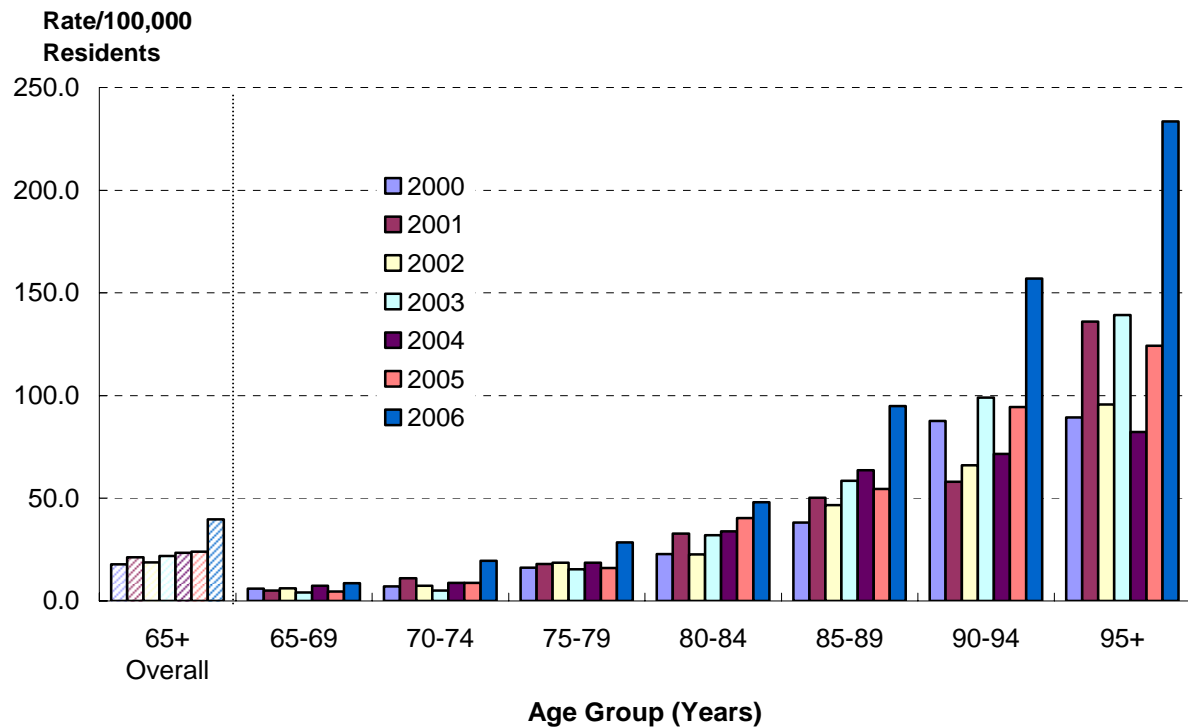
3 Year N=351

Data Source: CY2004-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

As the older adult population ages, the 85+ age group is expected to grow in number and diversity. The number of the Massachusetts population ages 85 years and older is expected to increase 81.6% from 2000 to 2030 (from 116,692 to 211,939). Furthermore, changes in marital and familial composition, the number of women in the labor force, education and income attainment, and the racial and ethnic composition of the older population in 2030 will be different than the older population of 2000. A closer look at the 5-year age groups within the 85+ population will help better target prevention efforts. For this section of the report, the 85+ age group category is presented in more detail whenever possible.



**Figure 2.2: Unintentional Fall Death Rates by Age Group**  
Massachusetts Residents Ages 65+ Years, 2000-2006

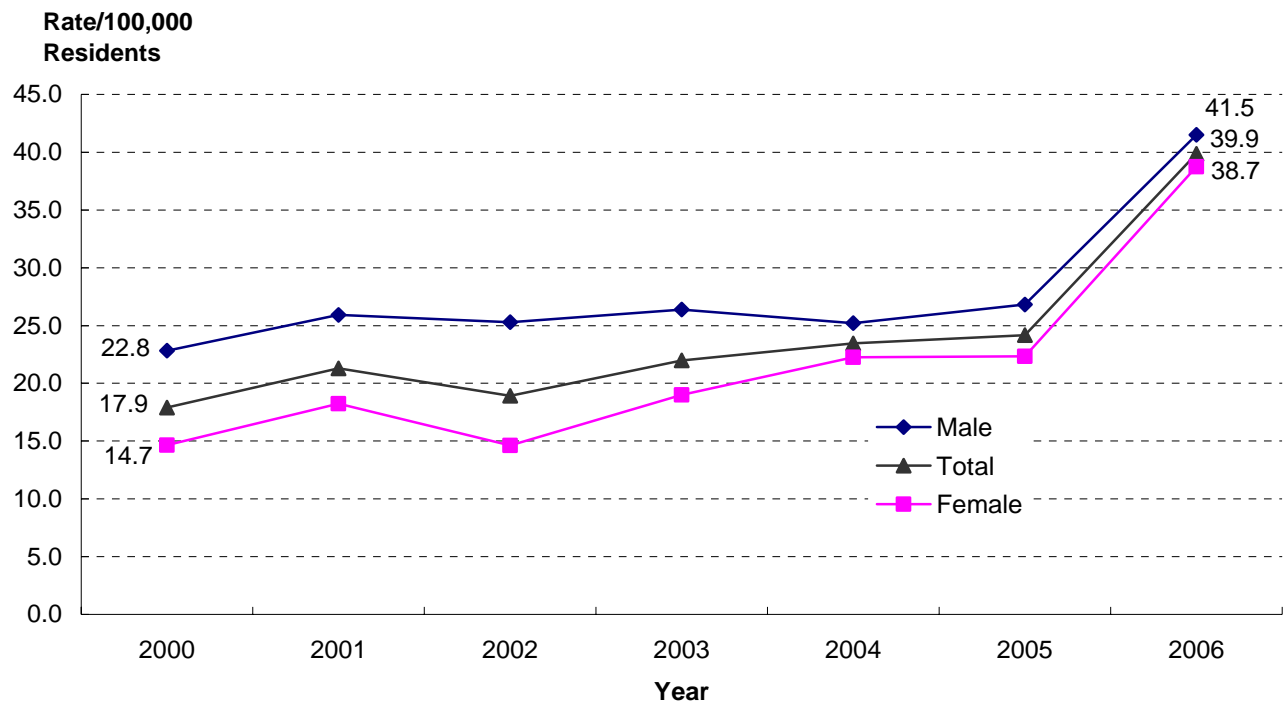


N=1,433

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

- Fall death rates among Massachusetts older adults increase with increasing age. In 2006, fall death rates among Massachusetts residents ranged from a low of 8.6 per 100,000, among those ages 65-69 years, to a high of 233.5 per 100,000 among those ages 95+ years (statistically significant).
  - The increase in the rate of deaths due to falls by age group may be due in part to an increase in adverse health conditions associated with increasing age.
- From 2000 through 2006, the Massachusetts fall death rate among older adults increased among all age groups. This increase was statistically significant among those ages 80-84 and 85-89 years.

**Figure 2.3: Crude Unintentional Fall Death Rates By Sex**  
Massachusetts Residents Ages 65+ Years, 2000 – 2006



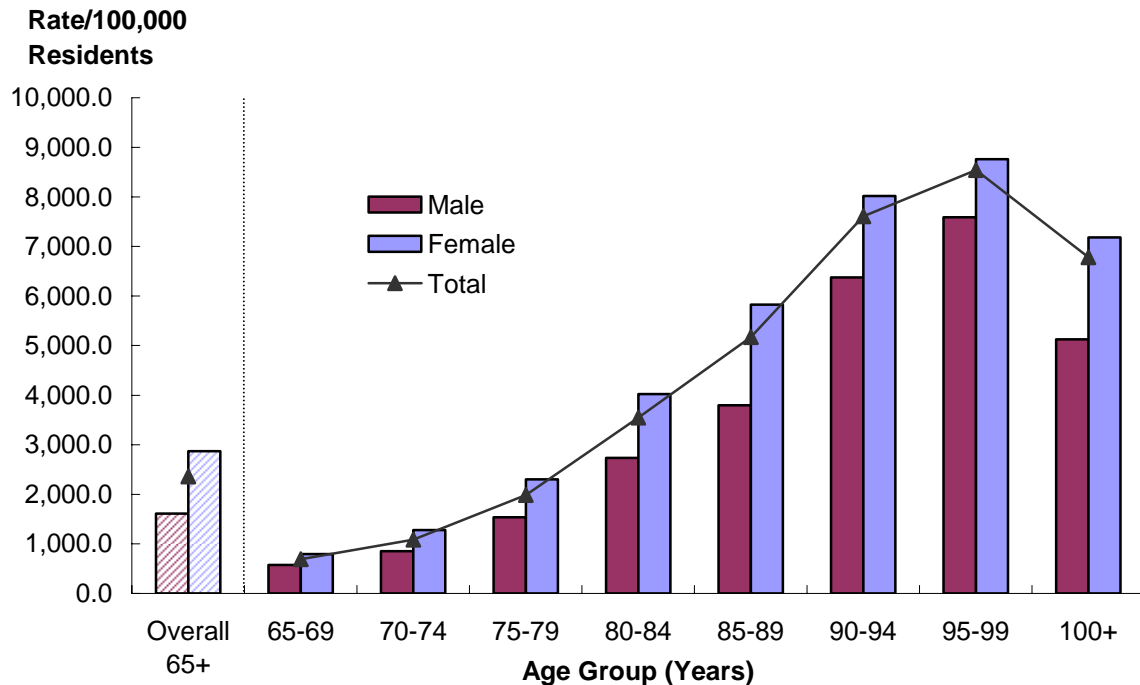
Male N=669, Female N= 764, Total N=1,433

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

- Crude fall fatality rates were higher among men than women for all years examined from 2000 through 2006, however this difference was not statistically significant.
  - In 2006, the fall death rate among older adults was 41.5 per 100,000 for males (n=144) and 38.7 per 100,000 for females (n=196). Males have higher fall death rates than females even though there are more deaths among females. The greater number of fall deaths among women is at least partially due to the fact that women have a longer life expectancy and age is a major risk factor for fall injury.
  - Males had higher rates of fall fatality rates compared to females among all age subgroups except among those ages 95+ years (data not shown).
  - National reports show a similar pattern, but the underlying causes for the disparity in fatality rates between males and females are unclear.<sup>5</sup>
- Fall fatality rates increased for both men and women from 2000 through 2006 (82% for men from 22.8 to 41.5 per 100,000 and 164% for women from 14.7 to 38.7 per 100,000). Both increases were statistically significant.

- After adjusting for age, fall fatality rates remained higher among men than women from 2000 through 2006, however this difference was not statistically significant. Age-adjusted rates increased for both men and women from 2000 through 2006 (67% for men from 22.0 to 36.8 per 100,000 and 147% for women from 13.7 to 33.8 per 100,000) (statistically significant).

**Figure 2.4: Age-Sex-Specific Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury**  
Massachusetts Residents Ages 65+ Years, 2006



Male N=5,613, Female N=14,596, Total N=20,209

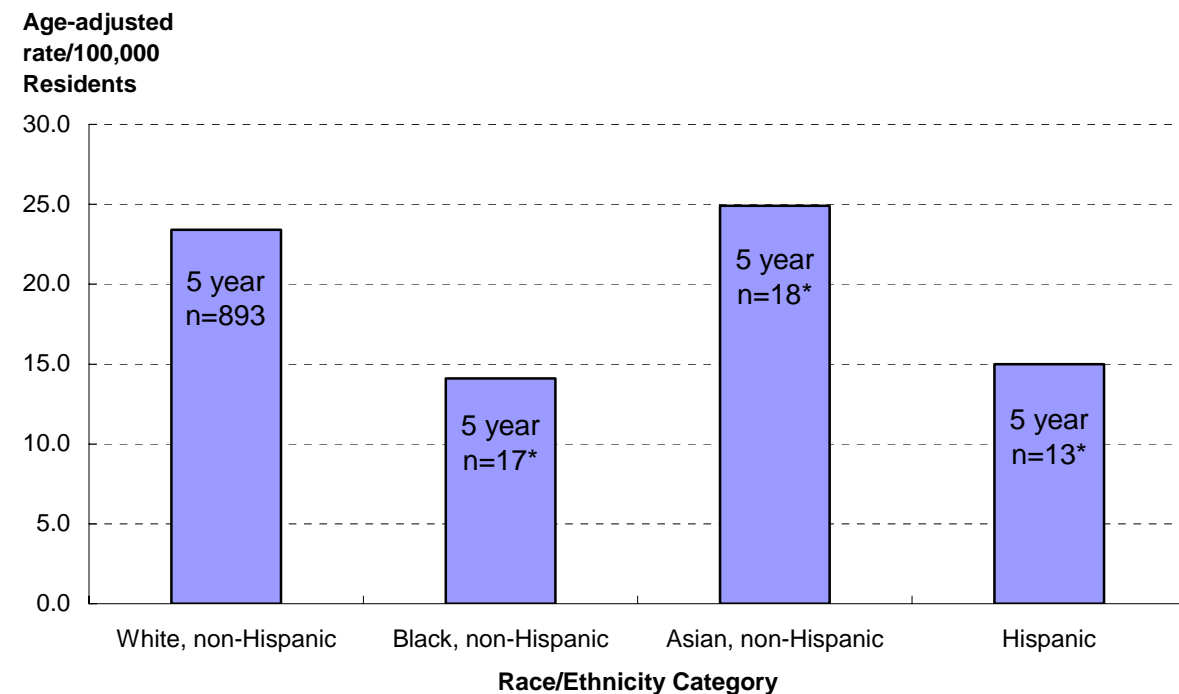
Data Source: FY2005 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy

- In 2006, the crude rate of hospital stays associated with a nonfatal fall injury among Massachusetts older adults was higher among women (2,872.3 per 100,000) than men (1,613.9 per 100,000).
- Females in all age subgroups had higher rates of hospital stays associated with nonfatal fall injuries compared to males. This differs from the pattern seen in fall fatalities.
- Hospital stay rates associated with nonfatal fall injuries generally increase with age subgroup. In 2006, the age-specific rate of hospitalizations for fall-related injuries for both sexes combined ages 95-99 years was 12.3 times higher than the rate among those ages 65-69 years (8,540.0 vs. 690.9 per 100,000) and 3.6 times higher than the overall rate among the 65+ year age group (2,361.0 per 100,000). (data not shown)

- By gender, hospital stay rates associated with these injuries also increase. In 2006, the age-specific rates were lowest among those 65-69 years (rate for males: 570.9 per 100,000; rate for females: 793.9 per 100,000) and highest among those 95-99 years (rate for males: 7,587.0 per 100,000; rate for females: 8,764.0 per 100,000). The age-specific rate among those ages 100+ years, typically an age with limited ambulation, was the exception to the increasing trend by age group.
- A relatively similar pattern by age and sex is seen among emergency department visits associated with a nonfatal fall injury by gender and age group (data available in Appendix B).

## Figure 2.5: Five-year Average Annual Age-Adjusted Unintentional Fall Death Rate by Race/Ethnicity

Massachusetts Residents Ages 65+ Years, 2002-2006



5 Year N=1,096

Data Source: CY2002-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

Black, non-Hispanic includes Cape Verdean. Asian, non-Hispanic includes Pacific Islander

Data excludes 1 case of American Indian, non-Hispanic race

\*Rates are based on counts less than twenty and may be unstable.

- After adjusting for age, Asian, non-Hispanics had the highest average annual fall death rates (24.9 per 100,000), followed by White, non-Hispanics (23.4 per 100,000), Hispanics (15.0 per 100,000), and Black, non-Hispanics (14.1 per 100,000). These differences were not statistically significant.
  - Caution should be used in interpreting the rates for Asians and Hispanics because of potential undercounts in population data and misclassification on death certificates which may result in inaccuracies in mortality statistics for these populations.<sup>43</sup>
- Nationally in 2005, the age-adjusted fall death rate among older adults was highest for White, non-Hispanic (43.2 per 100,000) and lowest for Black, non-Hispanic (20.3 per 100,000) (statistically significant).
- Research shows that bone mass density is lower in Whites.<sup>44</sup> Asian women also have a high risk for developing osteoporosis.<sup>45</sup> Falls among individuals with low bone mass density are often at risk of suffering a more severe injury because of their fragile bones.

## **Health Risk Indicators**

The Behavioral Risk Factor Surveillance System (BRFSS) is a population-based random-digit-dial telephone survey and a commonly accepted source for information on a variety of health topics. BRFSS is administered to adults ages 18 years and above and in all 50 states. BRFSS data are weighted to take into account differences in probabilities of selection. Results can be compared with national estimates. BRFSS population estimates represent the prevalence of risk factors occurring among individuals living in the community. The 2006 BRFSS survey was limited to households with landline phones. Individuals who live in institutionalized settings, have cognitive limitations, do not have phone service or have only mobile phone service are unable to participate. In addition, BRFSS is based on self-reported data and as such are subject to the possible bias of self-reported data. Further methodological details are available in Appendix A.

The 2006 national and Massachusetts BRFSS survey included two questions on falls.

- In the past three months, how many times have you fallen?
- How many of these falls caused an injury?

In this survey, a fall was defined as unintentionally coming to rest on the ground or another lower level. An injury from a fall was defined as one that caused the respondent to limit regular activities for at least a day or to go see a doctor. Presented here is the proportion of Massachusetts adults ages 65 years and older who reported a fall and the proportion of Massachusetts adults who reported a fall with injury in the past 3 months.

**Table 2.1: Prevalence of Self-Reported Falls and Falls with Injury within the Past 3 Months by Age Group, Race/Ethnicity, Disability, Education, Marital Status, Obesity Status, and Exercise Level**

Massachusetts Residents Ages 65+ Years, 2006

Categories	Unintentional Falls			Injured by Unintentional Fall		
	N	%	95% CI	N	%	95% CI
Overall	3,225	16.0	14.2 - 17.8	3,222	4.9	3.9 - 5.8
Age Group						
65-69	749	15.1	11.5 - 18.7	749	4.4	2.5 - 6.4
70-74	718	15.9	12.1 - 19.8	717	3.7	1.9 - 5.5
75-79	671	12.9	9.4 - 16.3	669	4.6	2.6 - 6.6
80-84	527	18.1	13.6 - 22.7	527	3.8	1.7 - 5.9
85-99	348	26.7	20.2 - 33.2	348	10.3	6.2 - 14.3
Race/Ethnicity*						
White	2,828	16.5	14.5 - 18.4	2,672	4.5	3.5 - 5.5
Black	111	13.5	5.1 - 21.9	99	10.1	1.2 - 19.0
Hispanic	152	16.7	6.7 - 26.8	145	13.5	3.2 - 23.8
Asian †	†	†	†	†	†	†
Disability‡						
Disabled and Need Help	208	33.6	23.8 - 43.44	200	13.9	6.3 - 21.5
Disabled	316	19.4	13.4 - 25.4	304	4.7	1.7 - 7.8
No Disability	1,047	10.9	8.2 - 13.7	963	3.4	1.9 - 4.9
Education						
< High School	522	25.4	19.1 - 31.6	515	9.2	5.5 - 12.9
High School	1,072	12.5	9.8 - 15.14	1,022	3.5	2.2 - 4.9
College 1-3 Years	668	15.8	11.8 - 19.7	616	5.1	3.0 - 7.3
College 4+ Years	949	16.6	13.6 - 19.7	851	4.5	2.8 - 6.3
Marital Status						
Married or Unmarried Couple	1,279	14.4	11.9 - 16.9	1,170	4.0	2.7 - 5.3
Divorced, Separated or Widowed	1,659	18.8	16.0 - 21.6	1,606	6.1	4.5 - 7.6
Single	258	13.0	8.0 - 18.1	226	5.0	1.3 - 8.9
Obese						
Yes	633	26.7	21.6 - 31.7	612	5.6	3.3 - 8.0
No	2,349	14.0	12.1 - 15.9	2,242	4.5	3.4 - 5.6
Any Exercise						
Yes	2,128	14.2	12.1 - 16.2	1,964	4.5	3.3 - 5.6
No	1,095	20.4	16.9 - 23.9	1,045	5.8	4.0 - 7.6

Data Source: 2006 Behavioral Risk Factor Surveillance System, Massachusetts Department of Public Health

White, Black and Asian race categories refer to non-Hispanic.

† Insufficient data for stable estimates

‡ Disability defined as having one or more of the following conditions for at least one year: 1) impairment of health problem that limited activities or caused cognitive difficulties; 2) used special equipment or required help from others to get around; or 3) reported a disability of any kind

N= The number of people who answered the corresponding question

%=The crude proportion is a weighted ratio of those who answered "yes" to the corresponding question versus all who responded to the question

95% C.I. (95% confidence interval) =The range of values determined by the degree of variability of the data within which the true value is likely to lie



### **Unintentional Fall (Table 2.1)**

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- Sixteen percent of Massachusetts adults ages 65 and older reported at least one fall in the past 3 months. This is comparable to national estimates (15.9%).
- Adults ages 85 years and older were more likely than those 65-69 to report having fallen in the past 3 months (26.7% vs. 15.1%) (statistically significant).
- The prevalence of reporting any fall among racial and ethnic subgroups was not significantly different.
- Older adults disabled and needing help were more likely to report a fall in the past 3 months than those without a disability (33.6% vs. 10.9%) (statistically significant).
- Older adults who reported any exercise in the past month were less likely to report a fall in the past 3 months than those who reported no exercise (14.2% vs. 20.4%) (statistically significant).
- Older adults who were obese were more likely to report a fall in the past 3 months than those who were not obese (26.7% vs. 14.0%) (statistically significant). Conversely, a previous research study found that low body mass index was also associated with an increased risk of falls due to underweight persons being weak or having poor nutritional or health status.<sup>46</sup>

### **Injured After an Unintentional Fall (Table 2.1)**

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- Among all Massachusetts residents ages 65 and older, almost 5% reported an injury due to a fall in the past 3 months.
  - Of the Massachusetts residents ages 65 and older who reported a fall in the past 3 months, 29.3% reported being injured; similar to 31.3% reported nationally (data not shown).<sup>16</sup>
- Adults ages 85 years and older were more likely than those 65-69 to report having fallen with injury in the past 3 months (10.3% vs. 4.4%) (statistically significant).
- The prevalence of reporting an injury from a fall among Hispanics, Black non-Hispanics, and White non-Hispanics was not significantly different (13.5%, 10.1%, 4.5%, respectively).
- The prevalence of reporting an injury from a fall in the past 3 months among older adults with disability and needing help was significantly higher compared to those without disability (13.9% vs. 3.4%).

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## **Geography**

The following section presents three-year average-annual rates of unintentional fall death and acute care hospital treatment associated with an unintentional fall injury by region and city/town. The rates provided are age-specific crude rates (number of events per 100,000 persons in this age group). Crude rates do not adjust for differences in age compositions between populations (e.g. some cities/towns have proportionally more older adults in the 85 year and older age group than other cities/towns, influencing the rates of fall-related events in these communities). The crude rates of fall injuries by city/town may also be influenced by the number of skilled nursing facilities/beds within these locales. These facilities may have residents that are at higher risk for falls. To assist in the interpretation of this data, the geographic location of these facilities in Massachusetts is listed in Appendix D.

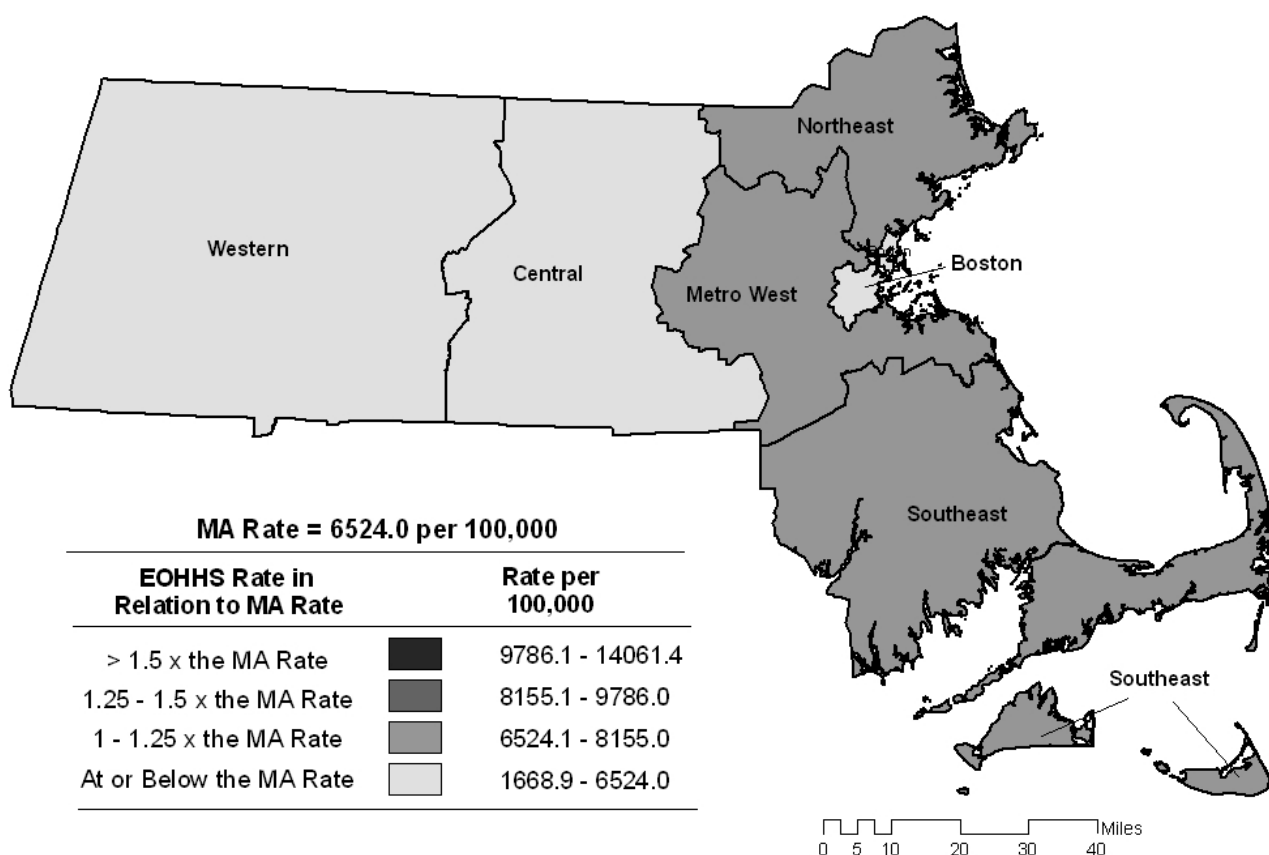
The three-year (2003-2005) average number of fall-related events among older adults occurring in 351 cities and towns in Massachusetts was mapped. Using three years of data provides some statistical stability in towns experiencing a small number of events. Rates were not calculated on three-year counts less than twenty, as these will be unstable.

The Executive Office of Health and Human Services (EOHHS) uses six geographical regions to provide coordination of care and administrative services throughout the Commonwealth. The regions include: Western, Central, Northeast, Metro West, Boston, and Southeast. Seven maps are provided in this section to illustrate the crude rate for each EOHHS region and their corresponding cities and towns in relationship to the Massachusetts rate.

Crude rates for fall-related events are provided for all 351 cities and towns in MA, and age-adjusted rates for selected cities and towns are provided in Appendix C.

## Map 2.1: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by Executive Office of Health and Human Services Region

Massachusetts Residents Ages 65+ Years, 2003-2005



N=167,214

Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

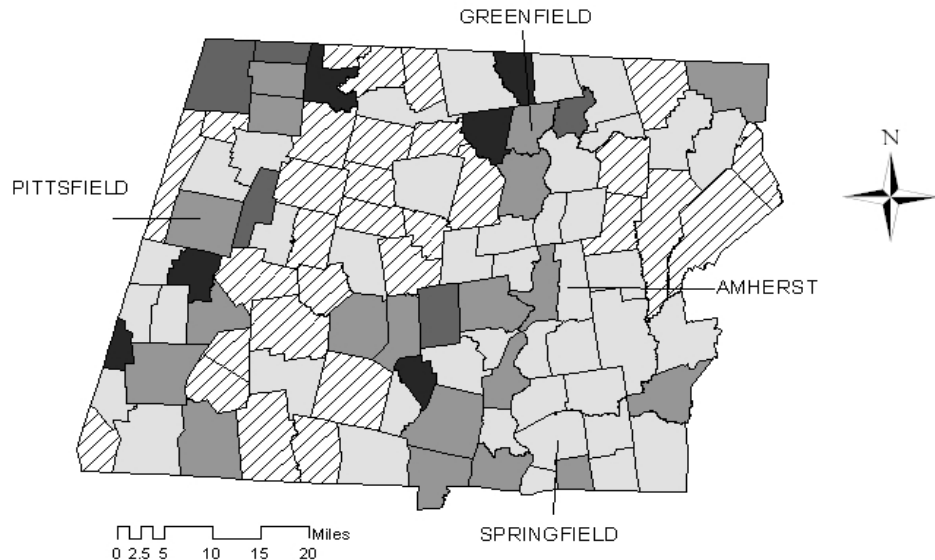
<sup>†</sup>Events include deaths, acute care hospital stays, and emergency department visits.

- Northeast (6,670.2 per 100,000), Metro West (6,685.7 per 100,000) and Southeast (6,704.8 per 100,000) EOHHS Regions had a crude fall-event rate 1-1.25 times higher than the overall Massachusetts rate. Likewise, these regions had an age-adjusted fall-event rate 1-1.25 times higher than the overall age-adjusted Massachusetts rate (see Appendix B for actual age-adjusted rates).

- The crude fall-event rates in Western (6,287.2 per 100,000), Central (6,201.7 per 100,000) and Boston (6,148.7 per 100,000) EOHHS Regions were at or below the Massachusetts rate.
- The reasons for these differences are unclear, but may be related to regional differences in the age composition and other demographic factors, the delivery of care for fall injuries (e.g. more or less hospital-based care), access to health care services, the local environment, and/or variable rates of fall occurrence and fall injuries.






**Map 2.2: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in the Western Executive Office of Health and Human Services Region**

Massachusetts Residents Ages 65+ Years, 2003-2005



**Western Region Rate = 6287.2 per 100,000**

**MA Rate = 6524.0 per 100,000**

City/Town Rate in Relation to MA Rate		Rate per 100,000
> 1.5 x the MA Rate		9786.1 - 14061.4
1.25 - 1.5 x the MA Rate		8155.1 - 9786.0
1 - 1.25 x the MA Rate		6524.1 - 8155.0
At or Below the MA Rate		1668.9 - 6524.0
Rate Not Calculated (N<20)		NA

N=22,367

Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup>Events include deaths, acute care hospital stays, and emergency department visits

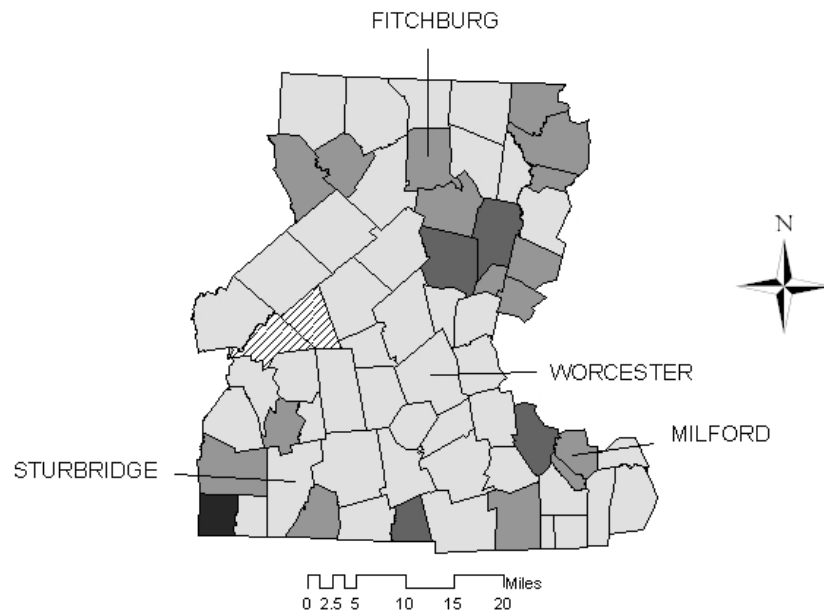
A stable rate could not be calculated for 30 cities/towns in the Western EOHHS Region.

