



# Fall-Related Injuries and Deaths Among Older MA Adults: 2002-2010

Injury Surveillance Program, Bureau of Health Information, Statistics, Research, and Evaluation  
Massachusetts Department of Public Health

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## Overview

Falls are a leading cause of injury and death across the United States and in Massachusetts and account for a significant portion of health care dollars spent on injury-related care.<sup>1</sup>

This bulletin focuses on unintentional falls among **older Massachusetts adults ages 65 and over**, as they have much higher rates of fall-related injury and death than those under age 65. Annually older adults account for **84%** of all fall-related deaths and **68%** of all hospital stays for fall-related injuries.<sup>2</sup>

Unintentional falls are the leading cause of injury-related death and nonfatal injuries among MA residents ages 65+. Fall-related death rates have increased significantly for this age group over the past several years.

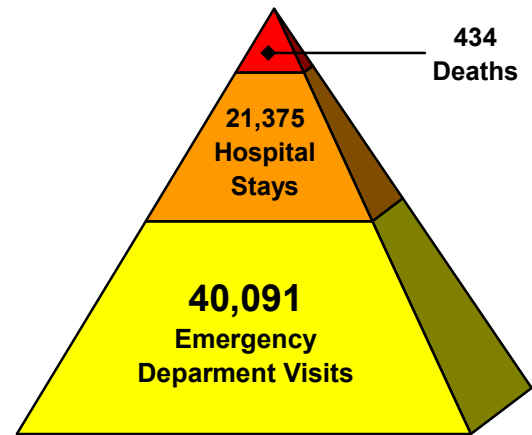
Unintentional falls led to the deaths of 434 MA older adults and 61,466 injuries treated in MA acute care hospitals (2010). Not included in these counts are those who received treatment only at home or in a physician office. (Fig. 1)

Research has found that there are many effective ways to prevent falls among older adults including improving balance and vision, and reducing hazards in the home. Massachusetts has made preventing falls among older adults a top priority. Data such as those included in this report are essential to guide the development and evaluation of efforts to prevent falls among older MA residents.

<sup>1</sup> In this bulletin, the term "injury" refers to nonfatal injuries unless otherwise specified.

<sup>2</sup> The most recent data available are for 2010. Due to how data are reported, mortality data are based on calendar year and nonfatal injury data are based on fiscal year.

Fig. 1. Annual Magnitude of Fall-related Deaths and Treated Injuries, MA Residents Ages 65+



## Key Findings

### Among MA residents ages 65 and over:

- Men had higher fall death rates, while women had higher rates of hospital care for nonfatal fall-related injuries (2010).
- Fall-related injury and death rates increased significantly with age (2010).
- Fall-related death rates in MA increased 143% between 2002 and 2010, from 17.7 to 43.0 per 100,000.
- Of nonfatal falls treated in MA acute care hospitals, 1 in 5 was associated with a traumatic brain injury and 1 in 10 involved a hip or other femur fracture (2010).
- Acute care hospital charges associated with fall-related injuries in 2010 totaled over \$630 million.



## Fall-related Deaths

Deaths are classified as “fall-related” only if the primary underlying cause of death on the death certificate is a fall, rather than another condition, such as heart attack or stroke.



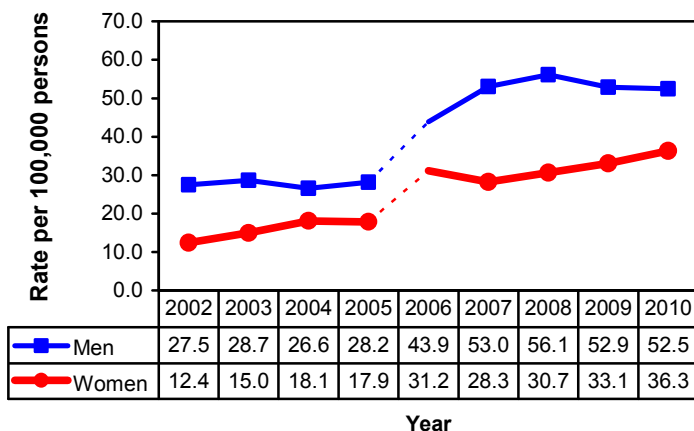
In 2010, 434 MA residents ages 65+ died from falling. This equals an age-adjusted fall death rate of 43.0 per 100,000 older adults. The comparable U.S. fall death rate for 2010 was 52.1 per 100,000.<sup>3</sup>