- The EOHHS Western region's crude fall-event rate (6,287.2 per 100,000) was 3.6% lower than the overall Massachusetts rate (6,524.0 per 100,000).

- Six cities and towns in Western Massachusetts had a crude fall-event rate at least 1.5 times higher than the Massachusetts rate: Leyden (13,483.9 per 100,000), Florida (12,792.0 per 100,000), Alford (11,556.1 per 100,000), Lenox (11,366.6 per 100,000), Shelburne (10,784.3 per 100,000), and Montgomery (10,513.5 per 100,000). When adjusting for age, the rates in these towns remained at least 1.5 times higher than the Massachusetts rate. The exception to this was Lenox, whose 3 year average annual age adjusted rate was 1.4 times that of Massachusetts. (See Appendix B for actual age adjusted rates.)

### Map 2.3: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in the Central Executive Office of Health and Human Services Region

Massachusetts Residents Ages 65+ Years, 2003-2005



**Central Region Rate = 6201.7 per 100,000**

**MA Rate = 6524.0 per 100,000**

City/Town Rate in Relation to MA Rate	Rate per 100,000
> 1.5 x the MA rate	9786.1 - 14061.4
1.25 - 1.5 x the MA rate	8155.1 - 9786.0
1 - 1.25 x the MA rate	6524.1 - 8155.0
At or Below the MA rate	1668.9 - 6524.0
Rate Not Calculated (N<20)	NA

N=18,560

Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup>Events include deaths, acute care hospital stays, and emergency department visits

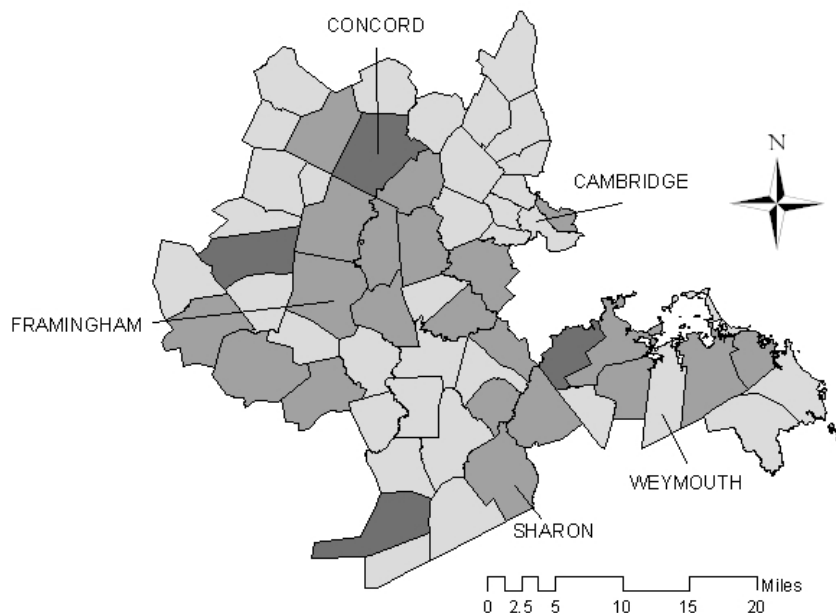
A stable rate could not be calculated for 2 cities/towns in the EOHHS Central Region.

- The EOHHS Central region's crude fall-event rate (6,201.7 per 100,000) was 5.0% lower than the Massachusetts rate (6,524.0 per 100,000).
- The crude fall-event rate in Wales (10,610.1 per 100,000) was 1.6 times higher than the overall Massachusetts rate. When adjusting for age, the rate in Wales was 1.9 times higher than the Massachusetts rate. (See Appendix B for actual age adjusted rates.)







**Map 2.4: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in the Metro West Executive Office of Health and Human Services Region**

Massachusetts Residents Ages 65+ Years, 2003-2005



**Metrowest Region Rate = 6685.8 per 100,000**

**MA Rate = 6524.0 per 100,000**

City/Town Rate in Relation to MA Rate		Rate per 100,000
> 1.5 x the MA Rate		9786.1 - 14061.4
1.25 - 1.5 x the MA Rate		8155.1 - 9786.0
1 - 1.25 x the MA Rate		6524.1 - 8155.0
At or Below the MA Rate		1668.9 - 6524.0

N=40,532

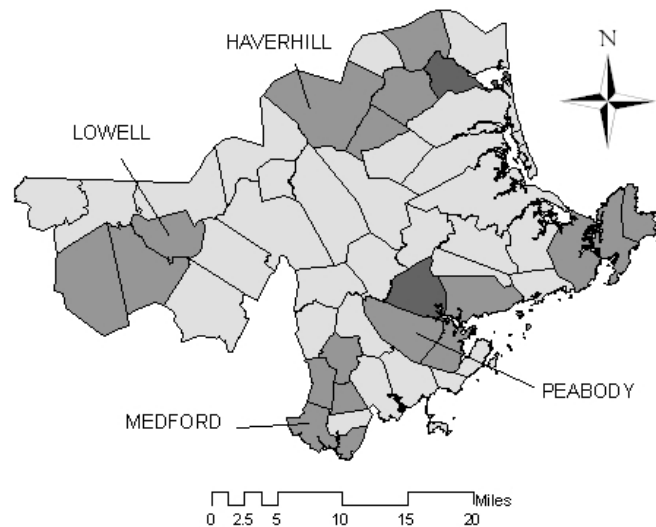
Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup> Events include deaths, acute care hospital stays, and emergency department visits

- The EOHHS Metro West region's crude fall-event rate (6,685.8 per 100,000) was slightly higher (2.5%) than the overall Massachusetts rate (6,524.0 per 100,000).
- No cities/towns in this region had crude rates that were more than 1.5 times the Massachusetts rate.





**Map 2.5: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in the Northeast Executive Office of Health and Human Services Region**

Massachusetts Residents Ages 65+ Years, 2003-2005



**Northeast Region Rate = 6670.2 per 100,000**

**MA Rate = 6524.0 per 100,000**

City/Town Rate in Relation to MA Rate		Rate per 100,000
> 1.5 x the MA Rate		9786.1 - 14061.4
1.25 - 1.5 x the MA Rate		8155.1 - 9786.0
1 - 1.25 x the MA Rate		6524.1 - 8155.0
At or Below the MA Rate		1668.9 - 6524.0

N=33,552

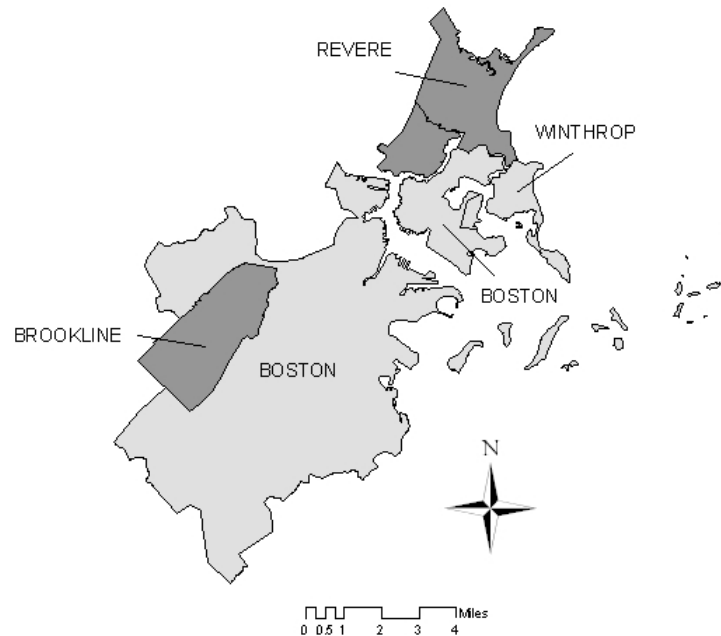
Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup>Events include deaths, acute care hospital stays, and emergency department visits

- The EOHHS Northeast region's crude fall-event rate (6,670.2 per 100,000) was slightly higher (2.2%) than the overall Massachusetts rate (6,524.0 per 100,000).
- No cities/towns in this region had crude rates that were more than 1.5 times the Massachusetts rate.

**Map 2.6: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in the Boston Executive Office of Health and Human Services Region**

Massachusetts Residents Ages 65+ Years, 2003-2005



**Boston Region Rate = 6148.7 per 100,000**

**MA Rate = 6524.0 per 100,000**

City/Town Rate in Relation to MA Rate	Rate per 100,000
> 1.5 x the MA Rate	9786.1 - 14061.4
1.25 - 1.5 x the MA Rate	8155.1 - 9786.0
1 - 1.25 x the MA Rate	6524.1 - 8155.0
At or Below the MA Rate	1668.9 - 6524.0

N=14,952

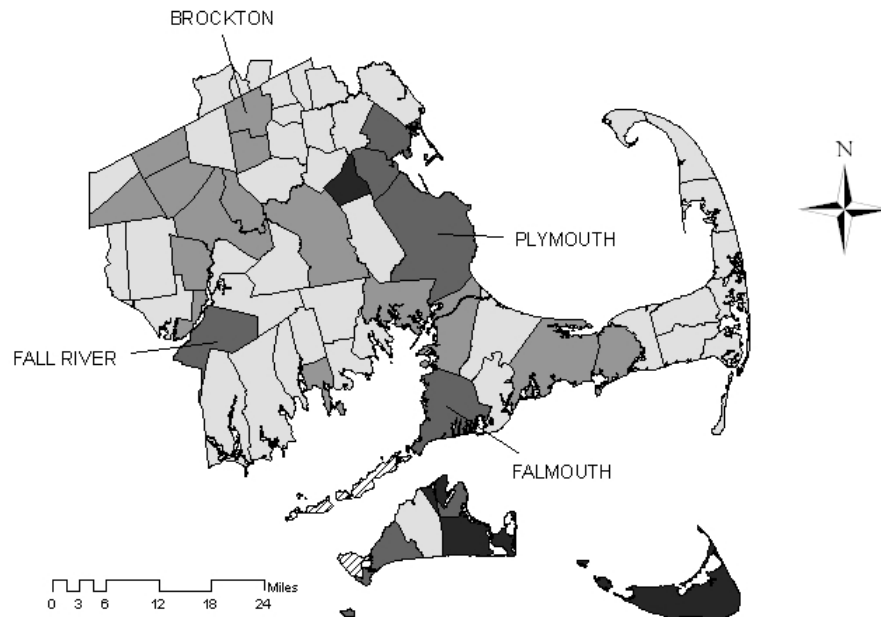
Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup> Events include deaths, acute care hospital stays, and emergency department visits

- The EOHHS Boston region's crude fall-event rate (6,148.7 per 100,000) was 5.8% lower than the overall Massachusetts rate (6,524.0 per 100,000).
- No cities/towns in this region had crude rates that were more than 1.5 times the Massachusetts rate.






**Map 2.7: Three-year Average Annual Crude Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in the Southeast Executive Office of Health and Human Services Region**

Massachusetts Residents Ages 65+ Years, 2003-2005



**Southeast Region Rate = 6704.8 per 100,000**

**MA Rate = 6524.0 per 100,000**

City/Town Rate in Relation to MA Rate		Rate per 100,000
> 1.5 x the MA Rate		9786.1 - 14061.4
1.25 - 1.5 x the MA Rate		8155.1 - 9786.0
1 - 1.25 x the MA Rate		6524.1 - 8155.0
At or Below the MA Rate		1668.9 - 6524.0
Rate Not Calculated (N<20)		NA

N=37,251

Data sources: CY2003-2005 Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup> Events include deaths, acute care hospital stays, and emergency department visits

- The EOHHS Southeast region had a crude fall-event rate (6,704.8 per 100,000) 2.8% higher than the overall Massachusetts rate (6,524.0 per 100,000).
- Fall-event rates in Edgartown (14,061.4 per 100,000), Tisbury (12,660.6 per 100,000), Nantucket (10,433.1 per 100,000), and Plympton (10,237.7 per 100,000) were more than 1.5 times higher than the overall Massachusetts rate. When adjusting for age, the rates in these towns remained at least 1.5 times higher than the Massachusetts rate. (See Appendix B for actual age adjusted rates.)

### **Section III. Circumstances of a Fall-Related Injury**

In this section, fatal and nonfatal fall-related injuries were examined to assess what is known regarding the circumstances these fall injuries and the location of where the fall injury occurred. Knowledge of the associated factors or circumstances of fall injuries and the types of places where falls are occurring are important for identifying effective prevention strategies. Examples of the types of places where the fall injury occurred could include home, nursing home, or assisted living facility. Additional information which are useful for prevention include the activity the person was engaged in at the time of the fall (e.g. recreation, working, bathing, etc.), the surface from which the person fell (e.g. stairs, same level, wheelchair, bed, etc.), the environment and engineering of the places in which falls occur (e.g. lighting, floor surface, ice, etc.), and medical or other conditions that change one's risk for fall injury (e.g. gait, balance and visual problems, alcohol and drugs, osteoporosis, dementia, etc.).

Unfortunately, the death certificate and acute care hospital data used to generate this report are collected for purposes other than fall surveillance and do not provide extensive details on these important aspects of fall injuries. These details are bound by the International Classification of Disease (ICD) coding structure, which, for years reported, differs for fatal and nonfatal data. Changes in the ICD coding structures can affect the comparability of data between versions (i.e. ICD-9 vs. ICD-10), however, updates to the ICD coding systems help to improve the specificity.

For example, the data do enable differentiation of the circumstances of a fall from "one level to another" versus a "fall on or from stairs or steps", unless it is classified as an "unspecified fall". In these cases, additional details are not known. Of the fatal unintentional fall injuries among older adults from 2004 through 2006, 54% were classified as "unspecified fall". In FY2006, 42% of hospital stays and 33% of emergency department visits for unintentional fall injuries among older adults were classified by the hospital as "other fall" or "unspecified fall".

In addition, the data enable some differentiation of the location of a fall. In 2006, 32% of hospital stays and 25% of emergency department discharges for unintentional fall injuries among older adults were assigned a place of injury code. Of those with a code, 6.5% of hospital stays and 14% of emergency department visits were classified by the hospital as "unknown" place of injury occurrence.

**Table 3.1: ICD-10 Categories for Unintentional Fall Deaths by Age Group**  
Massachusetts Residents Ages 65+ Years, 2004 – 2006

ICD-10 Categories for Unintentional Fall Deaths	Age Group (Years)				Total
	65-74	75-84	85-94	95+	
Fall involving ice and snow	1	1	0	0	2
Fall involving a slip, trip, or stumble	2	13	6	1	22
Fall involving ice skates, skis, roller skates, skateboards	0	0	0	0	0
Other fall on same level due to collision with another person	0	0	0	0	0
Fall while being carried by another person	1	0	0	0	1
Fall involving wheelchair	4	2	1	1	8
Fall involving bed	4	18	11	0	33
Fall involving chair	0	2	6	0	8
Fall involving other furniture	0	2	0	0	2
Falls involving stairs or steps	28	71	40	4	143
Fall from ladder	4	3	0	0	7
Fall from building or structure	5	7	11	2	25
Diving or jumping into water causing injury other than drowning or submersion	0	1	0	0	1
Other fall from one level to another	5	4	4	0	13
Other fall on same level	15	30	32	4	81
Unspecified fall	47	125	190	38	400
Total falls	116	279	301	50	746

N=746

Data Source: CY2004-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

**For fall deaths among Massachusetts older adults from 2004 through 2006:**

- Information on the circumstances of the fall was available from ICD-10 codes in 46% (n=346) of the deaths. In the remaining 54% (n=400), the death certificate data generated a code for “unspecified fall”. This means that there was not enough information written on the death certificate to categorize the fall any further.
- Where specificity is known, falls involving stairs or steps were responsible for 41% (n=143) of deaths; falls on the same level were responsible for 30% (n=103) of deaths; and falls involving the bed were responsible for 10% (n=33) of deaths.
- The proportion receiving an ICD-10 code for ‘unspecified fall’ differed by age groups:
  - 41%, (n=47) among those 65-74 years
  - 45%, (n=125) among those 75-84 years
  - 63%, (n=190) among those 85-94 years
  - 76%, (n=38) among those 95+ years

**Table 3.2: ICD-9-CM Categories for an Unintentional Fall-Related Injury Associated with an Acute Care Hospital Stay by Age Group**  
Massachusetts Residents Ages 65+ Years, 2006

Circumstances (ICD-9-CM External Cause of Injury Category )	Age Group (Years)				Total
	65-74	75-84	85-94	95+	
Fall on or from stairs or steps	395	688	378	23	1,484
<i>Escalator</i>	0	<7	0	0	<7
<i>Fall on or from sidewalk curb</i>	16	47	26	0	89
<i>Other stairs or steps</i>	379	635	352	23	1,389
Fall on or from ladders or scaffolding	82	57	21	0	160
<i>Fall from ladder</i>	81	56	21	0	158
<i>Fall from scaffolding</i>	<7	<7	0	0	<7
Fall from or out of building or other structure	9	12	<7	<7	24
Fall into hole or other opening in surface	<7	<7	<7	0	8
<i>From diving or jumping into water</i>	0	<7	0	0	<7
<i>Fall into storm drain or manhole</i>	0	0	0	0	0
<i>Fall into other hole or other opening in surface</i>	<7	<7	<7	0	7
Other fall from one level to another	301	762	661	114	1,838
<i>Fall from playground equipment</i>	0	<7	0	0	<7
<i>Fall from cliff</i>	0	0	0	0	0
<i>Fall from chair</i>	63	166	148	22	399
<i>Fall from wheelchair</i>	50	110	97	17	274
<i>Fall from bed</i>	103	329	300	56	788
<i>Fall from other furniture</i>	8	24	13	<7	49
<i>Fall from commode</i>	24	63	63	10	160
<i>Other fall from one level to another</i>	53	68	39	<7	165
Fall on same level from slipping, tripping, or stumbling	1,395	3,180	2,940	361	7,876
<i>Fall from (nonmotorized) scooter</i>	0	<7	<7	0	<7
<i>Fall from roller skates</i>	0	0	0	0	0
<i>Fall from skateboard</i>	<7	<7	0	0	<7
<i>Fall from skis</i>	<7	<7	0	0	<7
<i>Fall from snowboard</i>	0	0	0	0	0
<i>Fall from other slipping, tripping, or stumbling</i>	1,393	3,173	2,938	361	7,865
Fall on same level from collision, pushing, or shoving by or with other person	<7	8	11	<7	25
<i>In sports</i>	<7	0	0	0	<7
<i>Other and unspecified</i>	<7	8	11	<7	24
Other and unspecified fall	1,391	3,574	3,374	455	8,794
<i>Fall resulting in striking against sharp object</i>	<7	10	<7	0	14
<i>Fall resulting in striking against another object</i>	74	156	140	18	388
<i>Other fall</i>	188	397	388	53	1,026
<i>Unspecified fall</i>	1,126	3,008	2,844	384	7,362
<b>Total</b>	<b>3,579</b>	<b>8,286</b>	<b>7,388</b>	<b>956</b>	<b>20,209</b>

N=20,209

Data Source: FY2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy

**Table 3.3: ICD-9-CM Categories for an Unintentional Fall-Related Injury Associated with an Emergency Department Visit by Age Group**  
Massachusetts Residents Ages 65+ Years, 2006

Circumstances (ICD-9-CM External Cause of Injury Category)	Age Group (Years)				Total
	65-74	75-84	85-94	95+	
Fall on or from stairs or steps	1,174	1,298	533	25	3,030
<i>Escalator</i>	10	15	8	<7	34
<i>Fall on or from sidewalk curb</i>	116	156	71	<7	346
<i>Other stairs or steps</i>	1,048	1,127	454	21	2,650
Fall on or from ladders or scaffolding	225	125	29	<7	381
<i>Fall from ladder</i>	214	119	28	<7	363
<i>Fall from scaffolding</i>	<7	0	0	0	<7
Fall from or out of building or other structure	9	<7	<7	0	16
Fall into hole or other opening in surface	23	11	<7	0	37
<i>From diving or jumping into water</i>	<7	0	0	0	<7
<i>Fall into storm drain or manhole</i>	<7	0	0	0	<7
<i>Fall into other hole or other opening in surface</i>	20	11	<7	0	34
Other fall from one level to another	760	1,344	1,180	178	3,462
<i>Fall from playground equipment</i>	<7	<7	<7	0	9
<i>Fall from cliff</i>	0	<7	0	0	<7
<i>Fall from chair</i>	136	253	211	28	628
<i>Fall from wheelchair</i>	113	277	307	60	757
<i>Fall from bed</i>	284	571	503	73	1,431
<i>Fall from other furniture</i>	34	38	22	<7	99
<i>Fall from commode</i>	29	70	75	7	181
<i>Other fall from one level to another</i>	160	131	60	<7	356
Fall on same level from slipping, tripping, or stumbling	4,773	6,369	3,812	361	15,315
<i>Fall from (nonmotorized) scooter</i>	<7	<7	<7	0	10
<i>Fall from roller skates</i>	<7	<7	<7	0	13
<i>Fall from skateboard</i>	0	<7	0	0	<7
<i>Fall from skis</i>	13	<7	<7	0	20
<i>Fall from snowboard</i>	<7	<7	<7	0	<7
<i>Fall from other slipping, tripping, or stumbling</i>	4,751	6,353	3,801	361	15,266
Fall on same level from collision, pushing, or shoving by or with other person	22	13	<7	0	39
<i>In sports</i>	17	<7	<7	0	24
<i>Other and unspecified</i>	<7	7	<7	0	15
Other and unspecified fall	3,810	5,751	4,414	512	14,487
<i>Fall resulting in striking against sharp object</i>	61	68	48	<7	178
<i>Fall resulting in striking against another object</i>	571	876	565	62	2,074
<i>Other fall</i>	798	1,126	844	87	2,855
<i>Unspecified fall</i>	2,380	3,681	2,957	362	9,380
<b>Total</b>	<b>10,787</b>	<b>14,911</b>	<b>9,975</b>	<b>1,078</b>	<b>36,751</b>

N=36,751

Data Source: FY2006 Massachusetts Emergency Department Database, Massachusetts Division of Health Care Finance and Policy



### **Acute Care Hospital Stays (Table 3.2)**

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For fall-related injuries among older adults associated with an acute care hospital stay in 2006:

- Specificity on the circumstances of the fall was available for 67% (n=11,821) of the cases.
- Where specificity was known, most were “falls on the same level from slipping, tripping, or stumbling” (67%, n=7,876), followed by “other fall from one level to another” (16%, n=1,838).
- Where specificity was known, the proportion of hospital stays associated with injuries from a “fall on or from stairs” was 13% (n=1,484).
  - The proportion of falls on or from stairs was highest among those ages 65-74 years (17%, n=395), and decreased with age (14% among those ages 75-84 years, n=688; 9% among those ages 85-94 years, n=378; 4% among those ages 95+ years, n=23).

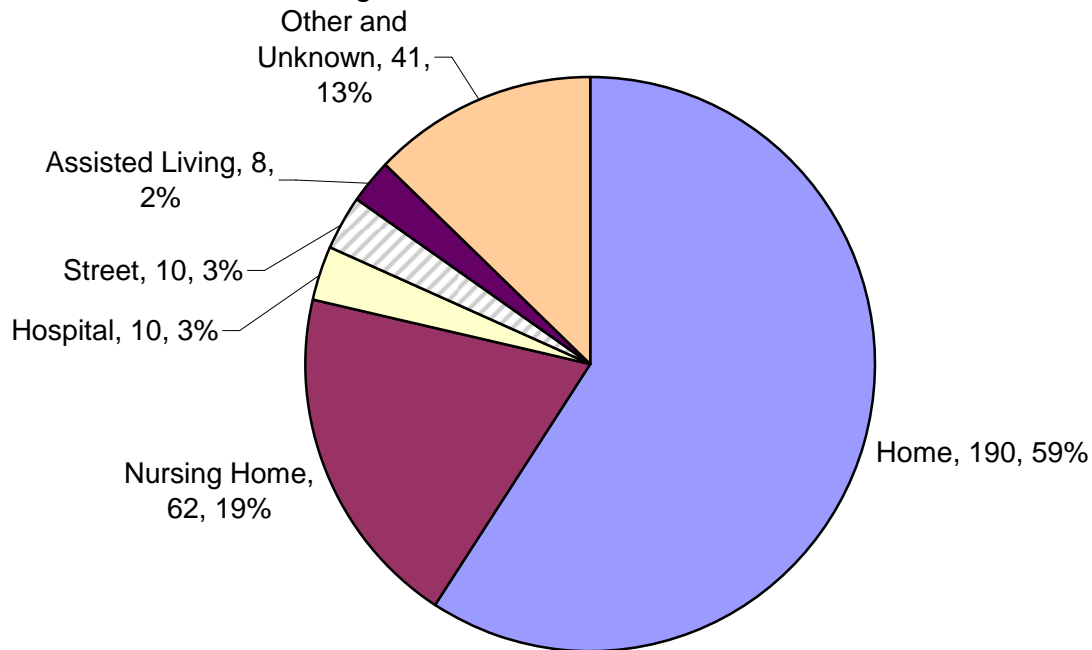
### **Emergency Department Discharges (Table 3.3)**

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For fall-related injuries among older adults associated with an emergency department discharge in 2006:

- Specificity on the circumstances of the fall was available for 67% (n=24,516) of the cases.
- Where specificity was known, most were “falls on the same level from slipping, tripping, or stumbling (42%, n=15,315), followed by “other fall from one level to another” (9%, n=3,462).
- Where specificity was known, the proportion of emergency department discharges associated with injuries from a “fall on or from stairs or steps” was 8% (n=3,030).
  - Falls on or from stairs or steps were highest among those ages 65-74 years (15%) and decreased with age (12% among those ages 75-84 years, n=1,298; 9% among those ages 85-94 years, n=9,975; 4% among those ages 95+ years, n=25).

**Figure 3.1: Fatal Unintentional Fall Deaths by Place of Injury Occurrence**  
Massachusetts Residents Ages 65+ Years, 2006



N=321

Data Source: CY2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

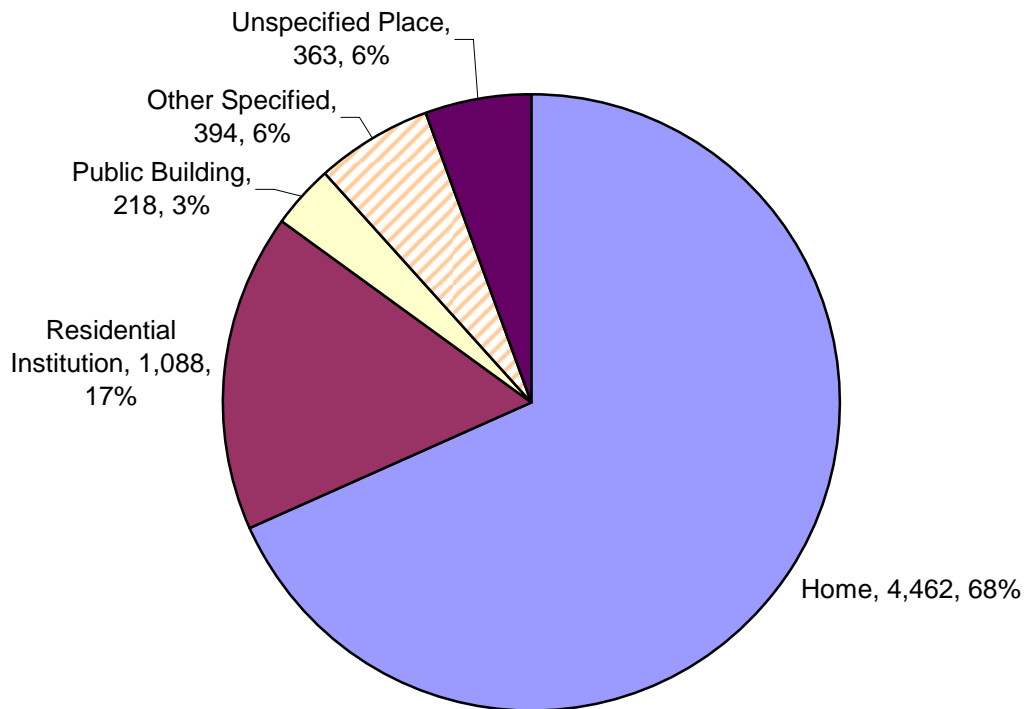
'Nursing Home' includes Nursing Home, Nursing Home Grounds, and Nursing Home/Assisted Living facility.

'Other and Unknown' includes Other, Other's home, Outside, Parking Lot, and Unknown.

The text on the actual death certificates for the fall deaths occurring in Massachusetts was examined for the types of locations where these falls occurred (n= 321; 19 of the 340 total deaths among Massachusetts residents occurred out-of-state). Of these:

- Sixty percent (59%, n=190) occurred at the decedent's home (includes injuries both inside and outside the home).
- Nineteen percent (19%, n=62) occurred in a nursing home and 2% (n=8 ) occurred in an assisted living facility.
- Three percent (3%, n=10) occurred on a street or roadway and 3% (n=10) occurred in a hospital.

**Figure 3.2: Place of Injury Occurrence for an Unintentional Fall-related Injury Associated with an Acute Care Hospital Stay**  
Massachusetts Residents Ages 65+ Years, 2006



N=6,525

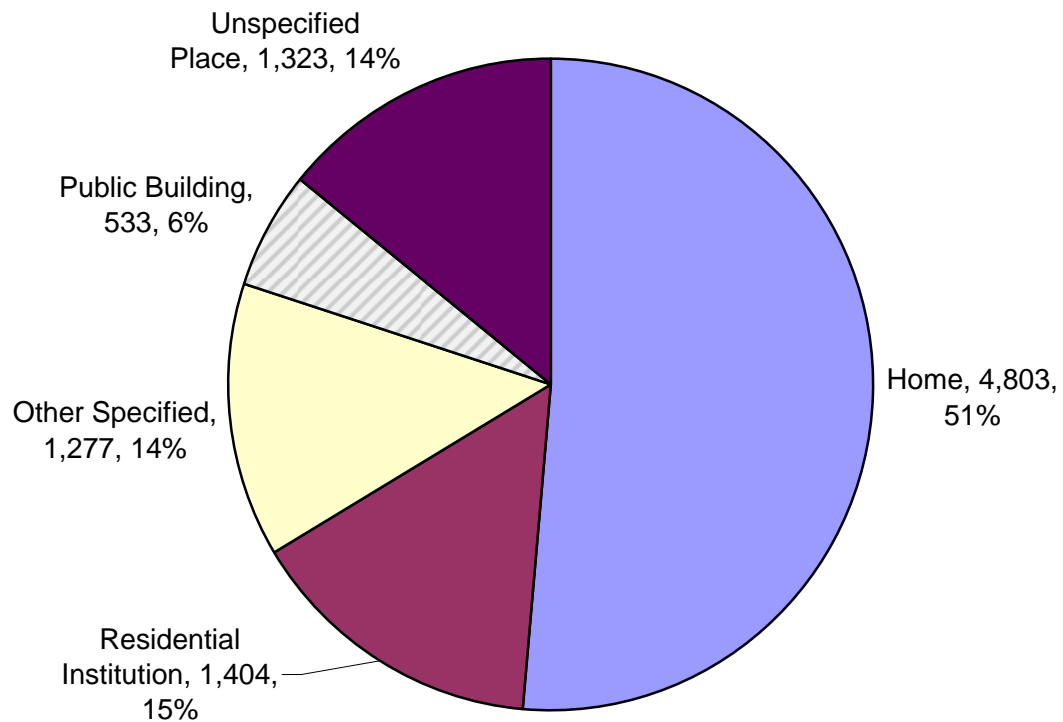
Data Source: CY2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

'Other specified' includes: farm, industrial place and premises, place for recreation and sport, street and highway

Of the fall-related injury hospital stays in 2006 only 32% (n=6,525) had information on the place of injury. Of these:

- Sixty-eight percent (68%, n=4,462) were associated with fall injuries in the home and 17% (n=1,088) were associated with fall injuries in a residential institution (including but not limited to nursing homes).

**Figure 3.3: Place of Injury Occurrence for an Unintentional Fall-related Injury Associated with an Emergency Department Discharge**  
Massachusetts Residents Ages 65+ Years, 2006



N=9340

Data Source: CY2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

'Other Specified' include: farm, industrial place and premises, place for recreation and sport, street and highway

Of the fall-related injury emergency department visits in 2006 only 25% (n=9,340) had information on the place of injury. Of these:

- Fifty-one percent (51%, n=4,803) were associated with fall injuries in the home and 15% (n=1,404) were associated with fall injuries in a residential institution (including but not limited to nursing homes).

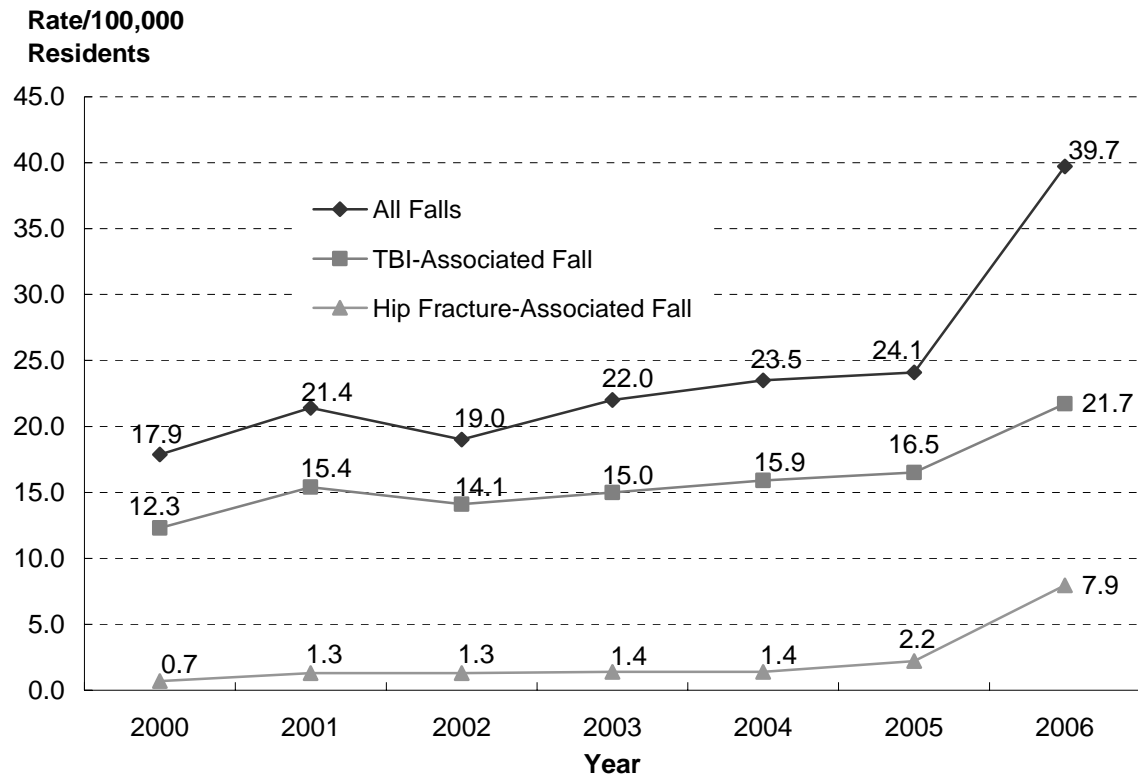
## **Section IV. Type of Injury and Body Part Injured**

Falls can cause many different types of injuries to various parts of the body. Reports produced by the Massachusetts Department of Public Health indicate that falls are the leading cause of traumatic brain injury (TBI) both nationally and in Massachusetts, and falls are often associated with fractures that occur at the hip.<sup>47</sup> In fact, the State and Territorial Injury Prevention Director's Association (STIPDA) recommends using hip fracture hospitalizations in persons aged 65 years and older to monitor trends in fall-related injuries. Because of the trends and recommendations indicated in these reports, this section has a particular emphasis on traumatic brain injuries (TBI) and hip fractures.

The first two figures present trends in the rates of TBI and hip fractures associated with fatal falls. This information is based on codes generated from text written on the death certificate and not from autopsy reports, which are generally more complete. The last two tables in this section present the number of fall-related injuries by type of injury (e.g. fracture, contusion, etc.) and body part injured (e.g. lower extremity, upper extremity, etc.) that were treated at an acute care hospital or emergency department. A fall may result in more than one type of injury or body region injured. In order to capture all of the injuries attributed to a fall, all of the injury diagnoses associated with each fall-related hospitalization were quantified and included in the count (e.g. hip fracture and wrist fracture, etc.). For this reason, the number of injuries exceeds the number of hospital events.

Age groups were combined where necessary to improve the stability of the rates.

**Figure 4.1: Crude Unintentional Fall Death Rate Associated with Traumatic Brain Injury and Hip Fracture**  
Massachusetts Residents Ages 65+ Years, 2000-2006



TBI-Associated Fall N=948, Hip Fracture-Associated Fall N=139, All Falls N=1,433

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

Note: Select injury types are not mutually exclusive

### Traumatic Brain Injury

- From 2000 through 2006, the number and rate of fall deaths among older adults in Massachusetts that were associated with a traumatic brain injury increased 77% (12.3 per 100,000, n=106 and 21.7 per 100,000, n= 186, respectively). The reasons for this increase are not clear.
- From 2000 through 2005, a TBI was associated with approximately two-thirds (68%) of all fatal falls among older adults in Massachusetts. In 2006, a TBI was associated with 54.7% of all fatal falls among older adults.

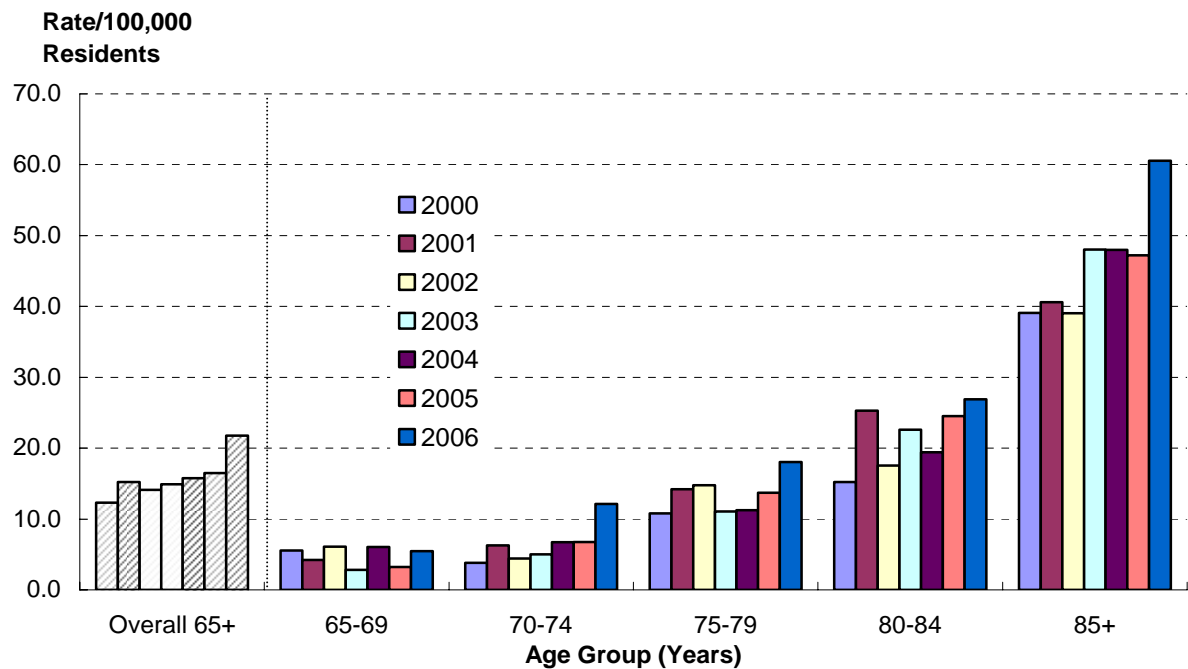
### Hip-fracture

- Fall death rates associated with a hip-fracture increased 1,035% from 2000 to 2006 (0.7 per 100,000, n=6 and 7.9 per 100,000, n=68, respectively). The fall death rate in 2000 is based on a count less than

twenty and may be unstable. This trend may be related to improved documentation of these injuries on the death certificate, as nonfatal fall-related hip fractures have declined (see Figure 4.4).

- From 2000 through 2005, a hip fracture was associated with approximately 6.5% of all fatal falls among older adults in Massachusetts. In 2006, a hip fracture was associated with 20% of all fatal falls among older adults.

**Figure 4.2: Unintentional Fall Death Rate Associated with Traumatic Brain Injuries by Age Group**  
Massachusetts Residents Ages 65+ Years, 2000 – 2006



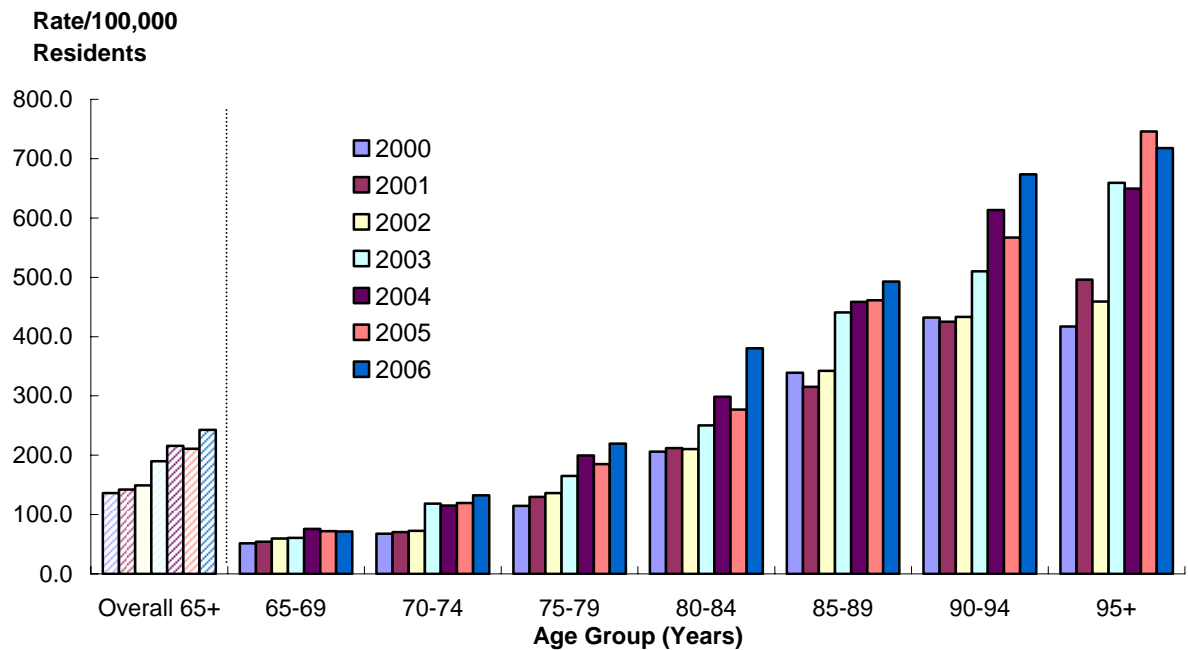
N=948

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

- From 2000 to 2006, 948 older adults in Massachusetts suffered a fall-related TBI death.
- Fall-related TBI death rates among MA older adults increased with increasing age groups. In 2006, these ranged from a low of 5.5 per 100,000 among those ages 65-69 years (n=12) to a high of 60.6 per 100,000 among those ages 85+ years (n=83).
- From 2000 through 2006, statistically significant increases in rates of fall-related TBI were noted in residents 70-74 (219% increase), 75-79 (67% increase), 80-84 (77% increase), and 85+ years of age (55% increase).



**Figure 4.3: Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group**  
Massachusetts Residents Ages 65+ Years, 2000 – 2006

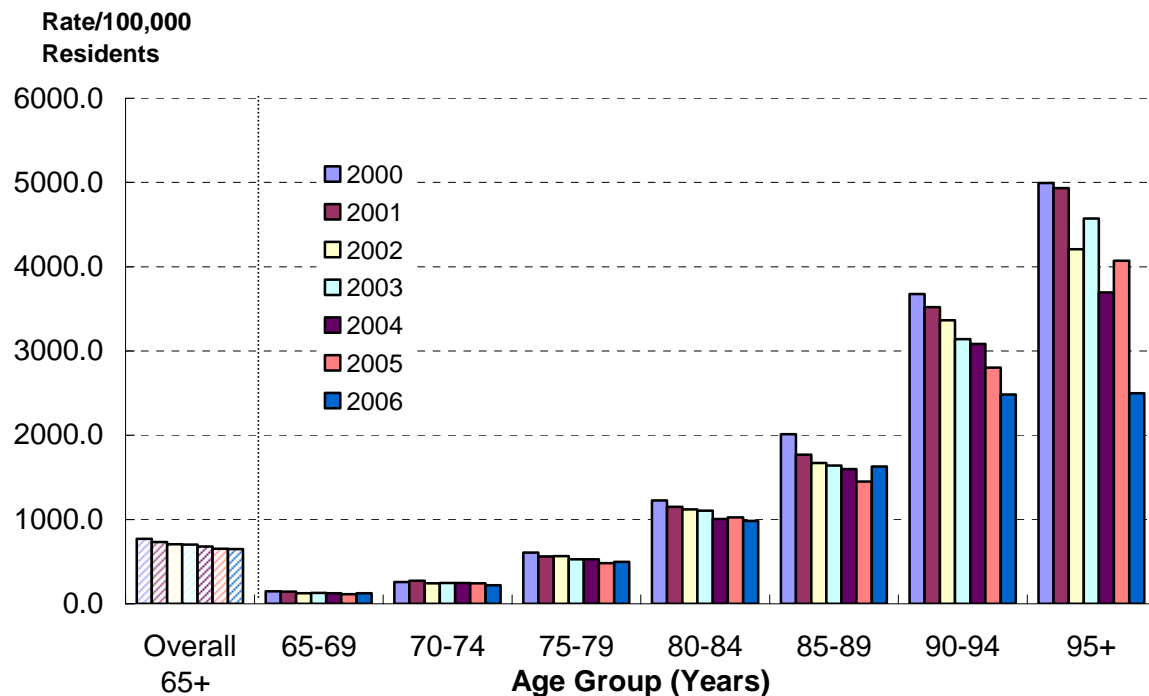


N=8,887

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy

- Similar to deaths, the overall rate of hospital stays associated with a fall-related TBI among Massachusetts older adults increased 78% (statistically significant) from 2000 through 2006 (136.2 per 100,000, n=1,173 to 242.5 per 100,000, n=2,076).
  - Statistically significant trend increases were noted in all age subgroups 70-74 years through 95+ years, with the largest gain (96% increase) in individuals 70-74 years of age (67.7 per 100,000, n=143 in 2000 to 132.4, n=251 in 2006).
- Rates of hospital stays for fall-related TBI increased with age. In 2006, these events were lowest among those ages 65-69 years (71.3 per 100,000, n=157) and highest among those ages 95+ years (717.7 per 100,000, n=83) (statistically significant).

**Figure 4.4: Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group**  
Massachusetts Residents Ages 65+ Years, 2000-2006

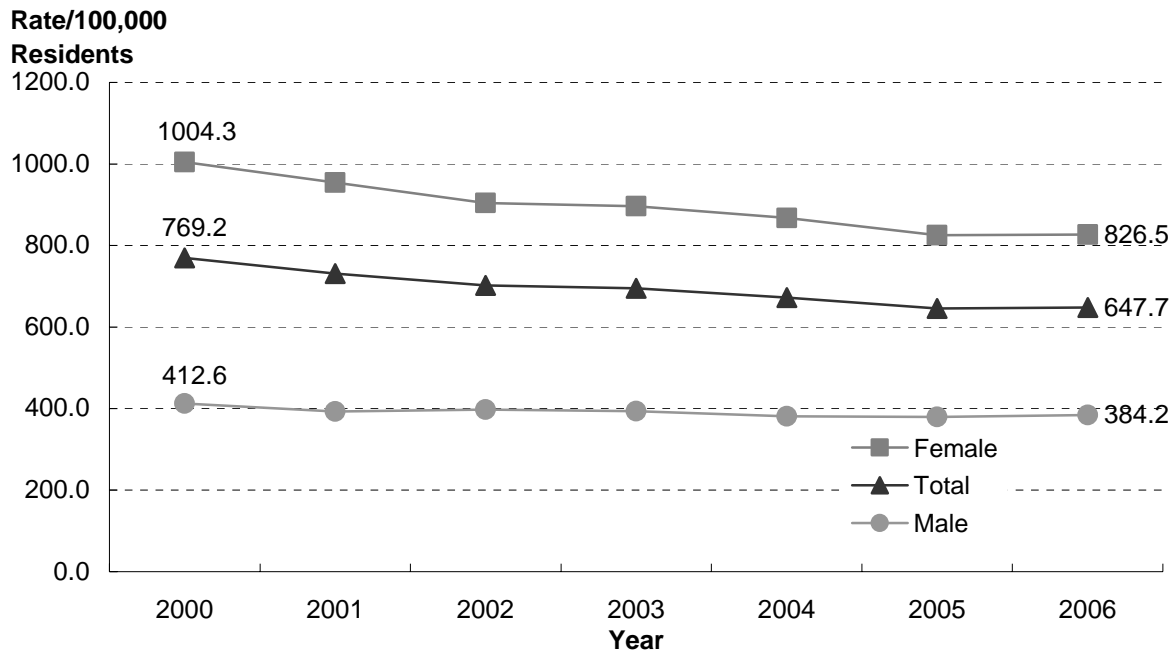


N=41,736

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy

- From 2000 through 2006, the overall rate of hospital stays for nonfatal fall-related hip fractures among older adults decreased 15.8% from 769.2 (n=6,624) to 647.7 per 100,000 (n=5,544). This was statistically significant. This trend is comparable to national estimates in which rates decreased 15.5% from 1993 through 2003.
- For each year examined, the rate of hospital stays associated with nonfatal fall-related hip fractures increased with age. For example, in 2006, the rates were lowest among those ages 65-69 years (124.0 per 100,000, n=273) and highest among those ages 95+ years (2,498.9 per 100,000, n=289).
- From 2000 through 2006, the largest decrease in rates of hospital stays for nonfatal fall-related hip fractures was seen among those ages 95+ years, a 50% decline, (4,993.0 per 100,000, n=324 in 2000 to 2,498.9 per 100,000, n=289 in 2006) and those ages 90-94 years, a 32% decrease, (3,676.5 per 100,000 n=1,002 in 2000 to 2,483.9 per 100,000, n=918 in 2006) (statistically significant).

**Figure 4.5: Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Sex**  
Massachusetts Residents Ages 65+ Years, 2000-2006



Male=9,502, Female=32,234, N=41,736

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy

- From 2000 through 2006, the rate of hospital stays for nonfatal fall-related hip fractures among older adults was higher among Massachusetts females than males.
  - The higher rates among females may be partially due to a longer life expectancy for women and to lower bone density among women. Both age and low bone density are risk factors for suffering a fall injury.<sup>16</sup>
- From 2000 through 2006, the rate of hospital stays for nonfatal fall-related hip fractures decreased by 18% (statistically significant) among females from 1,004.3 per 100,000 (n=5,212) to 826.5 per 100,000 (n=4,200). Among males, the rate decreased 8% from 412.6 per 100,000 (n=1,412) to 384.2 per 100,000 (n=1,344), however this decrease was not statistically significant.
- Reasons for the lower rates of fractures over time may be related to public health measures such as increased osteoporosis screening among women and use of effective treatments to rebuild bone mass.

**Table 4.2: Frequency of Fatal and Nonfatal Unintentional Fall Injuries by Nature of Injury and Body Region Injured, Acute Care Hospital Stays  
Massachusetts Residents Ages 65+ Years, 2006**

Body Region	Nature of Injury									TOTAL
	Fractures	Dislocations	Sprains/Strains	Internal	Open wound	Contusion/Superficial	Unspecified	System Wide/Late Effects	Other*	
Traumatic Brain Injury (TBI)	266	0	0	1,709	0	0	0	0	0	1,975
Other Head, Face, and Neck	680	<7	0	0	2,116	2,077	534	0	8	5,418
Spinal Cord Injury (SCI)	37	0	0	33	0	0	0	0	0	70
Vertebral Column Injury (VCI)	1,586	24	152	0	0	0	0	0	0	1,762
Torso	2,715	<7	52	446	18	916	90	0	13	4,252
Upper Extremity	3,229	156	240	0	373	871	83	0	24	4,976
Lower Extremity	8,036	61	511	0	197	1,682	162	0	10	10,659
Other and Unspecified	0	0	12	<7	<7	288	30	0	10	345
System Wide and Late Effects	0	0	0	0	0	0	0	219	0	219
<b>TOTAL</b>	<b>16,549</b>	<b>246</b>	<b>967</b>	<b>2,189</b>	<b>2,708</b>	<b>5,834</b>	<b>899</b>	<b>219</b>	<b>65</b>	<b>29,676</b>

Data Source: FY2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy  
All dispositions included.

\*Includes amputations, blood vessels, crushing, burns and nerves.

- In 2006, there were 29,676 fall-related injuries among Massachusetts older adults which resulted in 20,209 hospital stays.
- The most frequent types of injuries diagnosed during the hospital stays were fractures (56%, n=16,549), followed by contusions or superficial injuries (20%, n=5,834).
  - Almost half of the fractures occurred in the lower extremity (49%, n=8,036). Seventy-five percent of the lower extremity fractures involved the hip (n=6,041).

- The most frequent injured body regions treated during the hospital stays were the lower extremity (36%, n=10,659), followed by the head, face and neck (18%, n=5,418).
- On average, in 2006, each hospital stay for an unintentional fall was associated with an average of 1.5 injury diagnoses.

**Table 4.3: Frequency of Fatal and Nonfatal Unintentional Fall Injuries by Nature of Injury and Body Region Injured, Emergency Department Discharges  
Massachusetts Residents Ages 65+ Years, 2006**

Body Region	Nature of Injury									TOTAL
	Fractures	Dislocations	Sprains/Strains	Internal	Open Wound	Contusion/Superficial	Unspecified	System Wide/Late Effects	Other*	
Traumatic Brain Injury (TBI)	92	0	0	993	0	0	0	0	0	1,085
Other Head, Face, and Neck	926	0	<7	0	6,842	7,179	5,297	0	<7	20,254
Spinal Cord Injury (SCI)	10	0	0	7	0	0	0	0	0	17
Vertebral Column Injury (VCI)	719	15	1,472	0	0	0	0	0	0	2,206
Torso	1,617	<7	303	50	29	3,959	482	0	<7	6,445
Upper Extremity	5,325	492	1,474	0	1,969	4,762	583	0	14	14,619
Lower Extremity	2,038	57	1,876	0	720	6,489	454	0	<7	11,639
Other and Unspecified	<7	0	152	<7	27	1,017	147	0	8	1,357
System Wide and Late Effects	0	0	0	0	0	0	0	62	0	62
<b>TOTAL</b>	<b>10,732</b>	<b>567</b>	<b>5,281</b>	<b>1,051</b>	<b>9,587</b>	<b>23,406</b>	<b>6,963</b>	<b>62</b>	<b>35</b>	<b>57,684</b>

Data Source: FY2006 Massachusetts Emergency Department Discharge Database, Massachusetts Health Care Finance and Policy  
All dispositions included.

\*Includes amputations, blood vessels, crushing, burns and nerves.

- In 2006, there were 57,684 fall-related injuries diagnosed which resulted in 36,751 emergency department visits.
- The most frequent types of injuries diagnosed during the emergency department visits were contusions or superficial injuries (41%, n=23,406), followed by fractures (19%, n=10,732).
  - 31% of contusions or superficial injuries occurred on the head, face or neck (n=7,179).
  - Almost half of fractures diagnosed at the emergency department occurred in the upper extremity (49%, n=5,325). Forty-three percent (43%) of the upper extremity fractures occurred at the forearm or elbow (n=2,285).

- The most frequent injured body regions diagnosed during the emergency department visits were the head, face, and neck (35%, n=20,254), followed by the upper extremity (25%, n=14,619).
  - 69% of injuries sustained on the head, face and neck were open wounds or contusions (n=14,021).
  - 36% of injuries sustained in the upper extremity were fractures (n=5,325).
- On average, in 2006, each emergency department visit for unintentional fall injury was associated with an average of 1.6 injury diagnoses.





## Section V. Falls Prevention and Resource Guide

### **The Science of Injury Prevention**

Most falls are preventable through effective, scientifically tested interventions. Falls are not a chance occurrence, but are understandable, predictable, and preventable. Historically, most successful public health approaches for injury prevention efforts combine three types of intervention strategies: changes in the design of products or of the environment, changes to human behaviors and one's physical condition, and passage and enforcement of laws, regulations or policies. There are effective fall prevention interventions for each strategy that, in combination, can address the leading risk factors for falls.

#### Environment

There are a number of household and community environmental and engineering efforts that can reduce the risk of elder falls, including installing railings and grab bars where needed, securing all rugs, adding raised toilet seats, lowering bed heights and picking up all clutter in walking areas. Making community environments safer by ensuring good street lighting and contrast markings on curbs and stairs, secure railings installed on stairs, and smooth sidewalk surfaces (e.g. fix cracked sidewalks, remove snow and ice) can also lower the risk of falls.

#### Human Behavior and Body Strengthening to Prevent Injury

A fear of falling often leads to loss of confidence, less social activity, reduced physical activity and a corresponding decrease in lower body strength and conditioning. This can be counteracted by an increase in physical exercise and strength training under medical or other professional supervision. Alcohol consumption should be moderated. Eating regular meals with proper nutrition, including foods rich with calcium and vitamin D can help to prevent and manage osteoporosis. Visual changes, such as those which occur with macular degeneration, diabetic retinopathy, glaucoma and cataracts can be minimized and controlled through regular vision care. Prescribing clinicians or pharmacists can review and modify medications (both prescription and over-the-counter) to reduce side effects and interactions. Physician supervision may even be able to reduce the use of medications and as a result, lower the risk of falls. Finally, an awareness of posture-related blood pressure can prevent the dizziness and falls that frequently occur when elders stand up quickly.

### Law, Regulation or Policy

The presence of fall prevention programs is contingent upon support from agency heads or community leaders. There are many city ordinances contributing to elder falls and many pathways of preventing them, including improved lighting, safer building policies, promoting community physical fitness programs, or supporting vision and postural blood pressure screenings at the community level. Insurance policies and quality performance measures should be coordinated to strengthen collaboration between fall prevention partners and to maximize the impact on preventing fall injuries.

An important tool used in identifying opportunities to prevent injuries is the Haddon Matrix. The matrix describes interventions that could be applied to the person (host), the injury-producing instrument (agency/vehicle), and the environment (physical and social) before, during or after the event to prevent an injury from happening or that might reduce the harm done (see Table 5.1).

**Table 5.1 Example of the Haddon Matrix Applied to Fall Injuries among Older Adults**

	Host	Agent/Vehicle	Physical Environment	Social Environment
Pre-event (before the fall)	Improve body strength, bone density, gait and balance. Routine eye care, review medicines, proper nutrition, and vitamin D.	Remove materials that create a slippery surface.	Assess home for hazards, install grab bars, improve lighting, remove clutter, use contrast strips on stairways and walkways.	Attitudes about balance training, exercise, and vision screenings. Awareness that posture-related blood pressure can reduce dizziness. Wear proper non-skid shoes.
Event (during the fall and time of impact)	Use grab bars, wear hip protectors.	Reduce the hardness of flooring to lower the shock absorbed by the person from the fall	Ensure the presence of resilient surfacing	Organize the community with well-maintained sidewalks that are well-lit and not cracked, grab bars, ramps.
Post-event (after the individual is injured by the fall)	Access high quality trauma system to minimize severity		Ability to call 911 to summon help	Ensure reimbursement for home and medication assessments, support for fall prevention efforts

A variety of factors influence older adult health and well-being. Using the Centers for Disease Control Healthy Aging Research Center and the Healthy People 2010 models, public health approaches must be consistent with a holistic focus on the “whole person.”<sup>48</sup> A holistic approach is the combination of three measures of healthy aging: 1) avoidance of disease and disability; 2) maintenance of cognitive healthy aging; and 3) sustained engagement in life.<sup>49</sup>

## **Massachusetts Efforts to Prevent Falls**

The Massachusetts Department of Public Health's 2005 State Injury Prevention Plan identified falls among older adults as one of four key causes of unintentional injury needing immediate attention. Because the optimal public health approach to fall prevention is multifaceted, the responsibility for reducing and preventing fall injuries among older adults lies with individuals and organizations across a broad range of disciplines.

Health promotion and disease prevention, as well as fall prevention, are critical components for older adults seeking to retain an active and independent lifestyle. To empower our state's growing number of adults over age 65, the Massachusetts Department of Public Health is recommending and promoting a multi-pronged strategy of interventions applicable for older adults in all settings.

These strategies include:

- Staying active and regularly exercising regularly. Exercises should include balance and strength training. MDPH's Office of Healthy Aging has been training older adults and service providers in the *Matter of Balance* program, which promotes a healthy attitude toward exercise and activity, while reducing falls among older adults. Healthy Aging staff are available to guide communities in establishing effective *Matter of Balance* or other gait and balance exercise programs.
- Routinely reviewing and managing medications that affect balance, vision and cognition with health care professionals. Falls Prevention Coalition members include pharmacists and optometrists who recommend regular medication screenings and vision exams be administered by health providers to their older patients.
- Getting regular comprehensive vision exams and bone mass density screenings. Physicians and nutritionists who are members of the Falls Prevention Coalition give presentations to local councils on aging or senior public housing groups advocating for vision exams and the use of Vitamin D to help prevent falls.
- Making homes safer by installing railings and grab bars where needed, securing all rugs, ensuring good lighting, contrast markings on stairs, and removing all clutter in walking areas. Older adults, or their caregivers, can receive advice on making homes falls-safe by contacting the MDPH falls prevention information line at 1-800-227-SAFE. MDPH, CDC and Massachusetts Executive Office of Elder Affairs materials, translated into several languages, are available upon request.
- Making community environments safer by ensuring good lighting, contrast markings, and hazard-free railings and sidewalk surfaces. MDPH and Falls Prevention Coalition staff work with local public works departments, pedestrian advocacy groups such as WalkBoston, and disability rights activists to ensure that neighborhoods and business districts are pedestrian friendly. We recommend that every municipality develop a comprehensive snow and ice removal plan, install timed walk lights at

risky intersections, and remove brick sidewalks in favor of safer, more level footpaths.

- Eating regular meals with proper nutrition, including foods rich with calcium and vitamin D to prevent and manage osteoporosis. MDPH's Injury Prevention and Control Program partners with the Office of Healthy Aging and Disability, along the nutrition and healthy weight staff, to present consistent, clear messages on the importance of good nutrition as a key to preventing falls.

To facilitate this multi-disciplinary approach, the Massachusetts Department of Public Health has taken a leadership role on several activities that include individuals and organizations across a broad range of disciplines.

#### Falls Prevention Coalition

The Massachusetts Department of Public Health along with the Home Care Alliance and the Massachusetts Extended Care Federation formed the statewide Falls Prevention Coalition in March 2007. The goal of the Falls Prevention Coalition is to reduce the number of fall-related injuries and to incorporate fall prevention programs across the span of care, in community-based, rehabilitative settings, and long-term care settings. The Coalition is composed of more than 55 partners, including hospitals, nursing home companies, regulatory agencies, physicians, nurses, physical and occupational therapists, optometrists and other medical professionals and health care advocates. A complete list of Coalition members is included in Appendix C. Since the formation of the Coalition, a number of activities have been implemented. These include:

- A survey of all community and institution-based fall prevention intervention programs was conducted. Information is being used to develop statewide recommendations for effective interventions in each care setting.
- A social marketing campaign for fall prevention, focusing on adults ages 55 years and older and living independently in the community was created in consultation with the Emerson College Graduate Program. The campaign, "Key to Your Independence", includes a toll-free information line at the MDPH, radio ads and print materials paid for by Coalition members, and outside sponsors from the insurance industry.
- A series of presentations for seniors in gatherings ranging in number from 15 to 1,500, and two statewide forums for professionals held in November 2007 and May 2008 provided opportunities to share and disseminate the research and findings of our Coalition's various subcommittees (e.g. surveillance data, long-term care, community relations).
- Several informal presentations for students and professionals with the New England College of Optometry, the Massachusetts Medical Society, the National Glaucoma Society and the Massachusetts Association of Emergency Room Physicians (MAERP) were held to educate practitioners on how to make falls prevention a priority when examining their older patients, as well as how to best talk to older patients about preventing

falling. Visual health providers can play a critical role in fall prevention, not only in the provision of regular, comprehensive eye examinations and treatment of eye disease, but also in screening for falls among their patients, through the use of low vision specialists, and advocacy for fall-safe environments for elders with compromised vision.