**Older men have a higher fall-related death rate than older women.**

### Differences by age and gender, 2010:

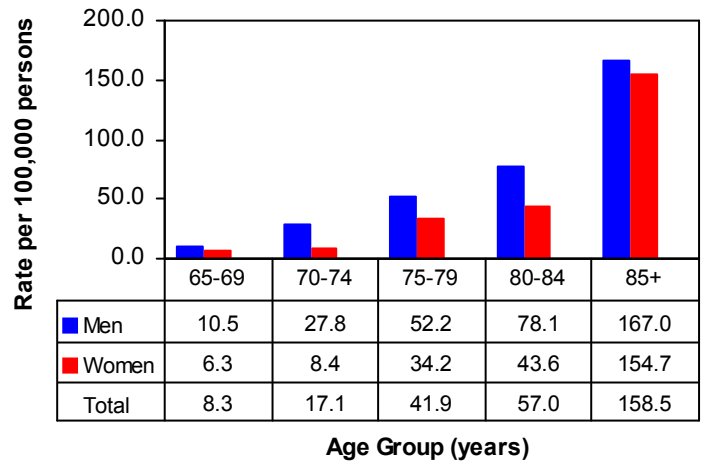
- Age-adjusted fall death rates among men ages 65+ were 45% higher than among older women (52.5 vs. 36.3. per 100,000). (Fig. 2)
- Residents ages 85 and over had fall death rates *19 times higher* than residents ages 65 to 69 (158.5 vs. 8.3 per 100,000). (Fig. 3)

Fig. 2. Trend in Age-adjusted Fall-related Death Rates, MA Residents Ages 65+, 2002-2010<sup>4</sup>



<sup>3</sup> Age-adjusted rates. Source: CDC WISQARS.

Fig. 3. Fall-related Death Rates by Gender and Age Group, MA Residents Ages 65+, 2010



### Trends in fall death rates<sup>4</sup>, 2002-2010:

- Fall death rates among older MA residents increased 143% between 2002 and 2010 (from 17.7 to 43.0 per 100,000)<sup>5</sup>.
- The U.S. fall death rate among adults ages 65+ increased 47% over the same time period (from 35.5 to 52.1 per 100,000).
- Fall death rates increased among both men and women ages 65+, nearly doubling among men (91% increase), and tripling among women (193% increase).
- Among all older adults, those ages 85 and older saw the greatest increase (177%) in fall death rates over this time period (57.2 to 158.5 per 100,000).

**Between 2002 and 2010, fall death rates among older MA residents increased 143%.**

### Differences by Race/Ethnicity, 2006-2010:<sup>6</sup>

- From 2006 through 2010, MA older adults who were White, non-Hispanic or Asian had the highest fall death rates at 40.7 and 38.0 per 100,000 respectively. This was followed by Black, non-Hispanic and Hispanic residents, who had fall death rates of 20.4, and 15.4 per 100,000 respectively. (Fig. 4)

<sup>4</sup> Age-adjusted rates are used in all trend analyses.

<sup>5</sup> The increase is partly due to improved identification of fall deaths by the Medical Examiner's Office after 2005 (indicated by dotted line).

<sup>6</sup> We combined 5 years of data for this analysis to maximize stability of rates. Rates for fall deaths by race/ethnicity are average annual age-adjusted rates per 100,000 persons.

Fig. 4. **Fall-related Death Rates by Race/Ethnicity, MA Residents Ages 65+, 2006-2010**

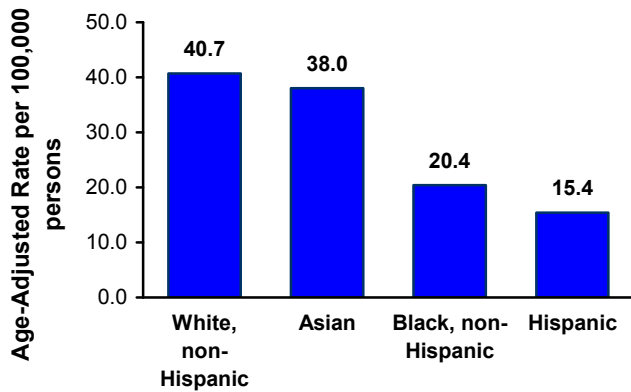
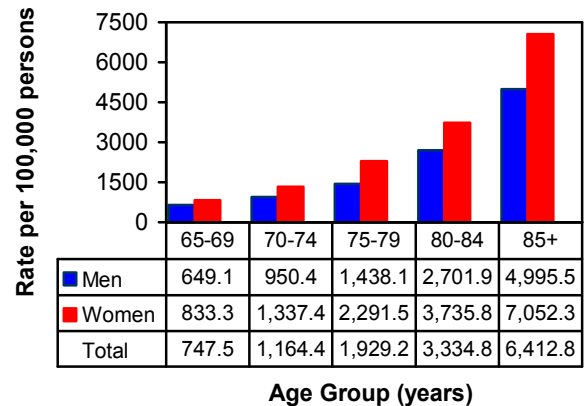