#### Evidence-Based Disease Prevention Efforts

In collaboration with the Executive Office of Elder Affairs, MDPH is working with communities to make evidence-based programs available for older adults.

These programs have a strong science base, successful track record of implementation in community organizations serving older adults, and provide critical information to empower older adults to better manage their health.

- The Stanford University Chronic Disease Self-Management Program
- *A Matter of Balance*
- Healthy Eating for Successful Living

An initiative shared between the Massachusetts Executive Office of Elder Affairs and the MDPH Office of Healthy Aging aims to implement recommendations from the document, “Falls Free: Promoting a National Falls Prevention Action Plan,” developed by the National Council on Aging. This initiative includes implementing evidence-based disease prevention (EBDP) programs for the at-risk older adult population. The goal is to develop a sustainable infrastructure within the Commonwealth to implement high-quality EBDP programs that provide the maximum number of at-risk older adults and people with disabilities the tools to maintain healthy and active lifestyles. One of the programs that is being implemented and evaluated is *A Matter of Balance*. This program is specifically designed to reduce the fear of falling, stop the fear of falling cycle, and increase activity level among community-dwelling older adults (physical inactivity is cited as a significant risk for falls and fall-related injuries in older adults). Currently, sites are being identified for training volunteer lay leaders of all ages, who will provide skill-building sessions for older adult participants. To meet the specific needs of the target population, curriculum materials are being translated into Russian, Spanish, and Chinese.

#### Health Care Settings

Massachusetts hospitals were the first in the nation to voluntarily report rates of falls occurring within a hospital on a public website. MDPH has introduced regulations for all Massachusetts hospitals, through our Office of Health Care Quality, requiring that every hospital in our Commonwealth develop a strategic plan to reduce falls in hospital settings.

Nursing homes have developed a new fall risk assessment tool, now available on several websites and used in many nursing homes throughout the state. Ongoing educational programs for nursing home staff are conducted on a regular basis, and conference calls provide opportunities for staff to share innovations and fall reduction strategies across settings.

Home care agencies too, have begun to share best practices in falls risk assessments. Most have now incorporated such tools into their regular intake process. They sponsor and participate in Matter of Balance training, a program designed to teach practical strategies to reduce fear and increase activity.<sup>50</sup> As part of their public health work, many agencies have gone beyond the walls of their patients homes and provide falls prevention programs at community centers.

### Other Partnerships

Many communities are beginning to recognize the link between outdoor environmental hazards, such as broken streetlights or sloping sidewalks, and falls among elders. MDPH is engaged in a partnership with WalkBoston, a pedestrian advocacy organization, to educate local businesses and government officials on the importance of removing snow and ice from sidewalks and crosswalks after winter storms. This deals directly with the problem of falls, not only for older adults, but for all residents, and also addresses the topic of pedestrian safety and walkable communities.

The Massachusetts Department of Public Health has led the effort to reduce the incidence and severity of falls and fall injuries among older adults, specifically traumatic brain injuries. The Massachusetts Traumatic Brain Injury Prevention Task Force was convened in large part to address falls prevention since falls are the leading cause of traumatic brain injury (TBI) nationally and in Massachusetts. The TBI Prevention Task Force developed and released recommendations related to fall prevention among older adults in October of 2007. Many of these have already been acted upon by the Department and its partners in fall prevention.

### Recommendations:

A great deal has been done to address fall prevention within the Commonwealth. However, more work remains. The Department of Public Health recommends two key initiatives to help drive these efforts:

- 1) Work with our partners in the Falls Prevention Coalition to develop a Strategic Plan for reducing the incidence and severity of falls and fall-related injuries.
- 2) Work with the Centers for Disease Control and Prevention/National Center for Health Statistics to identify the causes and contributing factors associated with the increased fall death rate.

Furthermore, MDPH believes that the strategic plan should specifically address the need to:

- Increase public awareness that falls are preventable events and that falls can and do cause serious injury. Provide older adults with the resources of evidence-based prevention programs available to improve physical mobility and skills to evaluate fall risk.

- Provide older adults, caregivers and aging network organizations with resources for home safety measures including home safety checklists, home modifications that reduce home hazards, improve independent functioning and lower the risk of falls.
- Create a sustainable statewide Elder Falls Prevention Program within state government based on evidence-based falls prevention programs.
- Educate students and health professionals on their role in fall prevention, including screening and management of fall risk factors and medication mismanagement. Educate them on fall prevention resources that can be used to improve balance or strength, vision deficits, postural hypotension and cognitive impairment.

For assistance in developing this Strategic Plan, the Department and the Falls Prevention Coalition should refer to specific initiatives or strategies that were identified within the Department of Public Health's 2007 TBI Prevention Report which included:

- Supporting Elder Affairs and MDPH Healthy Aging Initiative to implement recommendations from "Fall Free: Promoting Falls Prevention Action Plan" developed by the National Council on Aging.
- Working with city and state planners to implement environmental modifications to provide safe spaces for walking such as contrast markings on public stairways and sidewalks, "counting" walk signals, and to integrate universal safety design into planning initiatives.<sup>51</sup>
- Identifying and recognizing "fall safe" communities in Massachusetts. A fall-safe community is one in which the physical environment is constructed/modified to be as safe as possible; the transportation system follows falls prevention procedures, and bureaucratic, corporate and social institutions provide the necessary infrastructure support.<sup>52</sup>
- Making annual medication review and appropriate modification a requirement of the Massachusetts Prescription Advantage Program and explore how it could be expanded to other insurance plans.
- Requiring licensed health care facilities to meet the Joint Commission of Accreditation of Healthcare Organizations' (JCAHO) national patient safety goals for fall prevention. Increase statewide awareness of risk factors for elder falls, including medication mismanagement, loss of balance/strength, vision deficits, postural hypotension and cognitive impairment.

- Educating elderly consumers that falling is a common adverse event associated with the use of some prescription and non-prescription drugs, herbal medications and/or the result of interaction of medications with alcohol, and teach older consumers about the questions to ask their doctors and pharmacists.
- Providing patient education to health care providers to increase awareness of falls risks associated with medication and alcohol use and increase referrals to appropriate physical therapy. This recommendation is consistent with the work funded by the Agency for Healthcare Research and Quality (AHRQ), the MDPH Patient Safety project which includes a recommendation related to reconciling medications.
- Providing health care and other elder service providers with the knowledge and skills to evaluate physical mobility and make appropriate recommendations.
- Working with medical providers (e.g. pharmacists, nurses, doctors) to increase the numbers of adults who have an annual medication review focused on falls and fall-related injury prevention.
- Identifying, developing and disseminating a basic assessment tool to assess an individual's cognitive ability after a fall.
- Increasing awareness to the public and to health professionals that vision is associated with falls. Early detection of visual changes via yearly eye exams by a visual health professional, timely treatment and management of eye conditions, and referral to vision rehabilitation services where appropriate can minimize falls.

Fall injuries among Massachusetts older adults are a significant, growing public health problem, with enormous societal, health and economic ramifications. Falls are largely preventable through effective, scientifically proven interventions. Successful implementation of these interventions will require the efforts of a broad range of professionals, from both public and private institutions. Massachusetts is fortunate to have many programs committed to fall injury prevention. While fall prevention activities have gained momentum in Massachusetts in recent years, the data in this report indicates that there is a tremendous amount of work left to accomplish. The Massachusetts Department of Public Health prepared this report in an effort to document the problem of fall injuries in Massachusetts and identify steps to be taken to more effectively use existing infrastructure for the purpose of prevention.



# Fall Prevention Resource Guide

## **General Fall Prevention Resources**

### **Centers for Disease Control and Prevention**

#### **National Center for Injury Prevention and Control**

4770 Buford Hwy, NE

MS K-65

Atlanta, GA 30341

Phone: (800) CDC-INFO

TTY: (888) 232-6348

Fax: (770) 488-4760

Email: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov)

Designed for fall prevention programs, A Tool Kit to Prevent Senior Falls includes fact sheets, graphs, and brochures about falls and fall prevention for older adults.

[www.cdc.gov/ncipc/duip/fallsmaterial.htm](http://www.cdc.gov/ncipc/duip/fallsmaterial.htm)

### **Connecticut Collaboration for Fall Prevention**

Downloadable materials for public use (screening tools) as well as information sheets describing how to handle common fall risk factors such as medications, blood pressure drops on standing, and home fall hazards are available at

[www.fallprevention.org](http://www.fallprevention.org)

### **Fall Prevention Center of Excellence**

*University of Southern California Andrus Gerontology Center*

3715 McClintock Avenue, Room 228

Los Angeles, California 90089-0191

Phone: (213) 740-1364

Fax: (213) 740-7069

Email: [info@stopfalls.org](mailto:info@stopfalls.org)

The Fall Prevention Center of Excellence is the home of a California Fall Prevention Initiative. The Center provides information to both consumers and professional on various topics relating to falls and fall prevention at

[www.stopfalls.org](http://www.stopfalls.org)

### **Home Safety Council**

1250 Eye Street, NW, Suite 1000

Washington DC, 20005

Phone: (202) 330-4900

Fax: (202) 330-4901

Email: [info@homesafetycouncil.org](mailto:info@homesafetycouncil.org)

Through national programs and partners across America, the Home Safety Council works to educate and empower families to take actions that help keep them safer in and around their homes. The *Safe Steps* program was developed

to educate older adults and their family members on how to reduce their risk of falling dangers. The Expert Network is a regularly updated resource for experts that include home safety education materials designed for use with older adult audiences – focusing on fall prevention and other leading causes of preventable home injury.

[www.homesafetycouncil.org](http://www.homesafetycouncil.org)

### **National Institute on Aging**

One of the National Institutes of Health, the NIA promotes healthy aging by conducting and supporting biomedical, social, and behavioral research and public education. The NIA offers a variety of consumer information brochures, such as AgePage, on health promotion and disease prevention. Preventing Falls and Fractures is one of these many brochures available on line.

<http://www.niapublications.org/agepages/falls.asp>

### **National Safety Council**

The NSC is a leading safety and health advocate dedicated to protecting life and promoting health, identified falls among the elderly as a leading concern in its Safety Agenda for the Nation released in 2000. This site offers several resources and materials.

<http://www.nsc.org/issues/fallstop.htm>

### **General Aging Resources**

#### **Maine Health Partnership for Healthy Aging**

#### **Partnership for Healthy Aging**

465 Congress Street, Suite 701 Portland, ME 04101

Phone: 207-775-1095

Fax: 207-541-7540

Email: [PFHA@mmc.org](mailto:PFHA@mmc.org)

The Maine Partnership for Healthy Aging is a non-profit organization, established by MaineHealth, Maine Medical Center, Community Health Services and Southern Maine Agency on Aging to offer older adults and their families a comprehensive resource for health promotion, wellness, social services, family caregiver support and service integration.

<http://www.mainehealth.org/>

#### **Massachusetts Department of Public Health**

#### **Injury Prevention and Control Program**

250 Washington Street, 4<sup>th</sup> floor

Boston, Massachusetts 02108

Phone: (617) 624-5426

Toll-free: (800) 227-7233

Fax: (617) 624-5075

Email: [cindy.rodgers@state.ma.us](mailto:cindy.rodgers@state.ma.us)

The mission of IPCP is to promote unintentional and intentional injury prevention and reduction strategies throughout Massachusetts. IPCP routinely issues

reports, data summaries, public information materials and fact sheets on a variety of injury topics. IPCP also sponsors trainings and conferences. To learn more about falls prevention strategies, call 1-800-227-SAFE.

[www.mass.gov/dph/injury](http://www.mass.gov/dph/injury)

**Massachusetts Department of Public Health  
Injury Surveillance Program**

250 Washington Street, 6<sup>th</sup> floor

Boston, Massachusetts 02108

Phone: (617) 624-5665

Fax: (617) 624-5695

Email: [beth.hume@state.ma.us](mailto:beth.hume@state.ma.us)

The ISP collects, analyzes, interprets and disseminates information on injuries in the state of Massachusetts. Data is used to identify populations at risk, monitor trends and outcomes, and distribute injury data to prevention professionals and the public utilizing a variety of data sources.

[www.mass.gov/dph/bhsre/isp/isp.htm](http://www.mass.gov/dph/bhsre/isp/isp.htm)

**Massachusetts Department of Public Health  
Office of Healthy Aging and Disability Unit**

250 Washington Street, 4<sup>th</sup> floor

Boston, Massachusetts 02108

Phone: (617) 624-

Fax: (617) 624-5075

Email: [anita.albright@state.ma.us](mailto:anita.albright@state.ma.us)

The Healthy Aging Health and Disability Unit (HAH DU) promotes the health and well being of older adults and people with disabilities across the lifespan in Massachusetts. HAH DU coordinates and supports program and policy development that assures access to quality health care. HAH DU provides opportunities for older adults and people with disabilities to learn about and manage their health.

[www.mass.gov](http://www.mass.gov) and Search for “Healthy Aging and Disability”

**US Administration on Aging (AoA)**

The AoA works to raise awareness among other federal agencies, organizations, groups, and the public about both the contributions and needs of older Americans. It also informs older people and their caregivers about the benefits and services available to help them. Search by state and identify state and area agencies on aging.

[www.aoa.gov/eldfam/How\\_To\\_Find/Agencies/Agencies.asp](http://www.aoa.gov/eldfam/How_To_Find/Agencies/Agencies.asp)

**National Council on Aging (NCOA)**

1901 L Street, NW, 4<sup>th</sup> floor

Washington DC, 20036

Phone: (202) 479-1200

Fax: (202) 479-0735

TDD: (202) 479-6674

Email: [info@ncoa.org](mailto:info@ncoa.org)

The NCOA is a national network of organizations and individuals dedicated to improving the health and independence of older persons and increasing their continuing contributions of communities, society and future generations. The NCOA, with support from the Archstone Foundation and the Home Safety Council, spearheaded an initiative entitled Falls Free: Promoting a National Falls Prevention Action Plan in order to help older adults maximize their independence and quality of life by having fewer falls and fall-related injuries.

[www.ncoa.org](http://www.ncoa.org)

**National Osteoporosis Foundation**

1232 22<sup>nd</sup> Street, NW

Washington DC, 20037

Phone: (202) 223-2226

Toll-free: (800) 231-4222

The NOF is a voluntary, nonprofit health organization and resource for information about the causes, prevention, and treatment of osteoporosis, a risk factor for fall-related fractures.

[www.nof.org](http://www.nof.org)

**Professional Association Websites and Resources****American Association of Retired Persons**

The AARP is an organization for people ages 50 years and older that provides information and education, advocacy, and community services through a national network of local chapters and experienced volunteers. Providing help to seniors who wish to stay in their own homes but are facing mobility limitations, this AARP website features ideas for making the home more safe and accessible.

[www.aarp.org/life/homedesign](http://www.aarp.org/life/homedesign)

**Evidence-Based Fall Prevention Programs****A Matter of Balance**

The Matter of Balance program was developed by the Roybal Center for Research in Applied Gerontology at Boston University and the New England Research Institutes with funding from the National Institute on Aging. In this initiative, the Partnership for Healthy Aging has modified the program delivery to include lay leaders, which is proving to be effective in disseminating this fear of falling prevention program.

<http://www.aoa.gov/prof/evidence/docs/SMaine.pdf>

## **Clinical Practice Guidelines**

Several professional organizations in the United States have established fall prevention guidelines based on reviews of research and evidence on best practices when working with seniors. The three main clinical practice guidelines for the prevention of falls include the 1) Clinical Practice Guidelines by the American Geriatrics Society, the British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention (which is the most widely adopted guideline); 2) the American Medical Directors Association (focus on institutionalized patients); and 3) the Registered Nurses Association of Ontario. This website summarizes these and other available guidelines on fall prevention.

<http://www.fallsinlrc.ca/assessment/clinicalpracticeguidelines.htm>



## Appendix A. Methodology and Technical Notes

### Data Sources and Definitions

#### Deaths

Source: Registry of Vital Records and Statistics, Massachusetts Department of Public Health

An *injury death* was defined as any death with an International Classification of Disease, Version 10 (ICD-10) code of V01-Y36, Y40-Y89, U01-U03 in the underlying cause field. This includes Unintentional events, Suicides, Homicides, Deaths due to Legal Intervention, Acts of War, and Adverse Effects of Medical Care and Drugs. A *fatal unintentional fall* was defined as any death with an ICD-10 code of W00-W19 in the underlying cause of death field (see the end of Appendix A for the ICD-10 framework). A *fall-related traumatic brain injury death* was defined as any fall death with an ICD-10 code of S01.0-S01.9, S02.0, S02.1, S02.3, S02.7-S02.9, S04.0, S06.0-S06.9, S07.0, S07.1, S07.8, S07.9, S09.7-S09.9, T01.0, T02.0, T04.0, T06.0, T90.1, T90.2, T90.4, T90.5, T90.8, or T90.9.<sup>53</sup> A *fall-related hip fracture death* was defined as any fall death with an ICD-10 code of S72.0, S72.1, or S72.2 assigned to any associated cause of death fields.<sup>54</sup>

The death data in this report are provided for the calendar year (January 1 – December 31) from 2000 through 2006. Massachusetts residents who died in or out-of-state are included in these analysis; out-of-state residents who died in Massachusetts are not included.

#### Inpatient Hospitalizations

Source: Massachusetts Inpatient Hospital Discharge Database, Massachusetts Division of Health Care Finance and Policy

An *injury-related inpatient hospitalization* was defined as any case having an International Classification of Disease, Ninth Revision for Clinical Modification (ICD-9-CM) diagnosis code of 800-909.2, 909.4, 909.9, 909-994.9, 995.5-995.59, or 995.80-995.85 assigned to any of the 16 diagnosis fields. An inpatient hospitalization associated with an *unintentional fall injury* was defined as any injury-related hospital case having an External Cause of Injury code (E code) of E880-E886.9, E888 assigned to the 1<sup>st</sup> E code field (see the end of Appendix A for the ICD-9-CM framework).

An inpatient hospitalization associated with a *fall-related traumatic brain injury* was defined as any unintentional fall case having an ICD-9-CM diagnosis code of 800.0-801.9, 803.0-804.9, 850.0-854.1, 950.1-950.3, 959.01, or 995.55 assigned to any of the 16 diagnosis fields.<sup>53</sup>

An inpatient hospitalization associated with a *fall-related hip fracture* was defined as any unintentional fall case having an ICD-9-CM diagnosis code of 820 or 820.0-820.9 assigned to any of the 16 diagnosis fields.<sup>54</sup>

Injury-related hospital discharge cases transferred to another acute care hospital or subsequently dying in the hospital were excluded from most analyses as an attempt to de-duplicate counts between hospitals and the death certificate file. All dispositions are included for analyses involving hospital charge data and discharge disposition. Federal, psychiatric, or rehabilitation hospitals and outpatient clinics do not submit data to this database.

The inpatient hospital data in this report are for a federal fiscal year (October 1 – September 30) from 2000 through 2006, in order to present the timeliest data. Massachusetts residency is based on the listed zip code of residence. Only cases having a valid Massachusetts ZIP code as defined by the MDPH's on-line query system (MassCHIP) are included in these analyses.

Counts of fall injuries by city and town involving patients with zip codes that are shared across city and town borders were weighted using methodology described elsewhere.<sup>33</sup>

### **Observation Stays**

Source: Massachusetts Outpatient Observation Stays Database, Massachusetts Division of Health Care Finance and Policy

Observation Stays are discharges from an observation bed of an acute care hospital in Massachusetts. These are generally short term (<24 hour) stays, although the criteria for observation stay admission varies across hospitals. An *injury-related observation stay* was defined as any case having an International Classification of Disease, Ninth Revision for Clinical Modification (ICD-9-CM) diagnosis code of 800-909.2, 909.4, 909.9, 909-994.9, 995.5-995.59, 995.80-995.85 assigned to any of the 6 diagnosis fields (see the end of Appendix A for the ICD-9-CM framework).

An observation stay associated with an *unintentional fall injury* was defined as any injury-related observation stay case having an External Cause of Injury code (E code) of E880-E886.9, E888 assigned to the 1<sup>st</sup> E code field.

An observation stay associated with a *fall-related traumatic brain injury* was defined as any case having an ICD-9-CM diagnosis code of 800.0-801.9, 803.0-804.9, 850.0-854.1, 950.1-950.3, 959.01, or 995.55 assigned to any of the 6 diagnosis fields.<sup>53</sup>

An observation stay associated with a *fall-related hip fracture* was defined as any case having an ICD-9-CM diagnosis code of 820 or 820.0-820.9 assigned to any of the 6 diagnosis fields.<sup>54</sup>

Injury-related observation stay cases dying in the hospital were excluded from most analyses as an attempt to de-duplicate counts between hospitals and the death certificate file. All dispositions are included for analyses involving hospital charge data. Federal, psychiatric, or rehabilitation hospitals and outpatient clinics do not submit data to this database.

The observation stay data in this report are for a federal fiscal year (October 1 – September 30) from 2000 through 2006, in order to present the timeliest data. Massachusetts residency is based on the listed zip code of residence. Only cases having a valid Massachusetts ZIP code as defined by the MDPH's on-line query system (MassCHIP) are included in these analyses.

Counts of fall injuries by city and town involving patients with zip codes that are shared across city and town borders were weighted using methodology described elsewhere.<sup>33</sup>

### **Emergency Department**

Source: Massachusetts Emergency Department Discharge Database, Massachusetts Division of Health Care Finance and Policy

Emergency Department (ED) visits are discharges from the emergency department of an acute care hospital in Massachusetts. An *injury-related emergency department discharge* was defined as any case having an International Classification of Disease, Ninth Revision for Clinical Modification (ICD-9-CM) diagnosis code of 800-909.2, 909.4, 909.9, 909-994.9, 995.5-995.59, 995.80-995.85 assigned to any of the 6 diagnosis fields (see the end of Appendix A for the ICD-9-CM framework).

An emergency department discharge associated with an *unintentional fall injury* was defined as any injury-related emergency department case having an External Cause of Injury code (E code) of E880-E886.9, E888 assigned to the 1<sup>st</sup> E code field. Due to data quality issues, the E codes for two hospitals were excluded from emergency department analysis.



An emergency department discharge associated with a *fall-related traumatic brain injury* was defined as any case having an ICD-9-CM diagnosis code of 800.0-801.9, 803.0-804.9, 850.0-854.1, 950.1-950.3, 959.01, or 995.55 assigned to any of the 6 diagnosis fields.<sup>53</sup>

An emergency department discharge associated with a *fall-related hip fracture* was defined as any case having an ICD-9-CM diagnosis code of 820 or 820.0-820.9 assigned to any of the 6 diagnosis fields.<sup>54</sup>

Injury-related emergency department cases subsequently dying in the hospital or dead on arrival were excluded from most analyses as an attempt to de-duplicate counts between hospitals and the death certificate file. All dispositions are included for analyses involving emergency department charge data. Federal, psychiatric, or rehabilitation hospitals and outpatient clinics do not submit data to this database.

The emergency department data in this report are for a federal fiscal year (October 1 – September 30) from 2002 through 2006, in order to present the most timely data. Massachusetts residency is based on the listed zip code of residence. Only cases having a valid Massachusetts ZIP code as defined by the MDPH's on-line query system (MassCHIP) are included in these analyses.

Counts of fall injuries by city and town involving patients with zip codes that are shared across city and town borders were weighted using methodology described elsewhere.<sup>33</sup>

#### ***Behavioral Risk Factor Surveillance System (BRFSS)***

Source: Health Survey Program, Massachusetts Department of Public Health

The Behavioral Risk Factors Surveillance System (BRFSS) is a population-based random telephone survey and a commonly accepted source for information on a variety of health topics. The BRFSS collects uniform, state-specific data on preventive health practices and risk behaviors that are linked to injuries, chronic diseases, and preventable infectious disease in the adult population. The BRFSS is the largest telephone health survey in the US, collecting data from more than 350,000 adults each year. BRFSS is administered to adults ages 18 and above and in all 50 states. State results can be compared with national estimates. BRFSS population estimates represent the prevalence of risk factors occurring among individuals living in the community. The 2006 BRFSS was limited to households with land line phones. Individuals who live in institutionalized settings, have cognitive limitations, do not have phone service or have only mobile phone service are unable to participate. BRFSS is based on self-reported data and as such are subject to the possible bias and errors associated with self-reported data.

In 2006, the Massachusetts-based BRFSS included two questions on falls of respondents 45 years of age or older:

1. In the past three months, how many times have you fallen?
2. How many of those falls resulted in an injury?

All percentages are weighted to the total Massachusetts population in 2006 in order to reflect both the probability that an individual is selected to participate in the survey and differential participation by sex, age, and race-ethnicity. A detailed description of the weighting process has been published elsewhere.

#### ***Web-based Injury Statistics Query and Reporting System (WISQARS)***

Source: National Center for Injury Prevention and Control

WISQARS™ (Web-based Injury Statistics Query and Reporting System) is an interactive database system that provides customized reports of injury-related data. Tables present national

and state-specific numbers of injury deaths and death rates by particular causes of injury mortality. National and state-specific estimates and rates of nonfatal injuries treated in US hospital emergency departments are available.

### Terminology

**Hospital Stays:** Combines inpatient hospital discharges and observation bed stays into one category to assist in interpreting the total burden of cases admitted to the hospital in Massachusetts.

### Fall Injury Parameters

Fall injuries are classified using multiple parameters. For example, a fall injury may be classified by a diagnosis (e.g. fracture, contusion, laceration) or a body part (e.g. hip, hand, abdomen). Fall injuries are also classified by intent: unintentional or intentional (e.g. suicide/self-inflicted, or homicide/assault). Most fall-related injuries among the elderly are unintentional. Intentional fall injuries were excluded from all analysis for this report.

In Section IV of this report, fall injuries are classified according to the type of injury and anatomic body part. A modified version of the Barell injury diagnosis matrix was used for grouping types of injuries. This matrix was originally designed in 1996 by researchers from the Injury Prevention and Control Section of the Health Services Branch Unit in the Israeli Ministry of Health and by clinical personnel from the Trauma Branch of the Israeli Defense Forces Medical Corps.<sup>54</sup> These data reflect the number of injuries treated at acute care hospitals, which (since individuals can have more than one injury) is greater than the number of visits. In order to capture all of the injuries attributed to a fall, all injury diagnoses associated with the discharge were quantified. All dispositions were included.

### External Cause of Injury Completeness

Among inpatient hospital discharge data, 96% of cases for which there was an injury assigned to one of the diagnostic fields had an External Cause of Injury code (E code) provided. Among observation bed stay data the percentage was 84.6% and among emergency department data, the percentage was 98.6%. Overall, E codes were assigned to 98.3% of all injury-related cases.

### Population Data

Population data were used to calculate age-adjusted and crude rates in Massachusetts. Source: National Center for Health Statistics. Estimates of the July 1, 2000-July 1, 2006, United States resident population from the Vintage 2006 postcensal series by year, county, age, sex, race, and Hispanic origin, prepared under a collaborative arrangement with the U.S. Census Bureau. Available on the Internet from: <http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm>. August 16, 2006.

	Massachusetts Population Estimates						
Age Group	2000	2001	2002	2003	2004	2005	2006
65-69 Years	215,797	214,228	213,288	214,116	215,895	216,935	220,135
70-74 Years	210,913	207,357	202,901	198,850	194,257	191,996	189,546
75-79 Years	185,134	183,526	182,910	181,225	177,766	175,256	171,797
80-84 Years	131,567	134,346	136,623	137,078	138,956	138,732	137,462
85+ Years	117,785	120,711	122,976	127,008	129,193	133,379	137,022
Total	861,196	860,168	858,698	858,277	856,067	856,298	855,962

For age groups smaller than the 85+ category, single year of age population data were used to create 5-year age subgroups for the Massachusetts population ages 85+ years and calculate age-specific rates.

Source: US Census Bureau. PCT12. SEX BY AGE [209] - Universe: Total population  
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see <http://factfinder.census.gov/home/en/datanotes/expsf1u.htm>.

	Massachusetts Population Estimates						
Age Group	2000	2001	2002	2003	2004	2005	2006
85-89 Years	75,779	77,732	79,252	81,911	83,371	86,126	88,498
90-94 Years	31,937	32,690	33,269	34,326	34,887	35,987	36,959
95-99 Years	8,503	8,689	8,829	9,096	9,234	9,513	9,766
100+ Years	1,566	1,600	1,626	1,675	1,701	1,753	1,799

### Data Limitations

Current surveillance systems are lacking extensive details on the location and circumstances of the injury.

Rates and proportions based on fewer than seven observations are suppressed, and trends based upon small numbers (<20) should be interpreted with caution as rates can fluctuate greatly from year to year with even a small change in the number of cases.

Financial charges of hospital services are provided in both the hospital and emergency department data. The charges for service are based on the billing information as reported by the hospital to the source of payment, such as Medicare. The charges for service are not reflective of the actual cost of the care, but rather the amount charged by the acute care hospital for reimbursement of the care.

The validity of External Cause of Injury codes for injury-related acute care hospital cases has been assessed in one local study which was restricted to emergency department discharges. The study found that broad cause of injury categories were accurate for about 85% of cases.

Massachusetts residents receiving care for a fall injury at an out-of-state hospital are not included in the nonfatal injury totals.

Due to data quality issues, the external cause of injuries codes (E-codes) for one hospital were excluded from all analysis from FY2002-2003 and those from an additional hospital were excluded from FY2003-2006.

### Statistical Measures

All rates reported are per 100,000 individuals.

#### Crude Death Rate

The crude death rate represents the “true” number of occurrences of a health event in a specified time and population per unit time. It is calculated as follows:

$$\text{Crude Rate} = \frac{\text{\# of resident injuries in a year}}{\text{Resident population for that year}} \times 100,000$$

#### Age-Adjusted Rate

The age-adjusted rate is a summary rate designed to minimize the distortions created by differences in age distribution when comparing rates for populations with different age compositions. Age-adjusted rates are useful when comparing death rates from different populations or in the same population over time. For example, if one wished to compare the 1998 death rates between Barnstable County (Cape Cod) and Hampshire County, the age-adjusted formula would account for the fact that 24% of the Barnstable County residents were 65 years of age or older, whereas only 11% of the Hampshire County residents were in this age group.

Age-adjusted rates in this report were calculated by weighting the age-specific rates for a given year to the 2000 US standard population.<sup>55</sup>

Age	State Population	Number of cases in State	State Age-Specific Rate	Weight	Weighted State Age-Specific Rate
65-69	pop1	n1	n1/pop1	0.271103	(n1/pop1) * 0.271103
70-74	pop2	n2	n2/pop2	0.251397	(n2/pop2) * 0.251397
75-79	pop3	n3	n3/pop3	0.213627	(n3/pop3) * 0.213627
80-84	pop4	n4	n4/pop4	0.14117	(n4/pop4) * 0.14117
85+	pop5	n5	n5/pop5	0.122702	(n5/pop5) * 0.122702
Total	pop6	n6	--	1	SUM of column = State Age-Adjusted Rate

### **Age-Specific Rates**

A rate for a specific age group is calculated by dividing the actual number of cases in a given year for a specific age group by the population in that age group for that year. The numerator (number of cases) and the denominator (population) refer to the same age group. It is calculated as follows:

$$\text{Age-specific Rate} = \frac{\# \text{ of injuries among residents ages 65-74 in a given year}}{\text{Resident population ages 65-74 in that year}} \times 100,000$$

### **Rate of Change**

The total rate of change is calculated as follows:

$$\frac{P_n - P_o}{P_o}$$

Where  $P_n$  is the rate during the later time period and  $P_o$  is the rate during the earlier time period.

### **Applying Comparability Ratios to Examine Trends**

Beginning with 1999, mortality data are coded according to the International Classification of Diseases-10<sup>th</sup> revision (ICD-10). Due to changes in coding rules, comparison of mortality trends over time using different revisions of ICD is challenging. A method was devised to assess if changes in causes of death are “real” changes, or due to the new classification system. Using this method, death data for 1996 were coded twice; once according to ICD-9 and again according to ICD-10. A comparability ratio (CR) was then calculated by dividing the number of deaths coded according to ICD-10 by the number of deaths coded according to the most similar codes in ICD-9.

A CR of 1.00 indicates that the same number of deaths was assigned to a cause of death whether ICD-9 or ICD-10 was used. A CR of less than 1.00 results from 1) a decrease in the number of deaths assigned to a cause in ICD-10 compared with ICD-9 or 2) the cause described in ICD-10 is only a part of the ICD-9 title to which it is being compared. A CR of more than 1.00 results from 1) an increase in the assignments of deaths to a cause in ICD-10 compared with ICD-9 or 2) the ICD-10 title is broader than the ICD-9 title to which it is being compared.

The CR used in this report (comparability ratio of 0.7720 for unintentional fall) is based on the Final Comparability Study conducted by the National Center for Health Statistics (NCHS).

### **Confidence Intervals and Statistical Testing**

In testing for statistical significance, the testing methods from the National Center for Health Statistics (NCHS) were used. These methods are presented in the following document:

National Vital Statistics Reports, Volume 52, Number 10

Births: Final Data for 2002

by Joyce A. Martin, M.P.H.; Brady E. Hamilton, Ph.D.; Paul D. Sutton, Ph.D.; Stephanie J. Ventura, M.A.; Fay Menacker, Dr. P.H.; and Martha L. Munson, M.S.;

From the Division of Vital Statistics, NCHS.  
Technical Notes, "Significance testing" section beginning on page 110.

This document is available from the following website:

<http://www.cdc.gov/nchs/products/pubs/pubd/nvsr/52/52-23.htm>

For comparisons of more than 100 events, whether they are rates, proportions, or numbers, the binomial distribution is assumed, and confidence intervals are examined to see whether they overlap. When the number of events is less than 100, a Poisson distribution is assumed, and confidence intervals are constructed based upon the Poisson distribution. For more details and exact formulas for calculating confidence intervals or other tests of statistical significance, refer to the publication listed above. For BRFSS data, if the confidence intervals for two percentages were minimally overlapping, an additional statistical test used to calculate an odds ratio, was used in this report to determine whether the percentages were different.<sup>56</sup>

**Recommended Framework of ICD-9-CM External Cause of Injury (E Code) Groupings for Presenting Injury Morbidity Data<sup>57</sup>**

Mechanism/Cause	Manner/Intent				
	Unintentional	Self-inflicted	Assault	Undetermined	Other
Cut/pierce	E920.0-.9	E956	E966	E986	E974
Drowning/submersion	E830.0-.9, E832.0-.9 E910.0-.9	E954	E964	E984	
Fall	E880.0-E886.9, E888	E957.0-.9	E968.1	E987.0-.9	
Fire/burn	E890.0-E899, E924.0-.9	E958.1,.2,.7	E961, E968.0,.3, E979.3	E988.1,.2,.7	
Fire/flame	E890.0-E899	E958.1	E968.0, E979.3	E988.1	
Hot object/substance	E924.0-.9	E958.2,.7	E961, E968.3	E988.2,.7	
Firearm	E922.0-.3,.8,.9	E955.0-.4	E965.0-4, E979.4	E985.0-.4	E970
Machinery	E919(.0-.9)				
Motor vehicle traffic	E810-E819(.0-.9)	E958.5	E968.5	E988.5	
Occupant	E810-E819(.0,.1)				
Motorcyclist	E810-E819(.2,.3)				
Pedal cyclist	E810-E819(.6)				
Pedestrian	E810-E819(.7)				
Unspecified	E810-E819(.9)				
Pedal cyclist, other	E800-E807(.3) E820-E825(.6), E826.1,.9 E827-E829(.1)				
Pedestrian, other	E800-E807(.2) E820-E825(.7) E826-E829(.0)				
Transport, other	E800-E807(.0,.1,.8,.9) E820-E825(.0-.5,.8,.9) E826.2-.8 E827-E829(.2-.9), E831.0-.9, E833.0-E845.9	E958.6		E988.6	
Natural/environmental	E900.0-E909, E928.0-.2	E958.3		E988.3	
Bites and stings	E905.0-.6,.9, E906.0-.4,.5,.9				
Overexertion	E927				
Poisoning	E850.0-E869.9	E950.0-E952.9	E962.0-.9	E980.0-E982.9	E972
Struck by, against	E916-E917.9		E960.0; E968.2		E973, E975
Suffocation	E911-E913.9	E953.0-.9	E963	E983.0-.9	
Other specified and classifiable	E846-E848, E914-E915, E918, E921(.0-.9), E922(.4,.5), E923(.0-.9), E925.0-E926.9, E928(.3-.5), E929(.0-.5)	E955(.5,.6,.7,.9), E958(.0,.4)	E960.1, E965(.5-.9), E967(.0-.9), E968(.4,.6, .7), E979(.0-.2), E979(.5-.9)	E985(.5,.6,.7), E988(.0,.4)	E971, E978, E990- E994, E996, E997(.0-.2)
Other specified, not elsewhere classifiable	E928.8, E929.8	E958.8, E959	E968.8, E969	E988.8, E989	E977, E995, E997.8, E998, E999
Unspecified	E887, E928.9, E929.9	E958.9	E968.9	E988.9	E976, E997.9
Adverse effects					
Medical care					E870-E879
Drugs					E930.0-E949.9
All injury by Intent	E800-E869, E880-E929	E950-E959	E960-E969, E979	E980-E989	E970-E978, E990- E999
All external causes	E800-E999				

## Recommended Framework of ICD-10 External Cause of Injury Groupings for Presenting Injury Mortality Data

Mechanism/Cause	Manner/Intent				
	Unintentional	Self-inflicted	Assault	Undetermined	Other
Cut/pierce	W25-W29, W45	X78	X99	Y28	Y35.4
Drowning/submersion	W65-W74	X71	X92	X21	
Fall	W00-W19	X80	Y01	Y30	
Fire/burn					
Fire/flame	X00-X09	X76	X97, U01.3	Y26	Y36.3
Hot object/substance	X10-X19	X77	X98	Y27	
Firearm	W32-W34	X72-X74	X93-X95, U01.4	Y22-Y24	Y35.0
Machinery	W24, W30-W31				
All Transport	V01-V99	X82	Y03, U01.1	Y32	Y36.1
Motor vehicle traffic					
Occupant	V30-V79 (.4-.9), V83-V86 (.0-.3)				
Motorcyclist	V20-V28 (.3-.9), V29 (.4-.9)				
Pedal cyclist	V12-V14 (.3-.9), V19 (.4-.6)				
Pedestrian	V02-V04 (.1, .9), V09.2				
Unspecified	V80 (.3-.5), V81.1, V82.1				
Pedal cyclist, other	V10-V11, V12-V14 (.0-.2), V15-V18, V19 (.0-.3, .8, .9)				
Pedestrian, other	V01, V02-V04 (.0), V05, V06, V09 (.0, .1, .3, .9)				
Land Transport, other	V20-V28 (.0-.2), V29 (.0-.3), V30-V79 (.0-.3), V80 (.0-.2, .6-.9), V81-V82 (.0, .2-.9), V83-V86 (.4-.9), V87.9, V88 (.0, .9), V89 (.0, .1, .3, .9)	X82	Y03	Y32	
Transport, other	V90-V99		U01.1		Y36.1
Natural/environmental	W42-W43, W53-W64, W92-W99, X20-X39, X51-X57				
Overexertion	X50				
Poisoning	X40-X49	X60-X69	X85-X90, U01 (.6, .7)	Y10-Y19	Y35.2
Struck by, against	W20-W22, W50-W52	X79	Y00, Y04	Y29	Y35.3
Suffocation	W75-W84	X70	X91	Y20	
Other specified and classifiable	W23, W35-W41, W44, W49, W85-W91, Y85	X75, X81, U03.0	X96, Y02, Y05-Y07, U01 (.0, .2, .5)	Y25-Y31	Y35 (.1, .5), Y36 (.0, .2, .4-.8)
Other specified, not elsewhere classifiable	X58, Y86	X83, Y87.0	Y08, Y87.1, U01.8, U02	Y33, Y87.2	Y35.6, Y89 (.0, .1)
Unspecified	X59	X84, U03.9	Y09, U01.9	Y34, Y89.9	Y35.7, Y36.9
Adverse effects					
Medical care	Y40-Y59, Y88.0				
Drugs	Y60-Y84, Y88 (.1-.3)				
All injury by Intent	V01-X59, Y85-Y86	X60-X84, Y87.0, U03	X85-Y09, Y87.1, U01, U02	Y10-Y34, Y87.2, Y89.9	Y35-Y36, Y89.0, Y89.1)
All external causes	V01-Y36, Y85-Y87, Y89, U01-U03				





## Appendix B. Data Tables

**Introduction: Corresponding to Figure A.**

**Hospital Stays Associated with Nonfatal Unintentional Fall Injuries by Age Group**  
Massachusetts Residents, 2006

Age Group	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<1	167	216.4	183.6	249.2
1-4	348	112.0	100.2	123.8
5-9	401	103.5	93.3	113.6
10-14	339	82.5	73.7	91.3
15-24	673	75.1	69.5	80.8
25-34	763	92.0	85.5	98.5
35-44	1,362	137.2	129.9	144.5
45-54	2,305	237.2	227.5	246.9
55-64	2,746	389.4	374.8	403.9
65-74	3,579	873.6	845.0	902.2
75-84	8,286	2,679.3	2,621.6	2,737.0
85+	8,344	6,089.5	5,958.9	6,220.2

Data Sources: FY2006 Massachusetts Inpatient Hospital Discharge and Outpatient Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy.

**Introduction: Corresponding to Figure B.**

**Crude and Age-Adjusted Unintentional Fall Death Rates**

Massachusetts Residents Ages 65+ Years, 1990-2006

Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-Adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
1990	144	17.7	14.8	20.6	18.7	15.7	21.8
1991	142	17.7	14.8	20.6	18.6	15.6	21.7
1992	132	16.3	13.5	19.0	16.7	13.8	19.5
1993	122	14.9	12.2	17.5	14.9	12.3	17.6
1994	130	15.8	13.1	18.5	15.7	13.0	18.4
1995	114	13.8	11.3	16.3	13.5	11.1	16.0
1996	126	15.2	12.6	17.9	14.9	12.3	17.4
1997	133	16.1	13.3	18.8	15.5	12.9	18.1
1998	136	15.8	13.1	18.4	15.1	12.6	17.6
1999	137	15.9	13.2	18.5	15.3	12.8	17.9
2000	154	17.9	15.1	20.7	17.0	14.3	19.7
2001	183	21.3	18.2	24.4	20.0	17.1	22.9
2002	162	18.9	16.0	21.8	17.6	14.9	20.3
2003	188	21.9	18.8	25.0	19.6	16.8	22.4
2004	200	23.4	20.1	26.6	21.2	18.3	24.2
2005	206	24.1	20.8	27.3	21.3	18.4	24.2
2006	340	39.9	35.6	44.1	35.3	31.5	39.0

**Comparability Modified Crude and Age-Adjusted Unintentional Fall Death Rates**

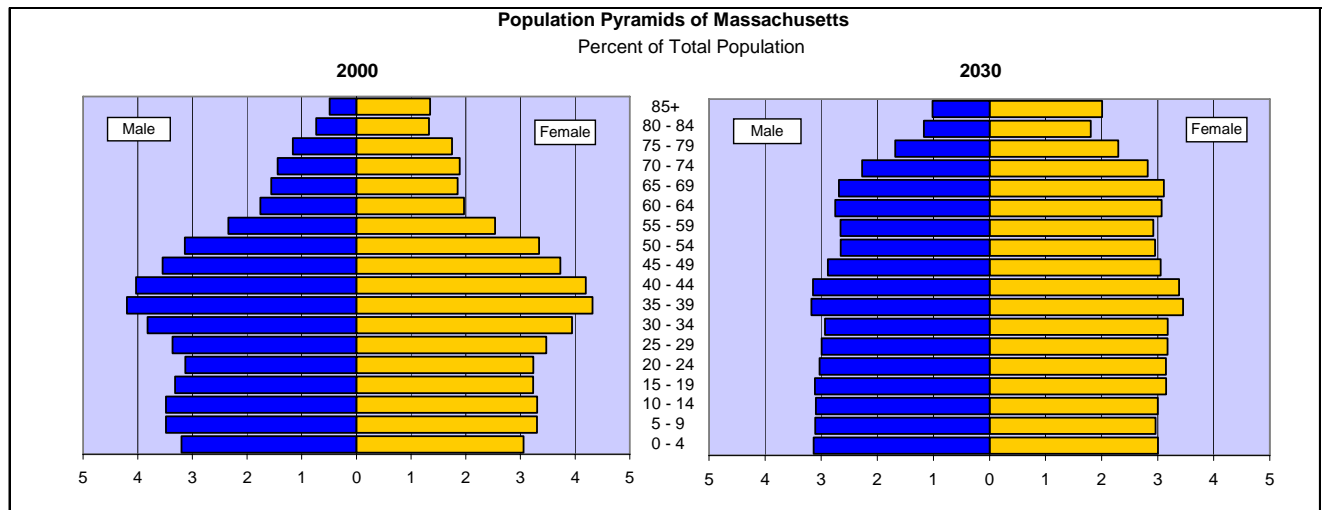
Massachusetts Residents Ages 65+ Years, 1990-1998

Year	Comparability Modified Count	Comparability Modified Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Comparability Modified Age-Adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
1990	111	13.6	14.4	21.0	14.4	11.7	17.1
1991	110	13.6	14.4	21.0	14.4	11.7	17.1
1992	102	12.5	13.1	19.4	12.9	10.4	15.4
1993	94	11.5	11.9	17.9	11.5	9.2	13.8
1994	100	12.2	12.7	18.9	12.1	9.7	14.5
1995	88	10.7	10.9	16.7	10.4	8.2	12.6
1996	97	11.7	12.2	18.2	11.5	9.2	13.8
1997	103	12.4	13.0	19.2	12.0	9.7	14.3
1998	105	12.2	12.8	18.8	11.7	9.5	13.9

Data Source: CY1990-1998 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

## Introduction: Corresponding to Figure C.

### Population Pyramid of Massachusetts in 2000 and 2030



Age Group	Census 2000				Projection 2030				2000 - 2030 Change	
	Number			Percent	Number			Percent	Total	
	Total	Male	Female		Total	Male	Female		Number	Percent
Total	6,349,097	3,058,816	3,290,281	100.0	7,012,009	3,330,034	3,681,975	100.0	662,912	10.4
0 - 4	397,268	203,062	194,206	6.3	430,607	219,841	210,766	6.1	33,339	8.4
5 - 9	430,861	221,145	209,716	6.8	425,658	217,933	207,725	6.1	-5,203	-1.2
10 - 14	431,247	221,168	210,079	6.8	427,311	216,955	210,356	6.1	-3,936	-0.9
15 - 19	415,737	210,460	205,277	6.5	439,374	218,288	221,086	6.3	23,637	5.7
20 - 24	404,279	198,756	205,523	6.4	433,349	212,519	220,830	6.2	29,070	7.2
25 - 29	434,024	213,376	220,648	6.8	432,792	209,960	222,832	6.2	-1,232	-0.3
30 - 34	492,764	242,386	250,378	7.8	428,637	205,529	223,108	6.1	-64,127	-13.0
35 - 39	540,593	266,507	274,086	8.5	464,660	222,561	242,099	6.6	-75,933	-14.0
40 - 44	522,402	255,838	266,564	8.2	457,807	220,742	237,065	6.5	-64,595	-12.4
45 - 49	461,945	225,029	236,916	7.3	415,987	201,885	214,102	5.9	-45,958	-9.9
50 - 54	411,408	199,205	212,203	6.5	393,264	186,069	207,195	5.6	-18,144	-4.4
55 - 59	310,002	148,841	161,161	4.9	391,296	186,430	204,866	5.6	81,294	26.2
60 - 64	236,405	111,504	124,901	3.7	408,157	192,775	215,382	5.8	171,752	72.7
65 - 69	216,498	98,882	117,616	3.4	406,337	188,198	218,139	5.8	189,839	87.7
70 - 74	211,332	91,416	119,916	3.3	357,483	159,401	198,082	5.1	146,151	69.2
75 - 79	184,941	73,829	111,112	2.9	278,804	117,675	161,129	4.0	93,863	50.8
80 - 84	130,699	46,464	84,235	2.1	208,547	82,038	126,509	3.0	77,848	59.6
85+	116,692	30,948	85,744	1.8	211,939	71,235	140,704	3.0	95,247	81.6
Under 18	1,500,064	769,145	730,919	23.6	1,545,614	785,557	760,057	22.0	45,550	3.0
5-17	1,102,796	566,083	536,713	17.4	1,115,007	565,716	549,291	15.9	12,211	1.1
18-24	579,328	285,446	293,882	9.1	610,685	299,979	310,706	8.7	31,357	5.4
25-44	1,989,783	978,107	1,011,676	31.3	1,783,896	858,792	925,104	25.4	-205,887	-10.3
45-64	1,419,760	684,579	735,181	22.4	1,608,704	767,159	841,545	22.9	188,944	13.3
65+	860,162	341,539	518,623	13.5	1,463,110	618,547	844,563	20.9	602,948	70.1

Demographic Indicator	2000	2030	Change
Median Age	36.5	40.2	3.7
Male	35.4	38.7	3.4
Female	37.7	41.7	3.9
Dependency Ratio (1)	66.5	83.3	16.8
Youth (2)	43.9	45.0	1.1
Old Age (3)	22.6	38.2	15.7

Demographic Indicator	2000	2030	Change
Child-Women Ratio (4)	27.9	31.5	3.6
Sex Ratio (5)	93.0	90.4	-2.5
Under 18	105.2	103.4	-1.9
18-64	95.5	92.7	-2.8
65-84	71.8	77.8	6.0
85+	36.1	50.6	14.5

(1) Dependency Ratio = (Age under 20 + Age 65 and over) / (Age 20-64) X 100

(2) Youth dependency ratio = Age under 20 / Age 20- 64 X 100

(3) Old age dependency ratio = Age 65 and over / Age 20 - 64 X 100

Source: U.S. Census Bureau, Population Division, Interim State Population Projections, 2005

Internet Release Date: April 21, 2005

(4) Child-Women ratio = Age under 5 / Female 15 - 44 X 100

(5) Sex Ratio = Male / Female X 100

Data Source: US Census Bureau, Population Division, Interim State Population Projections, 2005

**Section 1: Corresponding to Figure 1.1.**

**Frequency and Crude Rate of Fatal Falls and Nonfatal Acute Care Hospital Events  
Associated with Unintentional Fall Injury**

Massachusetts Residents Ages 65+ Years, 2006

Events	Massachusetts			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Deaths</b>	340	39.9	35.7	44.1
<b>Hospital Stays</b>	20,209	2,369.9	2,337.2	2,402.6
<b>Emergency Department Discharges</b>	36,751	4,309.3	4,265.2	4,353.4

Data Sources: CY2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2006 Massachusetts Inpatient Hospital Discharge and Outpatient Observation Stay and Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy

**Section 1: Corresponding to Figure 1.2.**

**Massachusetts Crude Unintentional Fall Death Rates**

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	Massachusetts			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	154	17.9	15.1	20.7
<b>2001</b>	183	21.3	18.2	24.4
<b>2002</b>	162	18.9	16.0	21.8
<b>2003</b>	188	21.9	18.8	25.0
<b>2004</b>	200	23.4	20.2	26.6
<b>2005</b>	206	24.1	20.8	27.4
<b>2006</b>	340	39.9	35.7	44.1

**Massachusetts Age-adjusted Unintentional Fall Death Rates**

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	Massachusetts			
	Count	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	154	17.0	14.3	19.7
<b>2001</b>	183	20.0	17.1	22.9
<b>2002</b>	162	17.6	14.9	20.3
<b>2003</b>	188	19.6	16.8	22.4
<b>2004</b>	200	21.2	18.3	24.1
<b>2005</b>	206	21.3	18.4	24.2
<b>2006</b>	340	35.3	31.5	39.1

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

**Section 1: Corresponding to Figure 1.2. (continued)**

**US Age-adjusted Comparison Rate**

US Residents Ages 65+ Years, 2000-2005

Year	United States			
	Count	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	10,273	29.5	28.9	30.1
<b>2001</b>	11,623	32.5	31.9	33.1
<b>2002</b>	12,837	35.2	34.6	35.8
<b>2003</b>	13,701	36.8	36.2	37.4
<b>2004</b>	14,899	39.3	38.7	39.9
<b>2005</b>	15,802	40.6	40.0	41.2

Data Source: CY2000-2005 Web-based Injury Statistics Query and Reporting System (WISQARS)

**Section 1: Corresponding to Table 1.1.**

**Age-adjusted and Crude Rates of Fatal Unintentional Falls**

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	Deaths						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	154	17.9	15.1	20.7	17.0	14.3	19.7
<b>2001</b>	183	21.3	18.2	24.4	20.0	17.1	22.9
<b>2002</b>	162	18.9	16.0	21.8	17.6	14.9	20.3
<b>2003</b>	188	22.0	18.9	25.1	19.6	16.8	22.4
<b>2004</b>	200	23.4	20.2	26.6	21.2	18.3	24.1
<b>2005</b>	206	24.1	20.8	27.4	21.3	18.4	24.2
<b>2006</b>	340	39.9	35.7	44.1	35.3	31.5	39.1

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

**Section 1: Corresponding to Table 1.1. (continued)**

**Age-adjusted and Crude Rates of Nonfatal Unintentional Fall Injuries Associated with Acute Care Hospital Stays**

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	Hospital Stays						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	18,374	2,133.5	2,102.7	2,191.9	2,024.3	1,995.0	2,053.6
<b>2001</b>	18,144	2,109.4	2,078.7	2,167.4	1,983.1	1,954.3	2,012.0
<b>2002</b>	18,054	2,102.5	2,071.8	2,160.4	1,956.7	1,928.2	1,985.2
<b>2003</b>	19,156	2,231.9	2,200.3	2,291.6	2,058.0	2,028.9	2,087.2
<b>2004</b>	19,340	2,259.2	2,227.3	2,319.2	2,068.6	2,039.5	2,097.8
<b>2005</b>	19,351	2,259.8	2,228.0	2,319.9	2,053.5	2,024.6	2,082.5
<b>2006</b>	20,209	2,369.7	2,337.0	2,431.1	2,132.2	2,102.8	2,161.6

Data Sources: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Outpatient Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy

**Age-adjusted and Crude Rates of Nonfatal Unintentional Fall Injuries Associated with Emergency Department Discharges**

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	Emergency Department Visits						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	NA	NA	NA	NA	NA	NA	NA
<b>2001</b>	NA	NA	NA	NA	NA	NA	NA
<b>2002</b>	35,039	4,080.5	4,037.8	4,161.6	3,906.8	3,865.9	3,947.7
<b>2003</b>	36,627	4,267.5	4,223.8	4,350.5	4,085.2	4,043.4	4,127.1
<b>2004</b>	36,426	4,255.0	4,211.3	4,337.9	4,050.4	4,008.8	4,092.0
<b>2005</b>	35,731	4,172.7	4,129.5	4,254.8	3,953.8	3,912.8	3,994.8
<b>2006</b>	36,751	4,309.3	4,265.3	4,392.6	4,053.8	4,012.4	4,095.3

Data Source: FY2000-2006 Massachusetts Emergency Department Discharge Database, Massachusetts Division of Health Care Finance and Policy  
Emergency Department data are not available (NA) prior to 2002.

**Section 1: Corresponding to Figure 1.3.**

**Total Charges for Acute Care Hospital Stays Associated with all Unintentional Fall Injuries (All Dispositions)**

Massachusetts Residents Ages 65+ Years, 2002-2006

Year	Hospital Stays			
	Total Charges	Mean	Median	Count
<b>2002</b>	\$ 279,054,084.00	\$ 14,577.34	\$ 10,738.00	19,143
<b>2003</b>	\$ 315,251,644.00	\$ 15,480.83	\$ 11,134.50	20,364
<b>2004</b>	\$ 347,571,683.00	\$ 16,967.96	\$ 12,027.50	20,484
<b>2005</b>	\$ 365,298,452.00	\$ 17,900.64	\$ 12,713.00	20,407
<b>2006</b>	\$ 407,582,856.00	\$ 19,103.06	\$ 13,589.50	21,336

Data Sources: FY2002-2006 Massachusetts Inpatient Hospital Discharge and Outpatient Observation Stay Databases, Massachusetts Division of Health Care Finance and Policy

**Total Charges for Emergency Department Visits Associated with all Unintentional Fall Injuries (All Dispositions)**

Massachusetts Residents Ages 65+ Years, 2002-2006

Year	Emergency Department			
	Total Charges	Mean	Median	Count
<b>2002</b>	\$ 34,074,376.00	\$ 971.00	\$ 691.00	35,070
<b>2003</b>	\$ 42,740,898.00	\$ 166.57	\$ 828.00	36,638
<b>2004</b>	\$ 48,976,469.00	\$ 1,344.84	\$ 948.00	36,418
<b>2005</b>	\$ 54,942,888.00	\$ 1,534.34	\$ 1,093.00	35,739
<b>2006</b>	\$ 64,365,733.00	\$ 1,751.40	\$ 1,273.00	36,751

Data Source: FY2002-2006 Massachusetts Emergency Department Discharge Database, Massachusetts Division of Health Care Finance and Policy

**Section 1: Corresponding to Figure 1.4.**

**Disposition Status for Inpatient Hospital Discharges Associated with Unintentional Fall Injuries**

Massachusetts Residents Ages 65+ Years, 2006

Discharge Status	Massachusetts	
	Count	Percent
<b>Intermediate to Long Term, Skilled Care and Rest Home</b>	11,088	56%
<b>Home</b>	4,841	24%
<b>Rehabilitation or Chronic Hospital</b>	2,850	31%
<b>Death</b>	702	8%
<b>Other</b>	664	7%

Data Source: FY2006 Massachusetts Inpatient Hospital Discharge Database, Massachusetts Division of Health Care Finance and Policy

## Section 2: Corresponding to Figure 2.1.

### Three-year Average Annual Unintentional Fall Death Rate by Age Group

Massachusetts Residents Ages 85+ Years, 2004-2006

Age Group	Deaths (2004-2006)			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 85+</b>	351	87.8	78.6	97.0
85-89	184	71.3	61.0	81.6
90-94	117	108.5	88.8	128.2
95+	50	148.1	109.9	195.2

Data Source: CY2004-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

## Section 2: Corresponding to Figure 2.2.

### Unintentional Fall Death Rates by Age Group

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	65+ Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	154	17.9	15.1	20.7
<b>2001</b>	183	21.3	18.2	24.4
<b>2002</b>	162	18.9	16.0	21.8
<b>2003</b>	188	21.9	18.8	25.0
<b>2004</b>	200	23.4	20.1	26.6
<b>2005</b>	206	24.1	20.8	27.3
<b>2006</b>	340	39.7	35.5	43.9

### Unintentional Fall Death Rates by Age Group

Massachusetts Residents Ages 65-69 Years, 2000-2006

Year	65-69 Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	13	6.0	3.2	10.3
<b>2001</b>	11	5.1	2.6	9.2
<b>2002</b>	13	6.1	3.2	10.4
<b>2003</b>	9	4.2	1.9	8.0
<b>2004</b>	16	7.4	4.2	12.0
<b>2005</b>	10	4.6	2.2	8.5
<b>2006</b>	19	8.6	5.2	13.5



**Section 2: Corresponding to Figure 2.2. (continued)****Unintentional Fall Death Rates by Age Group**

Massachusetts Residents Ages 70-74 Years, 2000-2006

Year	70-74 Age Group			
	Frequency	Crude Rate	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	15	7.1	4.8	10.2
<b>2001</b>	23	11.1	7.6	15.6
<b>2002</b>	15	7.4	5.1	10.3
<b>2003</b>	10	5.0	3.3	7.3
<b>2004</b>	17	8.8	6.0	12.3
<b>2005</b>	17	8.9	5.9	12.8
<b>2006</b>	37	19.5	14.4	25.8

**Unintentional Fall Death Rates by Age Group**

Massachusetts Residents Ages 75-79 Years, 2000-2006

Year	75-79 Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	30	16.2	10.9	23.1
<b>2001</b>	33	18.0	12.4	25.3
<b>2002</b>	34	18.6	12.9	26.0
<b>2003</b>	28	15.5	10.3	22.3
<b>2004</b>	33	18.6	12.8	26.1
<b>2005</b>	28	16.0	10.6	23.1
<b>2006</b>	49	28.5	21.1	37.7

**Unintentional Fall Death Rates by Age Group**

Massachusetts Residents Ages 80-84 Years, 2000-2006

Year	80-84 Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	30	22.8	15.4	32.6
<b>2001</b>	44	32.8	23.8	44.0
<b>2002</b>	31	22.7	15.4	32.2
<b>2003</b>	44	32.1	23.3	43.1
<b>2004</b>	47	33.8	24.9	45.0
<b>2005</b>	56	40.4	30.5	52.4
<b>2006</b>	66	48.0	37.1	61.1

**Section 2: Corresponding to Figure 2.2. (continued)****Unintentional Fall Death Rates by Age Group**

Massachusetts Residents Ages 85-89 Years, 2000-2006

Year	85-89 Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	29	38.3	25.6	55.0
<b>2001</b>	39	50.2	35.7	68.6
<b>2002</b>	37	46.7	32.9	64.4
<b>2003</b>	48	58.6	43.2	77.7
<b>2004</b>	53	63.6	47.6	83.2
<b>2005</b>	47	54.6	40.1	72.6
<b>2006</b>	84	94.9	75.7	117.5

**Unintentional Fall Death Rates by Age Group**

Massachusetts Residents Ages 90-94 Years, 2000-2006

Year	90-94 Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	28	87.7	58.3	126.7
<b>2001</b>	19	58.1	35.0	90.8
<b>2002</b>	22	66.1	41.4	100.1
<b>2003</b>	34	99.1	68.6	138.4
<b>2004</b>	25	71.7	46.4	105.8
<b>2005</b>	34	94.5	65.4	132.0
<b>2006</b>	58	156.9	119.2	202.9

**Unintentional Fall Death Rates by Age Group**

Massachusetts Residents Ages 95+ Years, 2000-2006

Year	95+ Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	9	89.4	40.9	169.7
<b>2001</b>	14	136.1	74.4	228.3
<b>2002</b>	10	95.6	45.9	175.9
<b>2003</b>	15	139.3	77.9	229.7
<b>2004</b>	9	82.3	37.6	156.2
<b>2005</b>	14	124.3	67.9	208.5
<b>2006</b>	27	233.5	153.9	339.7

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics,  
Massachusetts Department of Public Health

## Section 2: Corresponding to Figure 2.3.

### Crude and Age-adjusted Unintentional Fall Death Rates among Males

Massachusetts Residents Ages 65+ Years, 2000-2006

Male							
Year	Count	Crude Rate per 100,000	Lower 95% CI	Upper 95% CI	Age-adjusted Rate per 100,000	Lower 95% CI	Upper 95% CI
2000	78	22.8	18.1	28.5	22.0	17.4	27.5
2001	89	25.9	20.8	31.9	24.6	19.8	30.3
2002	87	25.3	20.3	31.2	23.6	18.9	29.1
2003	91	26.4	21.2	32.4	23.8	19.2	29.2
2004	87	25.2	20.2	31.1	23.2	18.6	28.6
2005	93	26.8	21.6	32.8	23.8	19.2	29.2
2006	144	41.5	34.7	48.3	36.8	30.8	42.8

### Crude and Age-adjusted Unintentional Fall Death Rates among Females

Massachusetts Residents Ages 65+ Years, 2000-2006

Female							
Year	Count	Crude Rate per 100,000	Lower 95% CI	Upper 95% CI	Age-adjusted Rate per 100,000	Lower 95% CI	Upper 95% CI
2000	76	14.7	11.5	18.3	13.7	10.8	17.1
2001	94	18.2	14.7	22.3	16.8	13.6	20.6
2002	75	14.6	11.5	18.3	13.4	10.5	16.8
2003	97	19.0	15.4	23.2	16.6	13.5	20.3
2004	113	22.3	18.1	26.4	19.7	16.1	23.3
2005	113	22.3	18.2	26.5	19.5	15.9	23.1
2006	196	38.7	33.3	44.2	33.8	29.1	38.5