Fig. 5. **Fall-related Hospital Stay Rates by Gender and Age Group, MA Residents Ages 65+, 2010**



## Treated Fall-related Injuries

Among MA residents ages 65 and over, falls are the leading cause of injuries treated in MA acute care hospitals, outnumbering the second leading cause, motor vehicle-related injuries, 13 to 1. In 2010, there were 61,466 nonfatal fall-related injuries among MA older adults treated in acute care hospitals (6,782.5 per 100,000). Nearly two-thirds (65%) of these were emergency department visits (n=40,091) while 35% required a hospital stay (n=21,375).

**Older women have higher rates of nonfatal fall-related injuries than older men.**

### Hospital stays for fall-related injuries, 2010:

- While men have higher fall death rates, women have 70% higher rates of hospital stays for fall-related injuries than men (2,847.8 vs. 1,676.0 per 100,000).
- Sixty-nine percent of older adults hospitalized for fall-related injuries in 2010 required additional care in a rehabilitation or other long-term care facility.
- Residents ages 85+ have by far the highest hospital stay rates for fall-related injuries. Their hospital stay rates are nearly *9 times higher* than those for residents ages 65-69. (Fig. 5)

### Trends in hospital stay rates, 2002-2010:

- Hospital stay rates for fall-related injuries increased 10% between 2002 and 2010.
- Hospital stay rates for fall-related injuries increased by 8% among women and 16% among men over this time period.
- Residents ages 65-69 saw the greatest increases (18%) in these rates.

### Emergency department (ED) visits, 2010:

Patterns for fall-related ED visits in 2010 were similar as for hospital stays, but at much higher rates. That is:

- Women had higher ED visit rates than men (5,188.6 vs. 3,356.5 per 100,000) and residents ages 85+ had the highest rates.
- Fall-related ED visit rates for residents ages 85+ were *3.5 times higher* than for residents ages 65-69 (8,693.0 vs. 2,474.6 per 100,000).

### Trends in ED visits, 2002-2010:

Similar to trends in hospital stays, rates of fall-related ED visits between 2002 and 2010 increased moderately (8%) and rates increased more among men than women (13% vs. 8% respectively).

### Differences by Race/Ethnicity, 2010:

Nonfatal fall-related injuries<sup>7</sup>.

- As with fatal falls, White, non-Hispanic residents ages 65+ had the highest rate of nonfatal fall-related injuries treated in MA acute care hospitals in 2010: 7,032.8 per

<sup>7</sup> Nonfatal fall rates include hospital stays and ED visits. These are crude rates per 100,000 persons.

100,000. This was followed by Hispanic and Black, non-Hispanic residents (4,503.6 and 3,720.1 per 100,000, respectively). Asian residents had the lowest rates: 2,529.2 per 100,000.

## Survey Data on Falls

The MA Behavioral Risk Factor Surveillance Survey (BRFSS) provides estimates of the number of MA adults who fell at least once in the past 3 months and if they were injured in this/these falls, regardless of whether or not they sought medical care.

In 2010, of MA adults ages 65+:

- An estimated 14% of MA older adults reported falling in the past three months. Approximately one-third (35%) of these adults reported sustaining an injury from falling that resulted in a medical visit or restricted activity for at least one day.
- National rates are similar. In 2006, 16% of U.S. adults ages 65+ reported falling in the past three months, and 31% of these sustained injuries that resulted in a medical visit or restricted activity for at least one day.

**Many common physical and mental health problems among older adults increase the risk of falling.**

Survey results further found that older adults who reported the following conditions were significantly more likely ( $p < .05$ ) than those without the condition to have fallen in the past three months: having a physical, emotional or cognitive disability, health problems that require use of special equipment, cognitive problems, poor mental health, diabetes, or prior heart attack.