### Crude and Age-adjusted Unintentional Fall Death Rates Overall

Massachusetts Residents Ages 65+ Years, 2000-2006

Year	Total						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	154	17.9	15.1	20.7	17.0	14.3	19.7
2001	183	21.3	18.2	24.4	20.0	17.1	22.9
2002	162	18.9	16.0	21.8	17.6	14.9	20.3
2003	188	22.0	18.9	25.1	19.6	16.8	22.4
2004	200	23.4	20.2	26.6	21.2	18.3	24.1
2005	206	24.1	20.8	27.4	21.3	18.4	24.2
2006	340	39.9	35.7	44.1	35.3	31.5	39.1

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics,  
Massachusetts Department of Public Health

## Section 2: Corresponding to Figure 2.3. (continued)

### Three-year Average Annual Fall Death Rates by Age Group among Males

Massachusetts Residents Ages 65+ Years, 2004-2006

Male				
Age Group	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	324	31.1	27.7	34.5
65-69	32	10.6	7.3	15.0
70-74	38	14.9	10.6	20.5
75-79	53	24.5	18.4	32.1
80-84	77	50.5	39.8	63.1
85-89	78	94.2	74.5	117.6
90-94	37	137.8	97.0	190.0
95+	9	140.8	64.4	267.3

### Three-year Average Annual Fall Death Rates by Age Group among Females

Massachusetts Residents Ages 65+ Years, 2004-2006

Female				
Age Group	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	422	27.6	25.0	30.3
65-69	13	3.7	2.0	6.3
70-74	33	10.3	7.1	14.4
75-79	57	18.5	14.0	23.9
80-84	92	35.0	28.2	43.0
85-89	106	60.5	49.0	72.0
90-94	80	98.8	78.3	122.9
95+	41	149.8	107.5	203.2

### Three-year Average Annual Fall Death Rates by Age Group Overall

Massachusetts Residents Ages 65+ Years, 2004-2006

Total				
Age Group	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	746	29.0	27.0	31.1
65-69	45	6.9	5.0	9.2
70-74	71	12.3	55.5	15.6
75-79	110	21.0	17.0	24.9
80-84	169	40.7	34.6	46.8
85-89	184	71.3	61.0	81.6
90-94	117	108.5	88.8	128.2
95+	50	148.1	109.9	195.2

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics,  
Massachusetts Department of Public Health

**Section 2: Corresponding to Figure 2.4.**

**Age-Sex-Specific Rates of Acute Care Hospital Stays Associated with an Unintentional Fall Injury (among Males)**

Massachusetts Residents Ages 65+ Years, 2006

Age Group	Male			
	Count	Age-Sex-Specific Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	5,613	1,613.9	1,571.6	1,656.1
65-69	580	570.9	524.4	617.4
70-74	716	850.3	788.0	912.6
75-79	1,088	1,532.4	1,441.3	1,623.5
80-84	1,392	2,735.0	2,591.3	2,878.7
85-89	1,086	3,794.8	3,569.1	4,020.5
90-94	592	6,379.0	5,865.1	6,892.8
95-99	141	7,587.0	6,334.7	8,839.4
100+	18	5,125.1	3,037.5	8,099.9

**Age-Sex-Specific Rates of Acute Care Hospital Stays Associated with an Unintentional Fall Injury (among Females)**

Massachusetts Residents Ages 65+ Years, 2006

Age Group	Female			
	Count	Age-Sex-Specific Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	14,596	2,872.3	2,825.7	2,918.9
65-69	941	793.8	743.1	844.5
70-74	1,342	1,273.9	1,205.8	1,342.1
75-79	2,321	2,302.6	2,209.0	2,396.3
80-84	3,485	4,025.8	3,892.2	4,159.5
85-89	3,490	5,828.3	5,634.9	6,021.6
90-94	2,220	8,020.8	7,687.1	8,354.4
95-99	693	8,764.0	8,111.5	9,416.5
100+	104	7,182.9	5,802.4	8,563.4

**Age-Sex-Specific Rates of Acute Care Hospital Stays Associated with an Unintentional Fall Injury (Overall)**

Massachusetts Residents Ages 65+ Years, 2006

Age Group	Total			
	Count	Age-Sex-Specific Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	20,209	2,361.0	2,328.4	2,393.5
65-69	1,521	690.9	656.2	725.7
70-74	2,058	1,085.8	1,038.8	1,132.7
75-79	3,409	1,984.3	1,917.7	2,050.9
80-84	4,877	3,547.9	3,448.3	3,647.5
85-89	4,576	5,170.7	5,020.9	5,320.5
90-94	2,812	7,608.5	7,327.3	7,889.7
95-99	834	8,540.0	7,960.4	9,119.6
100+	122	6,781.2	5,577.9	7,984.5

Data Source: FY2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Figure 2.4. (continued)

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 65+ Years, 2000-2006

	65+ Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	18,352	2,131.0	2,100.2	2,161.8
<b>2001</b>	18,115	2,106.0	2,075.3	2,136.7
<b>2002</b>	18,031	2,099.8	2,069.2	2,130.5
<b>2003</b>	19,136	2,229.6	2,198.0	2,261.2
<b>2004</b>	19,340	2,259.2	2,227.3	2,291.0
<b>2005</b>	19,351	2,259.8	2,228.0	2,291.7
<b>2006</b>	20,209	2,361.0	2,328.4	2,393.5

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 65-69 Years, 2000-2006

	65-69			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	1,389	643.7	609.8	677.5
<b>2001</b>	1,450	676.8	642.0	711.7
<b>2002</b>	1,347	631.5	597.8	665.3
<b>2003</b>	1,401	654.3	620.1	688.6
<b>2004</b>	1,430	662.4	628.0	696.7
<b>2005</b>	1,465	675.3	640.7	709.9
<b>2006</b>	1,521	690.9	656.2	725.7

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 70-74 Years, 2000-2006

	70-74			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	2,033	963.9	922.0	1,005.8
<b>2001</b>	2,072	999.2	956.2	1,042.3
<b>2002</b>	2,050	1,010.3	966.6	1,054.1
<b>2003</b>	2,141	1,076.7	1,031.1	1,122.3
<b>2004</b>	2,099	1,080.5	1,034.3	1,126.8
<b>2005</b>	2,106	1,096.9	1,050.0	1,143.7
<b>2006</b>	2,058	1,085.8	1,038.8	1,132.7

## Section 2: Corresponding to Figure 2.4. (continued)

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 75-79 Years, 2000-2006

	75-79			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	3,246	1,753.3	1,693.0	1,813.6
<b>2001</b>	3,207	1,747.4	1,687.0	1,807.9
<b>2002</b>	3,150	1,722.2	1,662.0	1,782.3
<b>2003</b>	3,413	1,883.3	1,820.1	1,946.5
<b>2004</b>	3,388	1,905.9	1,841.7	1,970.1
<b>2005</b>	3,251	1,855.0	1,791.2	1,918.8
<b>2006</b>	3,409	1,984.3	1,917.7	2,050.9

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 80-84 Years, 2000-2006

	80-84			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	4,260	3,237.9	3,140.7	3,335.1
<b>2001</b>	4,255	3,167.2	3,072.0	3,262.4
<b>2002</b>	4,293	3,142.2	3,048.2	3,236.2
<b>2003</b>	4,500	3,282.8	3,186.9	3,378.7
<b>2004</b>	4,595	3,306.8	3,211.2	3,402.4
<b>2005</b>	4,693	3,382.8	3,286.0	3,479.6
<b>2006</b>	4,877	3,547.9	3,448.3	3,647.5

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 85-89 Years, 2000-2006

	85-89			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	4,167	5,498.9	5,331.9	5,665.8
<b>2001</b>	3,969	5,106.0	4,947.1	5,264.8
<b>2002</b>	4,020	5,072.4	4,915.6	5,229.2
<b>2003</b>	4,311	5,263.1	5,105.9	5,420.2
<b>2004</b>	4,423	5,305.2	5,148.8	5,461.5
<b>2005</b>	4,319	5,014.7	4,865.2	5,164.3
<b>2006</b>	4,576	5,170.7	5,020.9	5,320.5

## Section 2: Corresponding to Figure 2.4. (continued)

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 90-94 Years, 2000-2006

	90-94			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	2,463	7,712.1	7,407.5	8,016.6
<b>2001</b>	2,386	7,298.8	7,006.0	7,591.7
<b>2002</b>	2,415	7,259.1	6,969.5	7,548.6
<b>2003</b>	2,494	7,265.7	6,980.5	7,550.9
<b>2004</b>	2,585	7,409.6	7,124.0	7,695.3
<b>2005</b>	2,604	7,236.0	6,958.0	7,513.9
<b>2006</b>	2,812	7,608.5	7,327.3	7,889.7

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 95-99 Years, 2000-2006

	95-99			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	681	8,008.5	7,407.0	8,610.0
<b>2001</b>	668	7,688.3	7,105.2	8,271.3
<b>2002</b>	657	7,441.4	6,872.4	8,010.4
<b>2003</b>	762	8,376.9	7,782.1	8,971.7
<b>2004</b>	725	7,851.5	7,279.9	8,423.0
<b>2005</b>	794	8,346.2	7,765.7	8,926.8
<b>2006</b>	834	8,540.0	7,960.4	9,119.6

### Crude Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 100+ Years, 2000-2006

	100+			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	113	7,217.8	5,887.0	8,548.6
<b>2001</b>	108	6,750.5	5,477.4	8,023.7
<b>2002</b>	99	6,088.8	4,948.7	7,412.9
<b>2003</b>	114	6,804.4	5,555.3	8,053.5
<b>2004</b>	95	5,585.4	4,518.9	6,827.8
<b>2005</b>	119	6,790.3	5,570.3	8,010.3
<b>2006</b>	122	6,781.2	5,577.9	7,984.5

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy



## Section 2: Corresponding to Figure 2.4. (continued)

### Crude and Age-adjusted Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury among Males

Massachusetts Residents Ages 65+ Years, 2000-2006

	Male						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	4,497	1,314.0	1,275.6	1,352.4	1,270.2	1,233.1	1,307.4
<b>2001</b>	4,627	1,348.4	1,309.5	1,387.2	1,288.3	1,251.2	1,325.4
<b>2002</b>	4,703	1,367.1	1,328.1	1,406.2	1,285.2	1,248.5	1,321.9
<b>2003</b>	5,060	1,466.3	1,425.9	1,506.7	1,364.8	1,327.2	1,402.4
<b>2004</b>	5,170	1,495.9	1,455.1	1,536.7	1,376.2	1,338.7	1,413.7
<b>2005</b>	5,348	1,540.7	1,499.4	1,582.0	1,408.6	1,370.8	1,446.3
<b>2006</b>	5,613	1,613.9	1,571.6	1,656.1	1,495.5	1,456.4	1,534.7

### Crude and Age-adjusted Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury among Females

Massachusetts Residents Ages 65+ Years, 2000-2006

	Female						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	13,855	2,669.8	2,625.4	2,714.3	2,508.4	2,466.6	2,550.1
<b>2001</b>	13,488	2,608.8	2,564.8	2,652.9	2,432.4	2,391.3	2,473.4
<b>2002</b>	13,328	2,589.5	2,545.5	2,633.5	2,396.9	2,356.2	2,437.6
<b>2003</b>	14,076	2,742.8	2,697.5	2,788.1	2,516.5	2,474.9	2,558.0
<b>2004</b>	14,170	2,775.9	2,730.2	2,821.6	2,534.2	2,492.5	2,575.9
<b>2005</b>	14,002	2,749.9	2,704.3	2,795.4	2,490.4	2,449.1	2,531.6
<b>2006</b>	14,596	2,872.3	2,825.7	2,918.9	2,584.8	2,542.9	2,626.8

### Crude and Age-adjusted Rates of Acute Care Hospital Stays Associated with a Nonfatal Unintentional Fall Injury Overall

Massachusetts Residents Ages 65+ Years, 2000-2006

	Total						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	18,352	2,131.0	2,100.2	2,161.8	2,031.5	2,002.1	2,060.9
<b>2001</b>	18,115	2,106.0	2,075.3	2,136.7	1,975.0	1,946.2	2,003.8
<b>2002</b>	18,031	2,099.8	2,069.2	2,130.5	1,940.5	1,912.1	1,968.8
<b>2003</b>	19,136	2,229.6	2,198.0	2,261.2	2,030.7	2,001.9	2,059.5
<b>2004</b>	19,340	2,259.2	2,227.3	2,291.0	2,033.1	2,004.4	2,061.7
<b>2005</b>	19,351	2,259.8	2,228.0	2,291.7	2,009.5	1,981.2	2,037.8
<b>2006</b>	20,209	2,361.0	2,328.4	2,393.5	2,132.2	2,102.8	2,161.6

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy

**Section 2: Corresponding to Figure 2.4. (continued)**

**Age-Sex-Specific Rates of Emergency Department Discharges Associated with an Unintentional Fall Injury (among Males)**

Massachusetts Residents Ages 65+ Years, 2006

Age Group	Male			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	11,188	3,216.8	3,157.2	3,276.4
65-69	1,841	1,812.1	1,729.3	1,894.9
70-74	1,910	2,268.3	2,166.6	2,370.1
75-79	2,188	3,081.7	2,952.6	3,210.8
80-84	2,460	4,833.4	4,642.4	5,024.4
85-89	1,784	6,233.9	5,944.6	6,523.2
90-94	798	8,598.7	8,002.1	9,195.3
95-99	176	9,470.3	8,071.2	10,869.5
100+	31	8,826.6	5,997.2	12,528.7

**Age-Sex-Specific Rates of Emergency Department Discharges Associated with an Unintentional Fall Injury (among Females)**

Massachusetts Residents Ages 65+ Years, 2006

Age Group	Female			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	25,561	5,030.1	4,968.4	5,091.8
65-69	3,299	2,783.0	2,688.0	2,878.0
70-74	3,737	3,547.5	3,433.7	3,661.2
75-79	4,775	4,737.2	4,602.9	4,871.6
80-84	5,487	6,338.5	6,170.8	6,506.2
85-89	4,820	8,049.3	7,822.1	8,276.6
90-94	2,572	9,292.5	8,933.4	9,651.7
95-99	767	9,699.8	9,013.3	10,386.3
100+	104	7,182.9	5,802.4	8,563.4

**Age-Sex-Specific Rates of Emergency Department Discharges Associated with an Unintentional Fall Injury (Overall)**

Massachusetts Residents Ages 65+ Years, 2006

Age Group	Total			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Overall 65+</b>	36,751	4,293.5	4,249.6	4,337.4
65-69	5,140	2,334.9	2,271.1	2,398.8
70-74	5,647	2,979.2	2,901.5	3,056.9
75-79	6,963	4,053.0	3,957.8	4,148.2
80-84	7,948	5,782.0	5,654.8	5,909.1
85-89	6,604	7,462.3	7,282.3	7,642.3
90-94	3,371	9,121.0	8,813.1	9,428.9
95-99	943	9,656.1	9,039.8	10,272.4
100+	135	7,503.8	6,238.0	8,769.6

Data Source: FY2006 Massachusetts Emergency Department Discharge Database, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Figure 2.4. (continued)

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 65+ Years, 2002-2006

	65+ Age Group			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	35,043	4,080.9	4,038.2	4,123.7
<b>2003</b>	36,297	4,229.1	4,185.5	4,272.6
<b>2004</b>	36,283	4,238.3	4,194.7	4,281.9
<b>2005</b>	35,628	4,160.7	4,117.5	4,203.9
<b>2006</b>	36,751	4,293.5	4,249.6	4,337.4

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 65-69 Years, 2002-2006

	65-69			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	4,737	2,220.9	2,157.7	2,284.2
<b>2003</b>	5,311	2,480.4	2,413.7	2,547.1
<b>2004</b>	5,219	2,417.4	2,351.8	2,483.0
<b>2005</b>	5,080	2,341.7	2,277.3	2,406.1
<b>2006</b>	5,140	2,334.9	2,271.1	2,398.8

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 70-74 Years, 2002-2006

	70-74			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	5,635	2,777.2	2,704.7	2,849.7
<b>2003</b>	6,023	3,028.9	2,952.4	3,105.4
<b>2004</b>	5,784	2,977.5	2,900.8	3,054.2
<b>2005</b>	5,576	2,904.2	2,828.0	2,980.5
<b>2006</b>	5,647	2,979.2	2,901.5	3,056.9

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 75-79 Years, 2002-2006

	75-79			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	6,961	3,805.7	3,716.3	3,895.1
<b>2003</b>	7,260	4,006.1	3,913.9	4,098.2
<b>2004</b>	7,069	3,976.6	3,883.9	4,069.3
<b>2005</b>	6,897	3,935.4	3,842.5	4,028.3
<b>2006</b>	6,963	4,053.0	3,957.8	4,148.2

## Section 2: Corresponding to Figure 2.4. (continued)

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 80-84 Years, 2002-2006

	80-84			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	7,565	5,537.1	5,412.4	5,661.9
<b>2003</b>	7,561	5,515.8	5,391.5	5,640.2
<b>2004</b>	7,774	5,594.6	5,470.2	5,718.9
<b>2005</b>	7,545	5,438.5	5,315.8	5,561.3
<b>2006</b>	7,948	5,782.0	5,654.8	5,909.1

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 85-89 Years, 2002-2006

	85-89			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	5,832	7,358.8	7,169.9	7,547.6
<b>2003</b>	6,003	7,328.7	7,143.3	7,514.1
<b>2004</b>	6,178	7,410.2	7,225.5	7,595.0
<b>2005</b>	6,161	7,153.4	6,974.8	7,332.1
<b>2006</b>	6,604	7,462.3	7,282.3	7,642.3

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 90-94 Years, 2002-2006

	90-94			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	3,215	9,663.7	9,329.7	9,997.8
<b>2003</b>	3,086	8,990.4	8,673.2	9,307.6
<b>2004</b>	3,173	9,095.1	8,778.6	9,411.5
<b>2005</b>	3,259	9,056.1	8,745.1	9,367.0
<b>2006</b>	3,371	9,121.0	8,813.1	9,428.9

### Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group

Massachusetts Residents Ages 95-99 Years, 2002-2006

	95-99			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	947	10,726.0	10,042.9	11,409.2
<b>2003</b>	914	10,047.9	9,396.5	10,699.3
<b>2004</b>	957	10,364.0	9,707.3	11,020.6
<b>2005</b>	959	10,080.6	9,442.6	10,718.7
<b>2006</b>	943	9,656.1	9,039.8	10,272.4

**Section 2: Corresponding to Figure 2.4. (continued)**

**Crude Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury by Age Group**

Massachusetts Residents Ages 100+ Years, 2002-2006

	100+			
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	151	9,287.0	7,805.7	10,768.3
<b>2003</b>	139	8,296.6	6,917.4	9,675.9
<b>2004</b>	129	7,584.3	6,275.5	8,893.2
<b>2005</b>	151	8,616.2	7,241.9	9,990.6
<b>2006</b>	135	7,503.8	6,238.0	8,769.6

Data Source: FY2002-2006 Massachusetts Emergency Department Discharge Database,  
Massachusetts Health Care Finance and Policy

**Section 2: Corresponding to Figure 2.4. (continued)**

**Crude and Age-adjusted Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury among Males**

Massachusetts Residents Ages 65+ Years, 2002-2006

	Male						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	10,121	2,942.1	2,884.8	2,999.5	2,824.3	2,769.2	2,879.3
<b>2003</b>	10,860	3,147.1	3,087.9	3,206.3	3,019.1	2,962.3	3,075.9
<b>2004</b>	10,813	3,128.7	3,069.7	3,187.7	2,980.1	2,924.0	3,036.3
<b>2005</b>	10,920	3,146.0	3,087.0	3,205.0	2,973.2	2,917.4	3,029.0
<b>2006</b>	11,188	3,216.8	3,157.2	3,276.4	3,026.5	2,970.4	3,082.5

**Crude and Age-adjusted Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury among Females**

Massachusetts Residents Ages 65+ Years, 2002-2006

	Female						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	24,922	4,842.1	4,782.0	4,902.2	4,632.0	4,574.5	4,689.5
<b>2003</b>	25,434	4,956.0	4,895.1	5,016.9	4,742.0	4,683.8	4,800.3
<b>2004</b>	25,467	4,989.0	4,927.8	5,050.3	4,750.6	4,692.2	4,808.9
<b>2005</b>	24,707	4,852.2	4,791.7	4,912.7	4,604.9	4,547.5	4,662.3
<b>2006</b>	25,561	5,030.1	4,968.4	5,091.8	4,760.0	4,701.7	4,818.4

**Crude and Age-adjusted Rates of Emergency Department Discharges Associated with a Nonfatal Unintentional Fall Injury Overall**

Massachusetts Residents Ages 65+ Years, 2002-2006

	Total						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2002</b>	35,043	4,080.9	4,038.2	4,123.7	3,896.4	3,855.6	3,937.2
<b>2003</b>	36,297	4,229.1	4,185.5	4,272.6	4,032.9	3,991.5	4,074.4
<b>2004</b>	36,283	4,238.3	4,194.7	4,281.9	4,009.9	3,968.6	4,051.1
<b>2005</b>	35,628	4,160.7	4,117.5	4,203.9	3,912.1	3,871.5	3,952.7
<b>2006</b>	36,751	4,293.5	4,249.6	4,337.4	4,053.8	4,012.4	4,095.3

Data Source: FY2002-2006 Massachusetts Emergency Department Discharge Database, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Figure 2.5.

### Five-year Average Annual Crude and Age-Adjusted Unintentional Fall Death Rate by Race/Ethnicity

Massachusetts Residents Ages 65+ Years, 2002-2006

Race/Ethnicity Category	Massachusetts						
	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>White, non-Hispanic</b>	1,047	26.4	24.8	28.0	23.4	22.0	24.8
<b>Black, non-Hispanic</b>	17	12.5	7.3	20.0	14.1	8.2	22.6
<b>Asian, non-Hispanic</b>	18	20.3	12.0	32.1	24.9	14.8	39.4
<b>Hispanic</b>	13	14.0	7.5	23.9	15.0	8.0	25.7

Data Source: CY2002-2006 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health

## Section 2: Corresponding to Map 2.1.

### Three-year Average Annual Crude Rate of Unintentional Fall-Related Events by Executive Office of Health and Human Services (EOHHS) Regions

Massachusetts Residents Ages 65+ Years, 2003-2005

Location	EOHHS Regions			
	Count	Crude Fall Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Western EOHHS Region</b>	22,367	6,287.2	6,204.8	6,369.6
<b>Central EOHHS Region</b>	18,560	6,201.7	6,112.5	6,290.9
<b>Northeast EOHHS Region</b>	33,552	6,670.2	6,598.8	6,741.6
<b>Metro West EOHHS Region</b>	40,532	6,685.7	6,620.7	6,750.8
<b>Southeast EOHHS Region</b>	37,251	6,704.8	6,636.7	6,772.9
<b>Boston EOHHS Region</b>	14,952	6,148.7	6,050.2	6,247.3
<b>Massachusetts</b>	167,205	6,523.7	6,492.4	6,554.9

### Three-year Average Annual Age-adjusted Rate of Unintentional Fall-Related Events by Executive Office of Health and Human Services (EOHHS) Regions

Massachusetts Residents Ages 65+ Years, 2003-2005

Location	EOHHS Regions			
	Count	Age-adjusted Fall Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Western EOHHS Region</b>	22,367	5,826.2	5,749.8	5,902.6
<b>Central EOHHS Region</b>	18,560	5,829.8	5,745.9	5,913.7
<b>Northeast EOHHS Region</b>	33,552	6,417.5	6,348.8	6,486.2
<b>Metro West EOHHS Region</b>	40,532	6,382.8	6,320.7	6,444.9
<b>Southeast EOHHS Region</b>	37,251	6,404.8	6,339.8	6,469.8
<b>Boston EOHHS Region</b>	14,952	5,889.3	5,794.9	5,983.7
<b>Massachusetts</b>	167,205	6,050.3	6,021.3	6,079.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy

**Section 2: Corresponding to data on Map 2.2, 2.3, and 2.7.**

**Three-year Average Annual Crude Rate of Unintentional Fall-Related Events among Select Cities (Fall Injury-event Rate At Least 1.5x Higher than MA Rate)**

Massachusetts Residents Ages 65+ Years, 2003-2005

Crude Rate with 95% C.I.				
Location	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Alford</b>	22	11,556.1	6,727.1	16,385.1
<b>Edgartown</b>	206	14,061.4	12,141.2	15,981.6
<b>Florida</b>	35	12,792.0	8,554.0	17,030.0
<b>Lenox</b>	430	11,366.6	10,292.2	12,441.0
<b>Leyden</b>	25	13,483.9	8,198.2	18,769.6
<b>Montgomery</b>	23	10,513.5	6,216.8	14,810.2
<b>Nantucket</b>	330	10,433.1	9,307.4	11,558.8
<b>Plympton</b>	56	10,237.7	7,556.3	12,919.1
<b>Shelburne</b>	132	10,784.3	8,944.5	12,624.1
<b>Tisbury</b>	266	12,660.6	11,139.1	14,182.1
<b>Wales</b>	40	10,610.1	7,322.0	13,898.2
<b>Massachusetts</b>	167,205	6,524.0	6,492.7	6,555.3

**Three-year Average Annual Age-adjusted Rate of Unintentional Fall-Related Events among Select Cities (Fall Injury-event Rate At Least 1.5x Higher than MA Rate)**

Massachusetts Residents Ages 65+ Years, 2003-2005

Age-adjusted Rate with 95% C.I.				
Location	Count	Age-adjusted Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>Alford</b>	22	10,852.4	6,317.5	15,387.3
<b>Edgartown</b>	206	15,180.5	13,107.5	17,253.5
<b>Florida</b>	35	16,094.7	10,762.5	21,426.9
<b>Lenox</b>	430	8,724.9	7,900.2	9,549.6
<b>Leyden</b>	25	13,192.3	8,020.9	18,363.7
<b>Montgomery</b>	23	12,853.1	7,600.2	18,106.0
<b>Nantucket</b>	330	10,735.3	9,577.0	11,893.6
<b>Plympton</b>	56	10,224.9	7,546.8	12,903.0
<b>Shelburne</b>	132	9,267.5	7,686.5	10,848.5
<b>Tisbury</b>	266	11,467.5	10,089.4	12,845.6
<b>Wales</b>	40	11,728.2	8,093.6	15,362.8
<b>Massachusetts</b>	167,205	6,050.3	6,021.3	6,079.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy



## Section 2: Corresponding to Map 2.2.

### Three-year Average Annual Rate of Unintentional Fall-Related Events by City/Town of Residence in the Executive Office of Health and Human Service (EOHHS) Western Region Massachusetts Residents Ages 65+ Years, 2003-2005

City/Town	Western EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
ADAMS	361	6,913.1	6,199.9	7,626.2
AGAWAM	979	6,932.0	6,497.7	7,366.2
ALFORD	22	11,556.1	7,242.1	17,496.1
AMHERST	409	6,148.5	5,552.4	6,744.5
ASHFIELD	21	3,343.9	2,070.0	5,111.6
ATHOL	132	2,262.6	1,876.2	2,648.9
BECKET	--	--	--	--
BELCHERTOWN	191	5,158.0	4,426.5	5,889.5
BERNARDSTON	47	4,541.1	3,336.6	6,038.7
BLANDFORD	--	--	--	--
BUCKLAND	--	--	--	--
CHARLEMONT	22	4,929.5	3,089.3	7,463.3
CHESHIRE	66	4,634.8	3,584.6	5,896.7
CHESTER	34	7,798.2	5,400.5	10,897.2
CHESTERFIELD	--	--	--	--
CHICOPEE	1,531	5,507.4	5,231.5	5,783.3
CLARKSBURG	78	9,609.8	7,596.2	11,993.5
COLRAIN	33	4,955.0	3,410.7	6,958.6
CONWAY	--	--	--	--
CUMMINGTON	--	--	--	--
DALTON	320	9,461.9	8,425.1	10,498.6
DEERFIELD	136	7,173.0	5,967.4	8,378.6
EAST LONGMEADOW	544	6,653.6	6,094.5	7,212.8
EASTHAMPTON	389	5,633.3	5,073.7	6,192.9
EGREMONT	30	3,758.0	2,535.5	5,364.7
ERVING	27	4,411.8	2,907.4	6,418.9
FLORIDA	35	12,792.0	8,910.1	17,790.6
GILL	50	9,553.2	7,090.6	12,594.8
GOSHEN	--	--	--	--
GRANBY	103	4,620.9	3,728.5	5,513.3
GRANVILLE	25	4,879.0	3,157.4	7,202.3
GREAT BARRINGTON	322	7,749.0	6,902.3	8,595.8
GREENFIELD	637	6,948.0	6,408.4	7,487.6
HADLEY	221	7,576.3	6,577.4	8,575.2
HAMPDEN	112	5,455.4	4,445.1	6,465.8
HANCOCK	--	--	--	--
HATFIELD	92	5,538.8	4,465.1	6,792.9
HAWLEY	--	--	--	--
HEATH	--	--	--	--
HINSDALE	36	5,932.5	4,155.0	8,213.0
HOLYOKE	1,289	7,183.9	6,791.7	7,576.0

City/Town	Western EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
HUNTINGTON	47	7,253.1	5,329.3	9,645.1
LANESBOROUGH	51	4,446.4	3,310.6	5,846.2
LEE	223	7,639.6	6,636.9	8,642.3
LENOX	430	11,366.6	10,292.3	12,441.0
LEVERETT	23	3,986.1	2,526.9	5,981.2
LEYDEN	25	13,483.9	8,726.1	19,904.9
LONGMEADOW	501	6,099.3	5,565.2	6,633.4
LUDLOW	479	5,153.3	4,691.8	5,614.8
MIDDLEFIELD	--	--	--	--
MONROE	--	--	--	--
MONSON	175	6,345.2	5,405.1	7,285.3
MONTAGUE	204	5,098.8	4,398.7	5,799.0
MONTEREY	--	--	--	--
MONTGOMERY	23	10,513.5	6,664.6	15,775.4
MOUNT WASHINGTON	--	--	--	--
NEW ASHFORD	--	--	--	--
NEW MARLBOROUGH	47	7,254.7	5,330.4	9,647.2
NEW SALEM	--	--	--	--
NORTH ADAMS	548	7,091.8	6,497.8	7,685.8
NORTHAMPTON	925	7,668.1	7,173.9	8,162.2
NORTHFIELD	69	5,551.1	4,319.1	7,025.2
ORANGE	75	2,373.0	1,866.5	2,974.5
OTIS	37	6,368.3	4,483.9	8,777.9
PALMER	424	7,203.5	6,517.9	7,889.2
PELHAM	29	5,646.7	3,781.7	8,109.6
PERU	--	--	--	--
PETERSHAM	--	--	--	--
PHILLIPSTON	--	--	--	--
PITTSFIELD	1,985	8,108.0	7,751.3	8,464.7
PLAINFIELD	--	--	--	--
RICHMOND	27	3,638.8	2,398.0	5,294.3
ROWE	--	--	--	--
ROYALSTON	25	6,552.6	4,240.5	9,673.0
RUSSELL	32	6,438.6	4,404.0	9,089.4
SANDISFIELD	--	--	--	--
SAVOY	--	--	--	--
SHEFFIELD	66	4,201.1	3,249.2	5,344.9
SHELBURNE	132	10,784.3	8,944.6	12,624.1
SHUTESBURY	--	--	--	--
SOUTH HADLEY	512	5,711.7	5,217.0	6,206.5
SOUTHAMPTON	91	5,185.2	4,174.8	6,366.3
SOUTHWICK	263	8,147.5	7,162.8	9,132.2
SPRINGFIELD	2,968	5,402.1	5,207.7	5,596.4
STOCKBRIDGE	59	3,962.4	3,016.4	5,111.2
SUNDERLAND	54	6,286.4	4,722.5	8,202.3
TOLLAND	--	--	--	--

City/Town	Western EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
TYRINGHAM	--	--	--	--
WARE	281	6,118.0	5,402.7	6,833.3
WARWICK	--	--	--	--
WASHINGTON	--	--	--	--
WENDELL	--	--	--	--
WEST SPRINGFIELD	701	5,427.4	5,025.6	5,829.2
WEST STOCKBRIDGE	30	4,116.9	2,777.7	5,877.1
WESTFIELD	1,201	7,436.7	7,016.1	7,857.4
WESTHAMPTON	39	8,926.3	6,347.5	12,202.5
WHATELY	20	3,448.3	2,106.3	5,325.6
WILBRAHAM	408	5,915.6	5,341.6	6,489.6
WILLIAMSBURG	62	6,438.2	4,936.1	8,253.5
WILLIAMSTOWN	443	9,355.9	8,484.6	10,227.1
WINDSOR	--	--	--	--
WORTHINGTON	22	5,022.8	3,147.8	7,604.6
Western EOHHS Region Total	22,367	6,287.2	6,204.8	6,369.6
Massachusetts Total	167,214	6,524.0	6,492.8	6,555.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Map 2.3.

### Three-year Average Annual Rate of Unintentional Fall-Related Events by City/Town of Residence in the Executive Office of Health and Human Service (EOHHS) Central Region Massachusetts Residents Ages 65+ Years, 2003-2005

City/Town	Central EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
ASHBURNHAM	81	5,450.9	4,328.8	6,774.9
ASHBY	51	6,100.5	4,542.2	8,021.0
AUBURN	492	5,764.5	5,255.1	6,273.9
AYER	184	6,901.7	5,904.5	7,899.0
BARRE	80	4,079.6	3,234.8	5,077.4
BELLINGHAM	196	4,352.7	3,743.3	4,962.0
BERLIN	62	6,602.8	5,062.3	8,464.4
BLACKSTONE	62	2,357.4	1,807.4	3,022.1
BOLTON	56	7,301.2	5,515.2	9,481.2
BOYLSTON	66	4,551.7	3,520.3	5,790.9
BRIMFIELD	76	6,568.7	5,175.4	8,221.7
BROOKFIELD	79	6,638.7	5,255.9	8,273.8
CHARLTON	153	5,450.7	4,587.0	6,314.4
CLINTON	434	7,311.3	6,623.4	7,999.2
DOUGLAS	78	4,434.3	3,505.2	5,534.3
DUDLEY	232	5,891.3	5,133.2	6,649.4
EAST BROOKFIELD	47	5,774.0	4,242.5	7,678.1
FITCHBURG	1,147	6,998.2	6,593.2	7,403.2
FRANKLIN	453	6,062.6	5,504.3	6,620.9
GARDNER	659	6,823.4	6,302.4	7,344.3
GRAFTON	218	4,153.2	3,601.8	4,704.5
GROTON	172	7,828.9	6,658.8	8,998.9
HARDWICK	65	6,190.5	4,777.7	7,890.3
HARVARD	83	6,399.4	5,097.0	7,933.0
HOLDEN	316	4,675.2	4,159.8	5,190.7
HOLLAND	28	4,487.2	2,981.7	6,485.2
HOPEDALE	210	7,500.0	6,485.6	8,514.4
HUBBARDSTON	43	5,011.7	3,626.9	6,750.6
LANCASTER	179	9,426.0	8,045.1	10,806.9
LEICESTER	178	4,598.3	3,922.8	5,273.8
LEOMINSTER	1,248	7,699.4	7,272.2	8,126.6
LUNENBURG	176	5,146.2	4,385.9	5,906.5
MEDWAY	185	5,240.8	4,485.6	5,996.0
MENDON	84	6,025.8	4,806.4	7,460.4
MILFORD	712	6,994.1	6,480.4	7,507.9
MILLBURY	309	4,982.3	4,426.7	5,537.8
MILLVILLE	29	4,227.4	2,831.2	6,071.3
NEW BRAINTREE	--	--	--	--
NORTH BROOKFIELD	99	5,549.3	4,510.2	6,756.1
NORTHBRIDGE	311	5,486.9	4,877.1	6,096.8
OAKHAM	--	--	--	--

City/Town	Central EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
OXFORD	235	5,361.6	4,676.1	6,047.1
PAXTON	93	4,986.6	4,024.8	6,108.9
PEPPERELL	176	6,816.4	5,809.4	7,823.5
PRINCETON	30	3,550.3	2,395.4	5,068.3
RUTLAND	73	4,517.3	3,540.9	5,679.9
SHIRLEY	107	5,232.3	4,240.9	6,223.7
SHREWSBURY	700	5,496.2	5,089.1	5,903.4
SOUTHBRIDGE	529	7,094.0	6,489.5	7,698.5
SPENCER	189	4,453.3	3,818.4	5,088.3
STERLING	183	9,186.7	7,855.7	10,517.8
STURBRIDGE	196	5,898.3	5,072.5	6,724.0
SUTTON	78	3,757.2	2,969.9	4,689.2
TEMPLETON	180	6,612.8	5,646.7	7,578.8
TOWNSEND	113	5,969.4	4,868.7	7,070.0
UPTON	146	8,405.3	7,041.9	9,768.7
UXBRIDGE	255	7,265.0	6,373.3	8,156.7
WALES	40	10,610.1	7,579.9	14,448.0
WARREN	98	5,179.7	4,205.1	6,312.4
WEBSTER	701	8,624.5	7,986.1	9,263.0
WEST BOYLSTON	158	4,973.2	4,197.8	5,748.7
WEST BROOKFIELD	146	6,013.2	5,037.8	6,988.6
WESTMINSTER	131	5,776.0	4,786.9	6,765.1
WINCHENDON	175	5,777.5	4,921.5	6,633.5
WORCESTER	4,470	6,413.5	6,225.5	6,601.5
Central EOHHS Region Total	18,560	6,201.7	6,112.5	6,290.9
Massachusetts Total	167,214	6,524.0	6,492.8	6,555.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Map 2.4.

### Three-year Average Annual Rate of Unintentional Fall-Related Events by City/Town of Residence in the Executive Office of Health and Human Service (EOHHS) Metro West Region

Massachusetts Residents Ages 65+ Years, 2003-2005

City/Town	Metro West EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
ACTON	382	7,499.0	6,747.0	8,251.0
ARLINGTON	1,149	5,445.0	5,130.1	5,759.8
ASHLAND	244	5,401.8	4,724.0	6,079.6
BEDFORD	398	5,762.3	5,196.2	6,328.4
BELMONT	676	5,674.5	5,246.7	6,102.2
BOXBOROUGH	28	3,927.1	2,609.5	5,675.7
BRAINTREE	1,281	7,063.3	6,676.5	7,450.1
BURLINGTON	567	6,129.1	5,624.6	6,633.6
CAMBRIDGE	1,710	6,067.3	5,779.7	6,354.8
CANTON	755	7,023.9	6,522.9	7,524.9
CARLISLE	65	5,489.9	4,237.0	6,997.3
COHASSET	267	8,113.0	7,139.9	9,086.2
CONCORD	678	8,162.8	7,548.3	8,777.2
DEDHAM	839	7,274.8	6,782.5	7,767.0
DOVER	113	6,121.3	4,992.7	7,250.0
FOXBOROUGH	331	5,755.5	5,135.5	6,375.6
FRAMINGHAM	2,027	7,938.1	7,592.5	8,283.7
HINGHAM	648	7,221.7	6,665.6	7,777.7
HOLLISTON	261	7,090.5	6,230.2	7,950.7
HOPKINTON	210	7,128.3	6,164.2	8,092.4
HUDSON	409	5,975.2	5,396.1	6,554.3
HULL	210	5,112.0	4,420.6	5,803.4
LEXINGTON	812	4,772.3	4,444.0	5,100.5
LINCOLN	172	6,532.5	5,556.2	7,508.7
LITTLETON	194	6,308.9	5,421.1	7,196.7
MARLBOROUGH	1,193	9,087.4	8,571.8	9,603.1
MAYNARD	235	6,131.0	5,347.1	6,914.9
MEDFIELD	198	5,864.9	5,048.0	6,681.9
MILLIS	138	6,241.5	5,200.1	7,282.9
MILTON	1,007	8,222.4	7,714.6	8,730.3
NATICK	1,045	7,520.7	7,064.7	7,976.7
NEEDHAM	1,173	7,656.2	7,218.0	8,094.3
NEWTON	2,721	7,156.8	6,887.9	7,425.7
NORFOLK	93	5,612.6	4,530.1	6,875.8
NORTHBOROUGH	255	6,381.4	5,598.1	7,164.6
NORWELL	255	6,416.7	5,629.1	7,204.3
NORWOOD	1,116	7,534.9	7,092.9	7,977.0
PLAINVILLE	157	5,514.6	4,652.0	6,377.2
QUINCY	3,393	7,903.0	7,637.1	8,168.9
RANDOLPH	777	6,302.7	5,859.6	6,745.9

City/Town	Metro West EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
SCITUATE	420	4,998.8	4,520.7	5,476.9
SHARON	374	6,785.2	6,097.5	7,472.9
SHERBORN	68	4,815.9	3,739.7	6,105.3
SOMERVILLE	1,577	6,543.0	6,220.1	6,866.0
SOUTHBOROUGH	139	6,298.1	5,251.1	7,345.2
STOW	98	6,511.6	5,286.5	7,935.6
SUDBURY	395	7,865.4	7,089.7	8,641.1
WALPOLE	642	6,470.5	5,969.9	6,971.0
WALTHAM	1,326	5,700.0	5,393.2	6,006.8
WATERTOWN	952	5,719.4	5,356.1	6,082.8
WAYLAND	411	7,433.5	6,714.9	8,152.2
WELLESLEY	629	5,721.8	5,274.7	6,169.0
WESTBOROUGH	507	8,064.3	7,362.3	8,766.2
WESTON	415	7,218.6	6,524.1	7,913.2
WESTWOOD	499	6,190.3	5,647.2	6,733.4
WEYMOUTH	1,562	6,313.4	6,000.3	6,626.5
WILMINGTON	357	5,070.3	4,544.3	5,596.3
WINCHESTER	646	5,926.1	5,469.1	6,383.1
WOBURN	1,004	5,846.7	5,485.1	6,208.4
WRENTHAM	329	8,418.6	7,508.9	9,328.3
Metro West EOHHS Region Total	40,532	6,685.7	6,620.7	6,750.8
Massachusetts Total	167,214	6,524.0	6,492.8	6,555.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Map 2.5.

### Three-year Average Annual Rate of Unintentional Fall-Related Events by City/Town of Residence in the Executive Office of Health and Human Service (EOHHS) Northeast Region

Massachusetts Residents Ages 65+ Years, 2003-2005

City/Town	Northeast EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
AMESBURY	398	6,624.5	5,973.7	7,275.3
ANDOVER	766	6,448.4	5,991.7	6,905.0
BEVERLY	1,421	7,608.3	7,212.7	8,003.9
BILLERICA	562	5,653.9	5,186.5	6,121.4
BOXFORD	100	4,448.4	3,576.5	5,320.3
CHELMSFORD	941	7,152.6	6,695.6	7,609.6
DANVERS	1,111	8,494.5	7,995.0	8,994.0
DRACUT	546	5,457.8	5,000.0	5,915.6
DUNSTABLE	32	5,079.4	3,474.3	7,170.5
ESSEX	68	5,097.5	3,958.4	6,462.2

City/Town	Northeast EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
EVERETT	1,085	6,628.8	6,234.4	7,023.2
GEORGETOWN	131	5,892.9	4,883.8	6,902.1
GLOUCESTER	1,054	7,448.8	6,999.1	7,898.5
GROVELAND	148	7,554.9	6,337.7	8,772.0
HAMILTON	129	5,048.9	4,177.6	5,920.2
HAVERHILL	1,788	7,801.7	7,440.1	8,163.4
IPSWICH	346	5,602.3	5,012.0	6,192.7
LAWRENCE	1,248	6,029.9	5,695.3	6,364.4
LOWELL	2,343	7,091.8	6,804.7	7,379.0
LYNN	2,089	6,503.5	6,224.6	6,782.4
LYNNFIELD	323	5,506.3	4,905.8	6,106.8
MALDEN	1,421	6,211.2	5,888.3	6,534.2
MANCHESTER	121	4,719.2	3,878.3	5,560.1
MARBLEHEAD	503	5,343.7	4,876.7	5,810.7
MEDFORD	1,993	7,042.9	6,733.7	7,352.1
MELROSE	918	6,927.3	6,479.1	7,375.4
MERRIMAC	134	6,454.7	5,361.8	7,547.6
METHUEN	1,209	6,027.5	5,687.8	6,367.3
MIDDLETON	101	4,004.8	3,223.7	4,785.8
NAHANT	106	5,062.1	4,098.4	6,025.8
NEWBURY	134	6,127.1	5,089.7	7,164.5
NEWBURYPORT	666	9,076.0	8,386.7	9,765.4
NORTH ANDOVER	684	6,259.2	5,790.1	6,728.2
NORTH READING	220	5,041.2	4,375.1	5,707.4
PEABODY	1,926	7,456.7	7,123.7	7,789.8
READING	591	5,925.4	5,447.7	6,403.1
ROCKPORT	344	7,367.7	6,589.2	8,146.3
ROWLEY	94	5,838.5	4,718.1	7,144.9
SALEM	1,174	6,833.1	6,442.3	7,224.0
SALISBURY	185	6,489.0	5,553.9	7,424.0
SAUGUS	876	6,314.9	5,896.7	6,733.1
STONEHAM	846	6,946.4	6,478.3	7,414.5
SWAMPSCOTT	484	6,293.9	5,733.2	6,854.6
TEWKSBURY	649	6,440.4	5,944.9	6,935.9
TOPSFIELD	169	5,971.7	5,071.4	6,872.1
TYNGSBOROUGH	122	5,365.0	4,413.0	6,317.0
WAKEFIELD	754	6,656.1	6,181.0	7,131.2
WENHAM	112	5,900.9	4,808.1	6,993.8
WEST NEWBURY	75	6,720.4	5,286.0	8,424.1
WESTFORD	312	6,725.6	5,979.3	7,471.9
Northeast EOHHS Region Total	33,552	6,670.2	6,598.8	6,741.6
Massachusetts Total	167,214	6,524.0	6,492.8	6,555.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy



**Section 2: Corresponding to Map 2.6.**

**Three-year Average Annual Rate of Unintentional Fall-Related Events by City/Town of Residence in the Executive Office of Health and Human Service (EOHHS) Boston Region**  
Massachusetts Residents Ages 65+ Years, 2003-2005

City/Town	Boston EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
BOSTON	10,727	5,931.8	5,819.6	6,044.1
BROOKLINE	1,403	6,683.5	6,333.8	7,033.1
CHELSEA	837	7,629.2	7,112.3	8,146.1
REVERE	1,458	6,622.8	6,282.8	6,962.7
WINTHROP	526	6,305.4	5,766.6	6,844.3
Boston EOHHS Region Total	14,952	6,148.7	6,050.2	6,247.3
Massachusetts Total	167,214	6,524.0	6,492.8	6,555.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy

## Section 2: Corresponding to Map 2.7.

### Three-year Average Annual Rate of Unintentional Fall-Related Events by City/Town of Residence in the Executive Office of Health and Human Service (EOHHS) Southeast Region

Massachusetts Residents Ages 65+ Years, 2003-2005

City/Town	Southeast EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
ABINGTON	317	5,240.5	4,663.6	5,817.4
ACUSHNET	211	4,669.2	4,039.2	5,299.2
AQUINNAH	14	14,285.7	7,810.1	23,969.0
ATTLEBORO	1,178	7,315.0	6,897.2	7,732.7
AVON	123	5,491.1	4,520.6	6,461.5
BARNSTABLE	1,902	6,606.5	6,309.6	6,903.4
BERKLEY	65	5,508.5	4,251.3	7,021.0
BOURNE	732	7,307.6	6,778.2	7,837.0
BREWSTER	443	5,379.5	4,878.5	5,880.4
BRIDGEWATER	305	4,647.3	4,125.7	5,168.8
BROCKTON	2,254	7,035.4	6,744.9	7,325.8
CARVER	331	6,374.0	5,687.3	7,060.6
CHATHAM	346	4,923.2	4,404.4	5,441.9
CHILMARK	45	8,653.8	6,312.2	11,579.5
DARTMOUTH	839	5,988.2	5,583.0	6,393.4
DENNIS	857	6,344.4	5,919.6	6,769.2
DIGHTON	180	7,269.8	6,207.7	8,331.8
DUXBURY	458	8,543.2	7,760.8	9,325.6
EAST BRIDGEWATER	232	5,470.4	4,766.5	6,174.3
EASTHAM	194	4,529.5	3,892.1	5,166.9
EASTON	377	6,060.1	5,448.4	6,671.9
EDGARTOWN	206	14,061.4	12,141.2	15,981.7
FAIRHAVEN	687	7,337.4	6,788.7	7,886.1
FALL RIVER	3,723	8,284.6	8,018.4	8,550.7
FALMOUTH	1,976	8,790.8	8,403.2	9,178.4
FREETOWN	112	4,848.5	3,950.5	5,746.4
GOSNOLD	0	--	--	--
HALIFAX	167	5,495.2	4,661.8	6,328.7
HANOVER	225	5,074.4	4,411.4	5,737.5
HANSON	139	5,344.1	4,455.7	6,232.5
HARWICH	599	5,237.8	4,818.4	5,657.3
HOLBROOK	246	4,795.3	4,196.1	5,394.6
KINGSTON	474	9,154.1	8,330.0	9,978.2
LAKEVILLE	164	4,472.3	3,787.8	5,156.8
MANSFIELD	284	6,643.3	5,870.6	7,415.9
MARION	173	6,057.4	5,154.8	6,960.1
MARSHFIELD	461	6,437.6	5,850.0	7,025.3
MASHPEE	461	5,946.1	5,403.3	6,488.9
MATTAPOISETT	182	5,588.0	4,776.1	6,399.8
MIDDLEBOROUGH	466	6,974.0	6,340.8	7,607.2

City/Town	Southeast EOHHS Region			
	Count	Fall-Event Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
NANTUCKET	330	10,433.1	9,307.5	11,558.8
NEW BEDFORD	2,559	5,763.5	5,540.2	5,986.8
NORTH ATTLEBORO	499	6,329.3	5,773.9	6,884.6
NORTON	343	7,872.4	7,039.3	8,705.5
OAK BLUFFS	162	9,563.2	8,090.5	11,035.8
ORLEANS	318	4,572.9	4,070.3	5,075.5
PEMBROKE	250	5,520.0	4,835.7	6,204.2
PLYMOUTH	1,716	9,177.9	8,743.7	9,612.2
PLYMPTON	56	10,237.7	7,733.4	13,294.4
PROVINCETOWN	78	4,295.2	3,395.1	5,360.6
RAYNHAM	353	7,195.3	6,444.7	7,945.9
REHOBOTH	146	4,573.9	3,832.0	5,315.9
ROCHESTER	60	4,615.4	3,522.0	5,940.9
ROCKLAND	431	6,158.9	5,577.4	6,740.4
SANDWICH	482	5,582.6	5,084.2	6,081.0
SEEKONK	89	1,668.9	1,340.2	2,053.7
SOMERSET	799	7,013.1	6,526.8	7,499.4
STOUGHTON	770	6,470.6	6,013.5	6,927.6
SWANSEA	425	5,753.4	5,206.4	6,300.3
TAUNTON	1,566	7,457.1	7,087.8	7,826.5
TISBURY	266	12,660.6	11,139.1	14,182.1
TRURO	48	4,359.7	3,214.5	5,780.3
WAREHAM	774	7,515.3	6,985.8	8,044.8
WELLFLEET	109	5,979.2	4,856.7	7,101.6
WEST BRIDGEWATER	265	7,173.8	6,310.1	8,037.5
WEST TISBURY	44	5,418.7	3,937.2	7,274.4
WESTPORT	361	5,794.5	5,196.8	6,392.3
WHITMAN	234	5,607.5	4,889.0	6,326.0
YARMOUTH	1,570	6,967.2	6,622.6	7,311.9
Southeast EOHHS Region Total	37,251	6,704.8	6,636.7	6,772.9
Massachusetts Total	167,214	6,524.0	6,492.8	6,555.3

Data Sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Observation Stay and Emergency Department Discharge Databases, Massachusetts Health Care Finance and Policy

#### Section 4: Corresponding with Figure 4.1:

##### Crude Unintentional Fall Death Rate Associated with Traumatic Brain Injury

Massachusetts Residents Ages 65+ Years, 2000-2006

TBI-Associated Fall				
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	106	12.3	10.0	14.6
2001	131	15.4	12.8	18.0
2002	121	14.1	11.6	16.6
2003	128	15.0	12.4	17.6
2004	135	15.9	13.2	18.6
2005	141	16.5	13.8	19.2
2006	186	21.7	18.6	24.8

##### Crude Unintentional Fall Death Rate Associated with a Hip Fracture

Massachusetts Residents Ages 65+ Years, 2000-2006

Hip Fracture-Associated Fall				
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	6	0.7	0.1	1.3
2001	11	1.3	0.5	2.1
2002	11	1.3	0.5	2.1
2003	12	1.4	0.6	2.2
2004	12	1.4	0.6	2.2
2005	19	2.2	1.2	3.2
2006	68	7.9	6.0	9.8

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics,  
Massachusetts Department of Public Health

#### Section 4: Corresponding with Figure 4.2.

##### Unintentional Fall Death Rate Associated with Traumatic Brain Injuries by Age Group

Massachusetts Residents Ages 65-69 Years, 2000-2006

65-69				
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	12	5.6	2.4	8.8
2001	9	4.2	1.5	6.9
2002	13	6.1	2.8	9.4
2003	6	2.8	0.6	5.0
2004	13	6.0	2.7	9.3
2005	7	3.2	0.8	5.6
2006	12	5.5	2.4	8.6

**Section 4: Corresponding with Figure 4.2. (continued)****Unintentional Fall Death Rate Associated with Traumatic Brain Injuries by Age Group**

Massachusetts Residents Ages 70-74 Years, 2000-2006

	70-74			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	8	3.8	1.2	6.4
2001	13	6.3	2.9	9.7
2002	9	4.4	1.5	7.3
2003	10	5.0	1.9	8.1
2004	13	6.7	3.1	10.3
2005	13	6.8	3.1	10.5
2006	23	12.1	7.2	17.0

**Unintentional Fall Death Rate Associated with Traumatic Brain Injuries by Age Group**

Massachusetts Residents Ages 75-79 Years, 2000-2006

	75-79			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	20	10.8	6.1	15.5
2001	26	14.2	8.7	19.7
2002	27	14.8	9.2	20.4
2003	20	11.0	6.2	15.8
2004	20	11.3	6.3	16.3
2005	24	13.7	8.2	19.2
2006	31	18.0	11.7	24.3

**Unintentional Fall Death Rate Associated with Traumatic Brain Injuries by Age Group**

Massachusetts Residents Ages 80-84 Years, 2000-2006

	80-84			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	20	15.2	8.5	21.9
2001	34	25.3	16.8	33.8
2002	24	17.6	10.6	24.6
2003	31	22.6	14.6	30.6
2004	27	19.4	12.1	26.7
2005	34	24.5	16.3	32.7
2006	37	26.9	18.2	35.6

#### Section 4: Corresponding with Figure 4.2. (continued)

##### Unintentional Fall Death Rate Associated with Traumatic Brain Injuries by Age Group

Massachusetts Residents Ages 85+ Years, 2000-2006

	85+			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	46	39.1	27.8	50.4
2001	49	40.6	29.2	52.0
2002	48	39.0	28.0	50.0
2003	61	48.0	36.0	60.0
2004	62	48.0	36.1	59.9
2005	63	47.2	35.5	58.9
2006	83	60.6	47.6	73.6

Data Source: CY2000-2006 Massachusetts Registry of Vital Records and Statistics,  
Massachusetts Department of Public Health

#### Section 4: Corresponding to Figure 4.3.

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 65+ Years, 2000 – 2006

	Overall 65+			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	1,173	136.2	128.4	144.0
2001	1,221	142.2	134.2	150.2
2002	1,273	149.1	140.9	157.3
2003	1,615	189.8	180.5	199.1
2004	1,826	215.7	205.8	225.6
2005	1,779	210.8	201.0	220.6
2006	2,076	242.5	232.1	252.9

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 65-69 Years, 2000 – 2006

	65-69			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	112	51.7	42.1	61.3
2001	115	54.4	44.5	64.3
2002	124	59.7	49.2	70.2
2003	125	60.9	50.2	71.6
2004	157	76.1	64.2	88.0
2005	148	72.1	60.5	83.7
2006	157	71.3	60.1	82.5

#### Section 4: Corresponding to Figure 4.3. (continued)

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 70-74 Years, 2000 – 2006

	70-74			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	143	67.7	56.6	78.8
2001	145	70.2	58.8	81.6
2002	147	72.9	61.1	84.7
2003	232	118.2	103.0	133.4
2004	218	115.3	100.0	130.6
2005	221	119.6	103.8	135.4
2006	251	132.4	116.0	148.8

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 75-79 Years, 2000 – 2006

	75-79			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	212	114.6	99.2	130.0
2001	240	129.9	113.5	146.3
2002	251	135.9	119.1	152.7
2003	303	165.4	146.8	184.0
2004	358	199.9	179.2	220.6
2005	327	184.9	164.9	204.9
2006	377	219.4	197.3	241.5

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 80-84 Years, 2000 – 2006

	80-84			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	269	205.8	181.2	230.4
2001	286	211.9	187.3	236.5
2002	288	210.3	186.0	234.6
2003	348	250.4	224.1	276.7
2004	426	298.5	270.2	326.8
2005	398	277.1	249.9	304.3
2006	523	380.5	347.9	413.1

#### Section 4: Corresponding to Figure 4.3. (continued)

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 85-89 Years, 2000 – 2006

	85-89			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	257	339.1	297.6	380.6
2001	245	315.2	275.7	354.7
2002	271	341.9	301.2	382.6
2003	361	440.7	395.2	486.2
2004	382	458.2	412.3	504.1
2005	397	461.0	415.7	506.3
2006	436	492.7	446.5	538.9

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 90-94 Years, 2000 – 2006

	90-94			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	138	432.1	360.0	504.2
2001	139	425.2	354.5	495.9
2002	144	432.8	362.1	503.5
2003	175	509.8	434.3	585.3
2004	214	613.4	531.2	695.6
2005	204	566.9	489.1	644.7
2006	249	673.7	590.0	757.4

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Traumatic Brain Injury by Age Group

Massachusetts Residents Ages 95+ Years, 2000 – 2006

	95+			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	42	417.1	291.0	543.2
2001	51	495.8	359.7	631.9
2002	48	459.1	329.2	589.0
2003	71	659.2	505.9	812.5
2004	71	649.3	498.3	800.3
2005	84	745.7	586.2	905.2
2006	83	717.7	563.3	872.1

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy



#### Section 4: Corresponding to Figure 4.4.

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 65+ Years, 2000 – 2006

	Overall 65+			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	6,624	769.2	750.6	787.7
2001	6,291	731.4	713.3	749.4
2002	6,031	702.3	684.6	720.1
2003	5,967	695.2	677.6	712.9
2004	5,753	672.0	654.7	689.4
2005	5,526	645.3	628.3	662.4
2006	5,544	647.7	630.6	664.7

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 65-69 Years, 2000 – 2006

	65-69			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	320	148.3	132.0	164.5
2001	311	145.2	129.0	161.3
2002	265	124.2	109.3	139.2
2003	278	129.8	114.6	145.1
2004	274	126.9	111.9	141.9
2005	249	114.8	100.5	129.0
2006	273	124.0	109.3	138.7

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 70-74 Years, 2000 – 2006

	70-74			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	547	259.3	237.6	281.1
2001	566	273.0	250.5	295.4
2002	495	244.0	222.5	265.5
2003	491	246.9	225.1	268.8
2004	483	248.6	226.5	270.8
2005	466	242.7	220.7	264.8
2006	419	221.1	199.9	242.2

#### Section 4: Corresponding to Figure 4.4. (continued)

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 75-79 Years, 2000 – 2006

	75-79			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	1,123	606.6	571.1	642.1
2001	1,033	562.9	528.5	597.2
2002	1,034	565.3	530.8	599.8
2003	955	527.0	493.5	560.4
2004	939	528.2	494.4	562.0
2005	843	481.0	448.5	513.5
2006	853	496.5	463.2	529.8

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 80-84 Years, 2000 – 2006

	80-84			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	1,615	1,227.5	1,167.6	1,287.4
2001	1,547	1,151.5	1,094.1	1,208.9
2002	1,529	1,119.1	1,063.0	1,175.2
2003	1,515	1,105.2	1,049.5	1,160.9
2004	1,399	1,006.8	954.0	1,059.6
2005	1,422	1,025.0	971.7	1,078.3
2006	1,350	982.1	929.7	1,034.5

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 85-89 Years, 2000 – 2006

	85-89			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	1,693	2,014.5	1,918.5	2,110.5
2001	1,523	1,768.3	1,679.5	1,857.1
2002	1,466	1,670.7	1,585.2	1,756.2
2003	1,485	1,638.7	1,555.4	1,722.0
2004	1,473	1,597.9	1,516.3	1,679.5
2005	1,382	1,452.2	1,375.6	1,528.8
2006	1,442	1,629.4	1,545.3	1,713.5

#### Section 4: Corresponding to Figure 4.4. (continued)

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 90-94 Years, 2000 – 2006

	90-94			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	1,002	3,676.5	3,448.9	3,904.1
2001	983	3,519.4	3,299.4	3,739.4
2002	957	3,363.2	3,150.1	3,576.3
2003	923	3,140.7	2,938.1	3,343.3
2004	922	3,084.3	2,885.2	3,283.4
2005	865	2,802.8	2,616.0	2,989.6
2006	918	2,483.9	2,323.2	2,644.6

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures by Age Group

Massachusetts Residents Ages 95+ Years, 2000 – 2006

	95+			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	324	4,993.0	4,449.3	5,536.7
2001	328	4,932.1	4,398.3	5,465.9
2002	285	4,206.6	3,718.2	4,695.0
2003	320	4,573.3	4,072.2	5,074.4
2004	263	3,695.1	3,248.5	4,141.7
2005	299	4,069.0	3,607.8	4,530.2
2006	289	2,498.9	2,210.8	2,787.0

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy

#### Section 4: Corresponding to Figure 4.5.

##### Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures among Males

Massachusetts Residents Ages 65+ Years, 2000-2006

	Male			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
2000	1,412	412.6	391.0	434.1
2001	1,355	392.6	371.7	413.5
2002	1,377	398.0	377.0	419.0
2003	1,366	393.6	372.7	414.4
2004	1,324	380.9	360.4	401.4
2005	1,324	379.2	358.8	399.7
2006	1,344	384.2	363.7	404.8

#### Section 4: Corresponding to Figure 4.5. (continued)

##### **Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures among Females**

Massachusetts Residents Ages 65+ Years, 2000-2006

	Female			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	5,212	1,004.3	977.1	1,031.6
<b>2001</b>	4,936	954.7	928.1	981.4
<b>2002</b>	4,654	904.2	878.2	930.2
<b>2003</b>	4,601	896.5	870.6	922.4
<b>2004</b>	4,429	867.7	842.1	893.2
<b>2005</b>	4,202	825.2	800.3	850.2
<b>2006</b>	4,200	826.5	801.5	851.5

##### **Rate of Acute Care Hospital Stays Associated with Nonfatal Unintentional Fall-related Hip Fractures Overall**

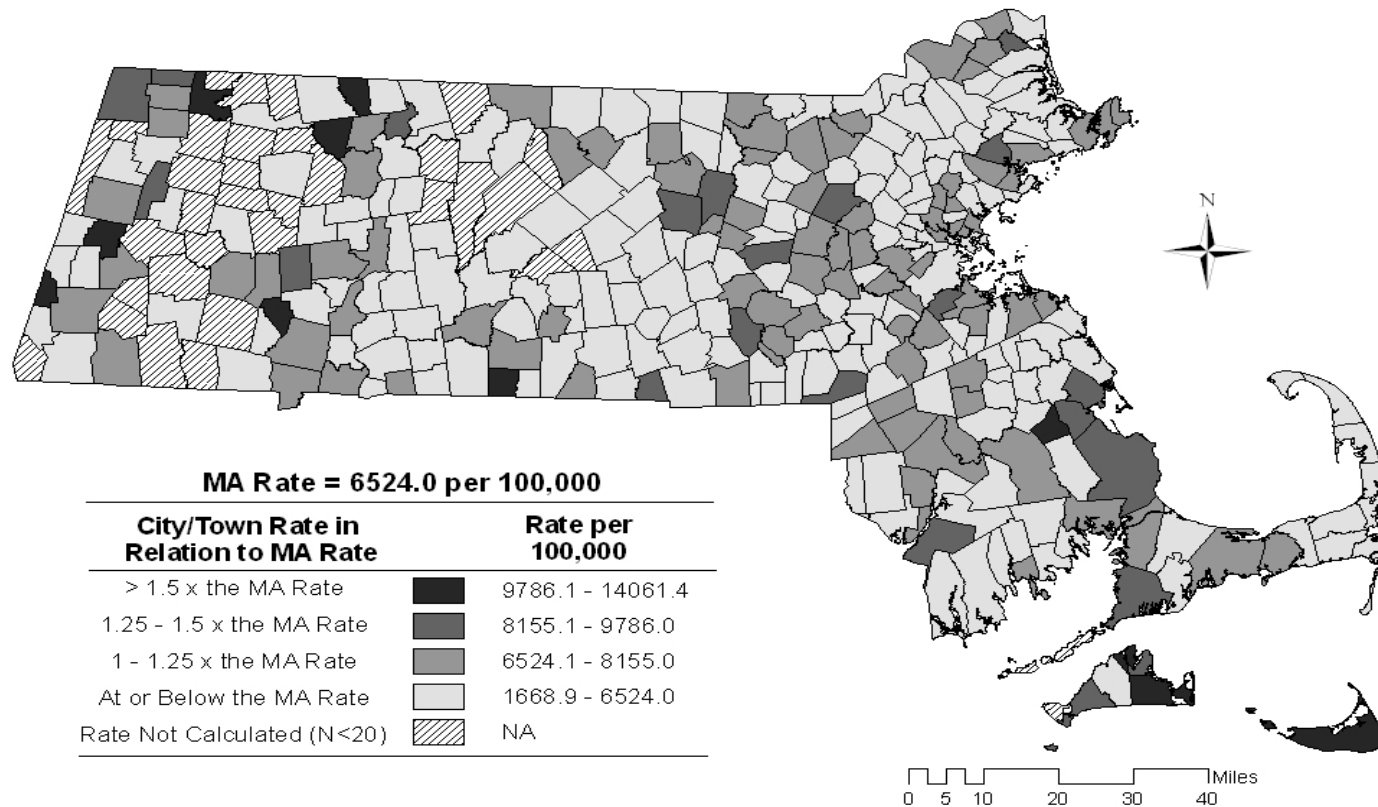
Massachusetts Residents Ages 65+ Years, 2000-2006

	Total			
Year	Count	Crude Rate per 100,000	Lower 95% C.I.	Upper 95% C.I.
<b>2000</b>	6,624	769.2	750.6	787.7
<b>2001</b>	6,291	731.4	713.3	749.4
<b>2002</b>	6,031	702.3	684.6	720.1
<b>2003</b>	5,967	695.2	677.6	712.9
<b>2004</b>	5,753	672.0	654.7	689.4
<b>2005</b>	5,526	645.3	628.3	662.4
<b>2006</b>	5,544	647.7	630.6	664.7

Data Source: FY2000-2006 Massachusetts Inpatient Hospital Discharge and Observation Stay Databases, Massachusetts Health Care Finance and Policy

## Map 2.1: Three-Year Average Annual Rate of Unintentional Fall-Related Events<sup>†</sup> by City/Town of Residence in Massachusetts

Massachusetts Residents Ages 65+ Years, 2003-2005



Data sources: CY2003-2005 Massachusetts Registry of Vital Records and Statistics, Massachusetts Department of Public Health; FY2003-2005 Massachusetts Inpatient Hospital Discharge, Outpatient Observation Stay, Emergency Department Discharge Databases, Massachusetts Division of Health Care Finance and Policy; Massachusetts Executive Office of Environmental Affairs, MassGIS

<sup>†</sup>Events include deaths, acute care hospital stays, and emergency department visits.