Older adults who reported the following conditions were **no more** likely ( $p \geq .05$ ) than those without the condition to have fallen in the past 3 months: stroke, cancer, osteoporosis, current smoker, heavy drinker, or could not see a doctor due to cost.

## Traumatic Brain Injuries

Traumatic brain injury (TBI) is considered one of the most severe types of injury as it may result in significant cognitive, behavioral, mental health and medical problems, as well as death<sup>8</sup>. Falls are the leading cause of traumatic brain injury-related deaths and hospital discharges among individuals ages 65 and over.

**Falls are the leading cause of traumatic brain injury-related death and injury among older adults.**

The demographic pattern of falls involving TBI is similar to all falls among older adults. Men have the highest rates of death, women have the highest rates of nonfatal injury, and residents ages 85+ have the highest rates of injury and death.

### Fatal falls involving TBI, 2010:

- Of the 434 MA residents ages 65+ who died from falling, over half (58%,  $n=252$ ) had sustained a traumatic brain injury. This equals a rate of 27.8 per 100,000.
- Rates of fatal falls involving TBI were 31% greater for men than for women (32.2 vs. 24.6 per 100,000 respectively).
- These rates were *14 times greater* for residents ages 85+ than for residents ages 65–69 (86.8 vs. 6.0 per 100,000).

### Nonfatal falls involving TBI, 2010:

- In 2010, nearly one in five (19%) nonfatal falls among older adults treated in MA acute care hospitals were associated with a traumatic brain injury ( $n=11,505$ ).
- Of the 11,505 MA residents ages 65+ who received treatment for a fall involving a TBI, 77% were treated in the ED ( $n=8,823$ ) and 23% required a hospital stay ( $n=2,682$ ).
- The hospital stay rate for nonfatal falls involving TBI was 295.9 per 100,000 MA adults ages 65+.
- The ED visit rate for nonfatal falls involving TBI was 973.6 per 100,000 older MA adults.

<sup>8</sup> LaVecchia F. *Final Report of the Massachusetts Traumatic Brain Injury Transition Project*; June, 1996.

## Trends in falls involving TBI, 2002-2010:

Among MA residents ages 65+:

- Rates of fatal falls involving TBI nearly doubled (89% increase) from 13.3 to 25.2 per 100,000 as compared to a 143% increase in fall death rates overall (pg.2).
- Hospital stay rates for nonfatal falls involving TBI rose 79% (from 153.5 to 274.4 per 100,000) compared to a 10% increase in such rates for all nonfatal falls (pg.3).
- ED visit rates for nonfatal falls involving TBI rose 160% (from 352.5 to 916.0 per 100,000) compared to an 8% increase in ED visit rates for nonfatal falls overall (pg.3).

**Between 2002 and 2010, rates of fatal falls among older adults that involve a TBI nearly doubled.**

## Hospital charges

- In 2010, total hospital charges (includes inpatient hospitalizations, observation stays, and ED visits) associated with treatment of fatal or nonfatal falls among MA older adults that involved a TBI were over \$119 million.

## Hip/Femur Fractures

A hip fracture is a fracture of the “neck” of the femur bone. Hip and other femur fractures are of particular concern due to their severity and long-term health impact<sup>9</sup>. In 2010, *one in ten* older adults treated in a MA acute care hospital for a nonfatal fall



sustained a hip or other femur fracture<sup>10</sup>. As 88% of such falls require hospital admission, this section focuses on hospitalizations only.

<sup>9</sup> We combined hip and other femur fractures in these analyses due to their similar severity and hospital costs.

<sup>10</sup> This analysis focuses on hospital admissions rather than ED visits or observation stays, as most individuals who sustain a hip or other femur fracture require hospitalization.

**9 out of 10 older adults hospitalized for a fall-related hip/femur fracture require additional long-term care.**

## Hospitalizations for nonfatal falls involving hip/femur fractures, 2010:

In 2010, among MA residents ages 65+:

- There were 5,502 hospitalizations involving a nonfatal fall-related hip/femur fracture.
- Hospitalization rates for falls involving hip/femur fractures were more than *twice* as high for older women as for older men (789.0 vs. 353.4 per 100,000) and over *14 times* higher for residents ages 85+ than for those ages 65-69 (1,918.0 vs. 132.4 per 100,000).