A stable estimate could not be calculated for 32 cities/towns in Massachusetts.

Rates are per 100,000 residents. Rates provided here are age-specific. Rates are not calculated on counts of less than five, and those based on counts less than twenty may be unstable. Population data for calculated rates are based on US Census population estimates.



## Appendix C. Massachusetts Falls Prevention Coalition Directory

<b>Name</b>	<b>Facility/Company</b>
Roger Kolakowski	All Care Resources
Diane Tonelli	Beaumont Rehabilitation & Skilled Nursing Center
Jill Krause	Beaumont Rehabilitation & Skilled Nursing Center
Karen Brennan	Beaumont Rehabilitation & Skilled Nursing Center
Kim Salmon	Beaumont Rehabilitation & Skilled Nursing Center
Susan Towles	Berkshire Healthcare Systems
Rosario Lopus	Boston Area Matter Of Balance Partnership
Jonathan Howland	Boston University
Dawn Camara	Brain Injury Association of Massachusetts
Kathleen Wigder	Cambridge Health Alliance
Amy Strong	CareTenders Home Health Agency
Jennifer Gay	Caritas Christi
Alixé Bonardi	Center for Developmental Disabilities Evaluation and Research
Tricia Farren	Center for Medicare and Medicaid Services
Lisa O'Loughlin	Community Care Connection
Gary Chu	Community Collaborations of New England Eye
Christine Carlsen	Elder Service Plan
Lisa Maffie	Elder Service Plan
Michael Cantor	Evercare- New England Region
Susan Mullaney	Evercare- New England Region
Phyllis Peacock	Falmouth Hospital
Jacqueline Marcotte	Genesis HealthCare Corp.
Stella Moran	Genesis HealthCare Corp.
Aedan Ford	Gentiva Home Health
Sean Clark	Gordon College
Terry Donovan	Hancock Park
Jean Singer	HealthBridge Management Inc.
Martha Bruce	Hebrew Rehabilitation Center - Recuperative Services Unit
Doug Kiel	Hebrew Rehabilitation Center for Aged
Robert Schreiber	Hebrew SeniorLife
Patricia Kelleher	Home Care Alliance of Massachusetts
Rigney Cunningham	Hospice & Palliative Care Federation of Massachusetts
Andrea Cohen	HouseWorks
Malka Young	Jewish Family Services of Metrowest
Helen Brown	Jewish Rehabilitation Center
Pamela Athanas	Kindred Healthcare, Inc.
Darlene Bourgeois	Lahey

<b>Name</b>	<b>Facility/Company</b>
Ellen Levinson	Life Care Center of Nashoba Valley
Dianna Veno	Life Care Centers of America, Inc.
Donna Bartlett	Mass Medline
Elissa Sherman	Massachusetts Aging Services Association
Paula Griswold	Massachusetts Coalition for the Prevention of Medical Errors
Mary Sullivan	Massachusetts College of Pharmacy and Health Sciences
Meg Robertson	Massachusetts Commission for the Blind
David Stevens	Massachusetts Councils on Aging
Sharon Oxx	Massachusetts Department of Mental Retardation
Holly Hackman	Massachusetts Department of Public Health
Jennifer Mieth	Massachusetts Department of Public Health
Linn Morrill	Massachusetts Department of Public Health
Maria McKenna	Massachusetts Department of Public Health
Lewis Howe	Massachusetts Department of Public Health
Jill Mazzola	Massachusetts Department of Public Health
Ruth Gabel	Massachusetts Department of Public Health
Sherman Lohnes	Massachusetts Department of Public Health
Timothy Macintyre	Massachusetts Department of Public Health
Anita Albright	Massachusetts Department of Public Health
Colleen McGuire	Massachusetts Department of Public Health
Beth Scheffler	Massachusetts Department of Public Health
Bill Sullivan	Massachusetts Department of Public Health
Nat Butler	Massachusetts Executive Office of Elder Affairs
Ruth Palombo	Massachusetts Executive Office of Elder Affairs
Sandy Tocman	Massachusetts Executive Office of Elder Affairs
Mary McKenna	Massachusetts Executive Office of Elder Affairs
Alice Bonner	Massachusetts Extended Care Federation
Peggi Leoni	Massachusetts Extended Care Federation
Al Norman	Massachusetts Home Care
Pat Noga	Massachusetts Organization of Nurse Executives
Michael Banville	Mass-ALFA
Kathy Foss	Masspro
Jeannie Martin	MatchUp
Kendra Grimes	MatchUp
Bency Punnose	Meadow Green Nursing & Rehab Center
Marie Giorgetti	MetroWest Medical Center/Tenet Corp.
Bette Ann Harris	MGH Institute of Health Professions
Marianne Beninato	MGH Institute of Health Professions
Patricia Sullivan	MGH Institute of Health Professions
Peg Mikkola	Minuteman Senior Services
Shirley Conway	Northeast Hospitals
Laurie Galvin	Norwell Visting Nurses Association
Kristen Crockett	Peabody Council on Aging



<b>Name</b>	<b>Facility/Company</b>
Diane O'Brien	Quabbin Valley Healthcare
Kristi Mendoza	River Terrace Health Care
Diane Connor	Senior Healthwise
Kathleen Bennett	Senior Whole Health
Kathy Farrell	Senior Whole Health
Cathy Bergeron	Soldiers Home in Holyoke
Chris Hannon	Southpointe Rehab & Skilled Care Center
Robert McMahan	SunBridge Healthcare Corp.
Paul Rousseau	Tewksbury Hospital
Leslie Worris	The Wellness Alliance
Denise Kress	Tufts Health Plan
Elaine Rousseau	Tufts Health Plan
Ellen White	Tufts Medical Center
Laura Black	UMASS Boston
Judy Borsody	UMASS Memorial Health Care
Patty MacCulloch	UMASS Memorial Health Care
Leaneore Bona	UMASS Memorial Medical Center
Mary Hudson	UMASS Worcester-Graduate School of Nursing
Paulette Seymour-Route	UMASS Worcester-Graduate School of Nursing
Constance Williams	Unicare
Wenjun Li	University of Massachusetts Medical School
Jeanne Ryan	VNA & Hospice of Cooley Dickinson, Inc.
Linda Colleton	Welch Healthcare & Retirement Group
Jonathan Fine	
Emily Shea	
Kathleen Glasco	
Kelly Allsup	
Linda Lacke	
Marietta McCarthy	
Maureen Powers	
Pat Dean	
Susan Karcz	

(last updated October 2, 2008)



## Appendix D. Location of Skilled Nursing Facilities in Massachusetts

Facility Name	City
Colony House Nursing & Rehab Center	Abington
Life Care Center of Acton	Acton
Country Estates of Agawam	Agawam
Heritage Hall East	Agawam
Heritage Hall North	Agawam
Heritage Hall South	Agawam
Heritage Hall West	Agawam
Wingate at Brighton	Allston
Amesbury Village Skilled Nursing and Rehabilitation Center	Amesbury
Harborside Healthcare - Maplewood	Amesbury
Center for Extended Care at Amherst	Amherst
Academy Manor of Andover	Andover
Wingate at Andover	Andover
Park Avenue Nursing & Rehab Center	Arlington
Quabbin Valley Healthcare	Athol
Golden Living Center- Attleboro	Attleboro
Golden Living Center- Bristol	Attleboro
Life Care Center of Attleboro	Attleboro
Life Care Center of Auburn	Auburn
Lasell House @ Lasell Village	Auburndale
Apple Valley Center	Ayer
Baldwinville Nursing Home & Rehabilitation Center	Baldwinville
Carleton-Willard Village Nursing & Rehab Center	Bedford
Belmont Manor Nursing Center	Belmont
Blueberry Hill Skilled Nursing and Rehabilitation Center	Beverly
Essex Park Nursing & Rehab Center	Beverly
Ledgewood Rehab & Skilled Nursing Center	Beverly
Life Care Center of Merrimack Valley	Billerica
New England Pediatric Care	Billerica
Blackstone Nursing Home	Blackstone
Armenian Nursing & Rehabilitation Center, Inc.	Boston
Benjamin Healthcare Center	Boston
Bostonian Nursing Care & Rehab Center	Boston
Caritas St. Elizabeth's Medical Center TCU	Boston

<b>Facility Name</b>	<b>City</b>
Don Orione Nursing Home	Boston
German Centre for Extended Care (Deutsches Altenheim)	Boston
Goddard House Skilled Nursing Center	Boston
Hancock Skilled Nursing & Rehab Center	Boston
Harborlights Rehab & Nursing Center	Boston
Hebrew Rehabilitation Center - Recuperative Services Unit	Boston
Laurel Ridge Rehab & Nursing Center	Boston
Marian Manor	Boston
North End Rehabilitation & Nursing Center	Boston
Park Place Rehabilitation and Skilled Care Center	Boston
Pond View Nursing Facility	Boston
Presentation Nursing & Rehab Center	Boston
Roscommon West Roxbury	Boston
Sherrill House	Boston
South Cove Manor	Boston
Stonehedge Convalescent Center	Boston
The Boston Center for Rehab & Subacute Care	Boston
The Boston Home	Boston
Bourne Manor Extended Care Facility	Bourne
Alliance Healthcare Center of Braintree	Braintree
Braintree Landing Skilled Nursing & Rehab Center	Braintree
Braintree Manor Rehabilitation & Nursing Ctr.	Braintree
John Scott House Rehab & Nursing Center	Braintree
EPOCH Senior Healthcare of Brewster	Brewster
Pleasant Bay Nursing & Rehab Center	Brewster
Bridgewater Nursing Home	Bridgewater
Brighton House Nursing & Rehabilitation Center	Brighton
Corey Hill Nursing Home	Brighton
Baypointe Rehab & Skilled Care Center	Brockton
Braemoor Rehabilitation & Nursing Center	Brockton
Embassy Rehabilitation & Health Center	Brockton
St. Joseph Manor Health Care	Brockton
TCU at Brockton Hospital	Brockton
The Guardian Center	Brockton
West Acres Nursing Home & Rehabilitation Center	Brockton
Brookline Health Care Center	Brookline
Coolidge House Nursing Care Center	Brookline
Cape Cod Nursing & Rehab Center	Buzzards Bay
Neville Center at Fresh Pond for Nursing & Rehab.	Cambridge

<b>Facility Name</b>	<b>City</b>
Sancta Maria Nursing Facility	Cambridge
Vernon Hall	Cambridge
Commons Residence at Orchard Cove	Canton
Hellenic Nursing & Rehabilitation Center	Canton
Tower Hill Center for Health & Rehab Center	Canton
Cape Regency, A Radius HealthCare Center	Centerville
Masonic Nursing Home, Inc.	Charlton
Liberty Commons Rehab & Skilled Care Center	Chatham
Palm Manor Nursing Center	Chelmsford
Sunny Acres Nursing & Rehab Center	Chelmsford
Chelsea Jewish Nursing Home	Chelsea
Chelsea Soldiers Home (Quigley Memorial Hospital)	Chelsea
Eastpointe Rehab & Skilled Care Center	Chelsea
Haven Healthcare Center of Chelsea	Chelsea
EPOCH Senior Healthcare of Chestnut Hill	Chestnut Hill
Birch Manor Rehabilitation & Skilled Nursing Center	Chicopee
Willimansett Center East	Chicopee
Willimansett Center West	Chicopee
Golden Living Center- Cohasset	Cohasset
Concord Health Care Center	Concord
Emerson Hospital Rehab & Trans Care Unit	Concord
Rivercrest Long Term Care Facility	Concord
Walden Rehab & Nursing Center	Concord
Craneville Place of Dalton	Dalton
Harborside - Cedar Glen	Danvers
Harborside - Danvers Twin Oaks	Danvers
Hunt Nursing & Retirement Home	Danvers
New England Homes for the Deaf	Danvers
Radius HealthCare Center at Danvers	Danvers
Brandon Woods of Dartmouth	Dartmouth
Golden Living Center- Dedham	Dedham
Highgate Manor Center for Health and Rehabilitation	Dedham
Dighton Nursing Center	Dighton
St. Joseph Rehabilitation & Nursing Center	Dorchester
Bay Path at Duxbury Rehab & Nursing Center	Duxbury
Duxbury House Alzheimer's Care Center	Duxbury
Sachem Skilled Nursing & Rehab Center	East Bridgewater
East Longmeadow Skilled Nursing Center	East Longmeadow
Redstone Rehabilitation & Nursing Center	East Longmeadow

<b>Facility Name</b>	<b>City</b>
Wingate at East Longmeadow	East Longmeadow
Southeast Rehabilitation and Skilled Care Center	Easton
Everett Nursing and Rehabilitation Center	Everett
Alden Court Nursing Care & Rehab Center	Fairhaven
Our Lady's Haven of Fairhaven	Fairhaven
Royal of Fairhaven Nursing Center	Fairhaven
Catholic Memorial Home	Fall River
Crawford Skilled Nursing & Rehab Center	Fall River
Fall River Jewish Home, Inc.	Fall River
Highland Manor Nursing Home	Fall River
Highlander Rehab & Nursing Center	Fall River
Kimwell Healthcare, LLC	Fall River
Sarah S. Brayton Nursing Care Center	Fall River
Southpointe Rehab & Skilled Care Center	Fall River
St. Anne's Hospital and TCU	Fall River
Harborside - Falmouth	Falmouth
JML Care Center	Falmouth
Royal Nursing Center	Falmouth
Golden Living Center- Fitchburg	Fitchburg
Hillcrest Nursing Center	Fitchburg
The Highlands, A Life Care Center	Fitchburg
Doolittle Home	Foxborough
Bethany Health Care Center	Framingham
Carlyle House	Framingham
Countryside Nursing Home	Framingham
Kathleen Daniel Healthcare, LLC	Framingham
Oak Knoll Healthcare Center	Framingham
Resident Care Rehabilitation & Nursing Center	Framingham
St. Patrick's Manor	Framingham
Franklin Skilled Nursing & Rehabilitation	Franklin
Leo P. LaChance Center for Rehab & Nursing	Gardner
TCC at Heywood Hospital	Gardner
Wachusett Manor Nursing Home	Gardner
Golden Living Center- Gloucester	Gloucester
Seacoast Nursing & Rehabilitation Center	Gloucester
Fairview Commons Nursing and Rehabilitation Center	Great Barrington
Great Barrington Rehab & Nursing Center	Great Barrington
Timberlyn Heights Nursing & Alzheimer's Center	Great Barrington
Buckley Healthcare Center	Greenfield

<b>Facility Name</b>	<b>City</b>
Charlene Manor Extended Care Facility	Greenfield
Poet's Seat Health Care Center	Greenfield
Seven Hills at Groton, Inc.	Groton
SunBridge Care & Rehab for Hadley	Hadley
Mary Lyon Skilled Care Center	Hampden
EPOCH Senior Healthcare of Harwich	Harwich
Baker-Katz Nursing Home	Haverhill
Hannah Duston Healthcare Center	Haverhill
Lakeview House Nursing Home	Haverhill
Penacook Place Nursing & Rehab Center	Haverhill
The Oxford	Haverhill
Wingate at Haverhill	Haverhill
Harbor House Rehab and Nursing Center	Hingham
Queen Anne Nursing Home	Hingham
Holden Rehabilitation & Nursing Center	Holden
Wachusett Extended Care Facility	Holden
Timothy Daniels House	Holliston
Geriatric Authority of Holyoke	Holyoke
Holyoke Health Care Center	Holyoke
Holyoke Medical Center TCC	Holyoke
Holyoke Rehabilitation Center	Holyoke
Loomis House Nursing Center	Holyoke
Mont Marie Health Care Center, Inc.	Holyoke
Mount Saint Vincent Care Center	Holyoke
Renaissance Manor on Cabot	Holyoke
Sisters of Providence Infirmary	Holyoke
Continuing Care at Hopedale	Hopedale
The Pavilion Skilled Nursing & Rehabilitation Center	Hyannis
Parkwell Rehabilitation & Nursing	Hyde Park
Caldwell Skilled Nursing & Rehab Center	Ipswich
Wingate at Silver Lake	Kingston
Island Terrace Nursing Home	Lakeville
River Terrace Health Care	Lancaster
MI Nursing/Restorative Center	Lawrence
SunBridge Care & Rehab-Colonial Heights	Lawrence
SunBridge Care & Rehab-Wood Mill	Lawrence
Laurel Lake Center for Health & Rehabilitation	Lee
Hampshire Care	Leeds
Linda Manor Extended Care Facility	Leeds

<b>Facility Name</b>	<b>City</b>
Kimball Farms Nursing Care Center	Lenox
Providence Care Center of Lenox	Lenox
Keystone Center	Leominster
Life Care Center of Leominster	Leominster
Brookhaven Nursing Center	Lexington
Golden Living Center- Lexington	Lexington
Lexington Health Care Center	Lexington
Pine Knoll Nursing Center	Lexington
Life Care Center of Nashoba Valley	Littleton
Julian Leavitt Family Jewish Nursing Home	Longmeadow
D'Youville Senior Care, Inc.	Lowell
Fairhaven Healthcare Center	Lowell
Heritage Manor	Lowell
Lowell Health Care Center	Lowell
Radius Northwood HealthCare Center	Lowell
SunBridge Care & Rehab-Glenwood	Lowell
Town & Country Nursing Center	Lowell
Willow Manor Genesis ElderCare	Lowell
Wingate at Lowell	Lowell
Abbott House/The Swampscott Wing	Lynn
Lawrence Manor Nursing Home	Lynn
Life Care Center of the North Shore	Lynn
Phillips Manor Nursing Home	Lynn
Golden Living Center - Dexter House	Malden
McFadden Memorial Manor	Malden
Devereux House	Marblehead
Lafayette Rehabilitation & Skilled Nursing Facility	Marblehead
Sippican Healthcare Center	Marion
Bolton Manor Nursing & Rehabilitation Center	Marlborough
Marie Esther Health Center	Marlborough
Marlborough Hills Healthcare Center	Marlborough
Harborside - Mashpee	Mashpee
Roscommon Extended Care Center	Mattapan
Thomas Upham House	Medfield
Brighten at Medford	Medford
Courtyard Nursing Care Center	Medford
Glen Ridge Nursing Care Center	Medford
Medway Country Manor Skilled Nursing & Rehabilitation	Medway
EPOCH Senior Healthcare of Melrose	Melrose



<b>Facility Name</b>	<b>City</b>
Golden Living Center - Elmhurst	Melrose
Golden Living Center- Melrose	Melrose
Tuell Nursing Home	Melrose
Methuen Health and Rehabilitation Center	Methuen
St. Raphael's TCU at Holy Family Hospital	Methuen
SunBridge Care & Rehab-Broadway	Methuen
The Nevins Nursing and Rehab Centre	Methuen
Golden Living Center- Oak Hill	Middleborough
Hannah B. G. Shaw Home For The Aged	Middleborough
Nemasket Healthcare	Middleborough
The Neuro-Rehabilitation Center at Middleboro	Middleborough
Blaire House of Milford	Milford
Geriatric Authority of Milford Nursing & Rehab Center	Milford
SunBridge Care & Rehab for Milford	Milford
Millbury Health Care Center	Millbury
Milton Healthcare, LLC	Milton
Jesmond Nursing Home	Nahant
Our Island Home	Nantucket
Beaumont Rehab & Skilled Nursing Center	Natick
Eliot Healthcare Center	Natick
Mary Ann Morse Nursing & Rehab Center	Natick
Riverbend of South Natick	Natick
The TCU at Leonard Morse	Natick
Avery Manor	Needham
Briarwood Rehabilitation and Nursing Center	Needham
Skilled Nursing Facility at North Hill	Needham
Wingate at Needham	Needham
Bedford Village Nursing Home	New Bedford
Brandon Woods of New Bedford	New Bedford
Hallmark Nursing & Rehab Center	New Bedford
Hathaway Manor Extended Care Facility	New Bedford
New Bedford Health Care Center	New Bedford
New Bedford Jewish Convalescent Home	New Bedford
Sacred Heart Home, Inc.	New Bedford
Savoy Nursing & Rehabilitation Center	New Bedford
Southeastern Mass. Health & Rehabilitation Center	New Bedford
Taber Street Nursing & Rehab Center	New Bedford
The Oaks Nursing Home	New Bedford
Anna Jaques Hospital Subacute Unit	Newburyport

<b>Facility Name</b>	<b>City</b>
Brigham Manor Nursing & Rehab Center	Newburyport
Country Rehabilitation & Nursing Center	Newburyport
Port Healthcare Center	Newburyport
Golden Living Center- Chestnut Hill	Newton
Golden Living Center- West Newton	Newton
Newton Health Care Center	Newton
The Stone Institute	Newton
Waban Health and Rehabilitation Center	Newton
North Adams Commons Nursing & Rehabilitation Center	North Adams
Meadows, The	North Andover
Prescott House Nursing Home	North Andover
Sutton Hill Center Genesis HealthCare	North Andover
Madonna Manor	North Attleboro
Royal Megansett Nursing & Retirement Home	North Falmouth
SunBridge Care & Rehab for North Reading	North Reading
Calvin Coolidge Nursing & Rehab Center	Northampton
Northampton Rehabilitation and Nursing Center	Northampton
Beaumont Rehab & Skilled Nursing Center	Northborough
Coleman House	Northborough
Beaumont Rehab & Skilled Nursing Center	Northbridge
EPOCH Senior Healthcare of Norton	Norton
Norwell Knoll Rehabilitation & Nursing Center	Norwell
Southwood at Norwell Nursing Center	Norwell
Charlwell Healthcare, LLC.	Norwood
Golden Living Center- Norwood	Norwood
The Ellis Nursing & Rehab Center	Norwood
Victoria Haven Nursing Facility	Norwood
Windemere Nursing & Rehab Center of Martha's Vineyard	Oak Bluffs
Orleans Convalescent & Retirement Center	Orleans
SunBridge Care & Rehab-Sandalwood	Oxford
Palmer Healthcare Center	Palmer
Brooksby Village/Renaissance Gardens	Peabody
Peabody Glen Health Care Center	Peabody
Pilgrim Rehab & Skilled Nursing Center	Peabody
Rainbow Nursing Home	Peabody
Rosewood Nursing & Rehab Center	Peabody
Berkshire Place	Pittsfield
Hillcrest Commons	Pittsfield
Mount Greylock Extended Care Facility	Pittsfield

<b>Facility Name</b>	<b>City</b>
Springside of Pittsfield, A Skilled Nursing & Rehabilitation Facility	Pittsfield
Golden Living Center-Plymouth	Plymouth
Life Care Center of Plymouth	Plymouth
Newfield House, Inc.	Plymouth
Radius HealthCare Center/Pediatric Center at Plymouth	Plymouth
Cape End Manor	Provincetown
Hancock Park	Quincy
John Adams HealthCare Center	Quincy
Marina Bay Skilled Nursing & Rehab Center	Quincy
Quincy Rehab & Nursing Center	Quincy
William B. Rice Eventide Home	Quincy
Cedar Hill Health Care Center	Randolph
Life Care Center of Raynham	Raynham
Daniels House Nursing Home	Reading
Wingate at Reading	Reading
Annemark Nursing & Rehabilitation Center	Revere
Lighthouse Nursing Care Center	Revere
The Meadows Skilled Nursing & Rehabilitation Center	Rochdale
Coyne Healthcare Center	Rockland
South Shore Nursing Facility	Rockland
Den-Mar Rehab & Nursing Center	Rockport
Sea View Retreat	Rowley
Grosvenor Park	Salem
Shaughnessy Kaplan Rehabilitation Hospital	Salem
Berkshire Rehab	Sandisfield
Cape Heritage, A Radius HealthCare Center	Sandwich
Hammersmith House Nursing Care Center	Saugus
Harborside - Northshore	Saugus
Cardigan Nursing Home	Scituate
Life Care Center of the South Shore	Scituate
EPOCH Senior Healthcare of Sharon	Sharon
Anchorage Nursing Home	Shelburne
Shrewsbury Nursing & Rehabilitation Center	Shrewsbury
Clifton Rehabilitative Nursing Center	Somerset
Somerset Ridge Center	Somerset
Hutchins Transitional Care Unit	Somerville
Jeanne Jukan Residence	Somerville
Eagle Pond Rehab & Living Center	South Dennis
Wingate at South Hadley	South Hadley

<b>Facility Name</b>	<b>City</b>
Windsor Skilled Nursing & Rehabilitation Center	South Yarmouth
Radius HealthCare Center at Southbridge	Southbridge
Chapin Center	Springfield
Parkview Rehabilitation & Nursing Center	Springfield
Reeds Landing (Hawthorne House)	Springfield
Wingate at Springfield	Springfield
Sterling Healthcare Center	Sterling
Arnold House	Stoneham
Bear Hill Rehabilitation and Nursing Center	Stoneham
Life Care Center of Stoneham	Stoneham
Blue Hills Alzheimer's Care Center	Stoughton
Copley at Stoughton	Stoughton
Goddard Rehab & Nursing Center	Stoughton
Sudbury Pines Extended Care Facility	Sudbury
Wingate at Sudbury	Sudbury
Cozy Corner Nursing & Rehabilitation Center	Sunderland
Jewish Rehabilitation Center of the North Shore	Swampscott
Country Gardens Skilled Nursing & Rehab Center	Swansea
Golden Living Center- Wedgemere	Taunton
Longmeadow of Taunton	Taunton
Marian Manor of Taunton	Taunton
Taunton Nursing Home	Taunton
Transitional Care Unit of Morton	Taunton
Blaire House of Tewksbury	Tewksbury
Masconomet Healthcare Center	Topsfield
Farren Care Center	Turners Falls
Lydia Taft House	Uxbridge
Greenwood Nursing and Rehab Center	Wakefield
Harborside - Wakefield	Wakefield
Kirkwood House	Wakefield
Harrington House Nursing & Rehab Center	Walpole
Leland Home	Waltham
Maristhill Nursing & Rehabilitation Center	Waltham
Marquardt Nursing Center (at Fernald State School)	Waltham
Meadow Green Nursing & Rehab Center	Waltham
Piety Corner Nursing Home	Waltham
Forestview Nursing & Rehab Center	Wareham
The Tremont Rehab & Skilled Care Center	Wareham

<b>Facility Name</b>	<b>City</b>
Emerson Rehabilitation & Nursing Center	Watertown
Wayland Nursing & Rehab Center	Wayland
Lanessa Extended Care	Webster
Oakwood Rehab & Nursing Center	Webster
TCU at Hubbard Hospital	Webster
Webster Manor Healthcare Center	Webster
Elizabeth Seton Residence, Inc.	Wellesley
Newton & Wellesley Alzheimer Center	Wellesley
Oakdale Rehab & Skilled Nursing Center	West Boylston
Life Care Center of West Bridgewater	West Bridgewater
Quaboag on the Common	West Brookfield
Golden Living Center- Chetwynde	West Newton
Roscommon on the Parkway	West Roxbury
Wingate at West Springfield	West Springfield
Beaumont Rehabilitation & Skilled Nursing Center	Westborough
Westborough Health Care Center	Westborough
Governor's Center	Westfield
Harborside - Westfield	Westfield
Renaissance Manor of Westfield	Westfield
Westford House	Westford
Campion Health Center, Inc.	Weston
EPOCH Senior Healthcare of Weston	Weston
Clark House at Fox Hill Village	Westwood
Colonial Rehab & Nursing Center	Weymouth
Pope Nursing Home	Weymouth
Samuel Marcus Nursing Home	Weymouth
Weymouth Health Care Center	Weymouth
St. Camillus Health Center	Whitinsville
Life Care Center of Wilbraham	Wilbraham
Wingate at Wilbraham	Wilbraham
Sweet Brook Transitional Care and Living Centers	Williamstown
Williamstown Commons	Williamstown
Wilmington Health Care Center	Wilmington
Woodbriar of Wilmington Rehab & S.N. Center	Wilmington
Aberjona Nursing Center	Winchester
Winchester Nursing Center	Winchester
Woburn Nursing Center	Woburn
Autumn Village Skilled Nursing and Rehabilitation Center	Worcester
Blaire House of Worcester, LTC	Worcester

<b>Facility Name</b>	<b>City</b>
Christopher House of Worcester	Worcester
Golden Living Center- The Hermitage	Worcester
Holy Trinity Nursing & Rehabilitation Center	Worcester
Jewish Healthcare Center, Inc.	Worcester
Knollwood Nursing Center at Briarwood	Worcester
Lutheran Home of Worcester	Worcester
Notre Dame Long Term Care Center	Worcester
Odd Fellows Home of Massachusetts	Worcester
Parsons Hill Nursing & Rehabilitation Center	Worcester
Radius HealthCare Center at Worcester	Worcester
Saint Francis Home	Worcester
St. Mary Health Care Center	Worcester
SunBridge Care & Rehab-Hammond House	Worcester
SunBridge Care & Rehab-Spring Valley	Worcester
The Neuro-Rehabilitation Center at Worcester	Worcester
University Commons Nursing Care Center	Worcester
Washburn House	Worcester
West Side House	Worcester
Maples Rehabilitation and Nursing Center	Wrentham
Pond Home	Wrentham
Serenity Hill Nursing and Rehab Center	Wrentham
Mayflower Place Nursing & Rehab Center	Yarmouth

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