## Trends in falls involving hip/femur fractures, 2002-2010:

- Hospitalization rates among older adults for nonfatal falls involving hip/femur fractures decreased 22% between 2002 and 2010 (695.0 to 544.1 per 100,000). The reason for this decrease is not fully understood, but may be partly due to improved osteoporosis screening and treatment.<sup>11</sup>

## Discharge status<sup>12</sup>

- Of all hospitalizations for falls involving a hip/femur fracture, 4% died and 89% were discharged to a rehabilitation hospital or other long-term care facility.

## Hospital charges

In 2010, median charges for fall-related inpatient hospitalizations of older adults who sustained a hip/femur fracture were *twice* as high as for those who did not sustain a hip/femur fracture (\$28,422 vs. \$13,494).

- Falls involving hip/femur fractures accounted for 38% of hospitalization charges for fall-related injuries among older MA residents (\$196 million out of \$512 million).

<sup>11</sup> Brown CA, Starr AZ, Nunley JA. (2012) *Analysis of Past Secular Trends of Hip Fractures and Predicted Number in the Future 2010-2050*. J Orthop Trauma; 26:117-122.

<sup>12</sup> Transfers and deaths are *included* in the analysis of discharge status and hospital charges.

## Fall Location and Circumstances



Limited data are available on the location and circumstances of falls (e.g. fall down stairs, fall from bed) leading to deaths and injuries. For fall

location, we present death data as it has more complete location information than nonfatal injury data.<sup>13</sup> For fall circumstances, we present nonfatal injury data, as it has more complete circumstance information than death data.<sup>14</sup>

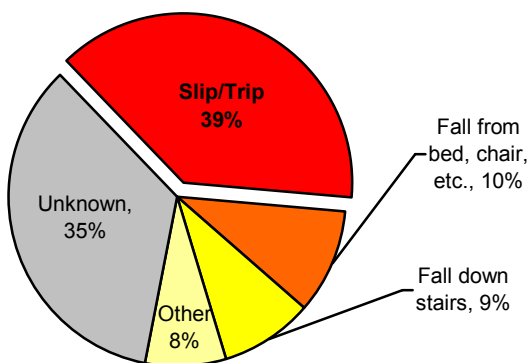
### Fall location

- At least 60% of all fall-related deaths among older adults occur in the home.
- In 2010, the location of fatal falls involving a **traumatic brain injury** or **hip/femur fracture** were similar as for all fall deaths among older adults in that they occurred most frequently at home (63% and 52% respectively).

### Fall circumstances

Falls resulting from slipping, tripping or stumbling on the same level were the most frequently reported circumstances for fall-related injuries among older adults. (Fig. 6)

Fig. 6. Circumstances of Fall-related Hospital Stays, MA Residents Ages 65+, 2010



<sup>13</sup> In 2010, 57% of locations for fall-related hospital stays among older adults were missing or unspecified.

<sup>14</sup> In 2010, 54% of circumstances for fall deaths among older adults were unspecified.

Compared to all nonfatal falls among older adults requiring a hospital stay in 2010, a greater percentage of those involving a **traumatic brain injury** were due to falling down stairs (15%), and a greater percentage of those involving a **hip/femur fracture** occurred from slipping or tripping (46%).

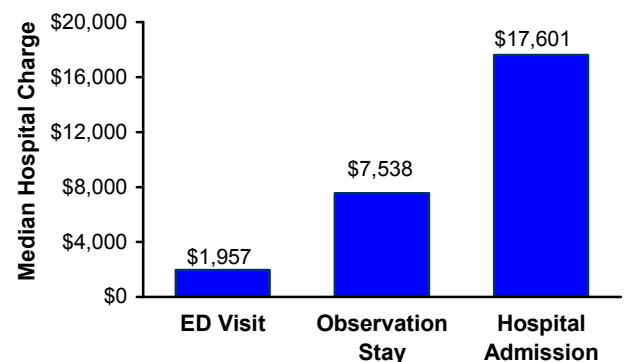
## Hospital Charges<sup>15</sup>

The cost of hospital care for fall-related injuries can be an economic burden on individuals and families. Controlling the rising cost of health care is a major priority in Massachusetts. Hospital charges may also serve as an indicator of injury severity.

- In 2010, total hospital charges (ED visits and hospital stays) associated with fall-related injuries among older MA residents totaled over \$630 million.

**In 2010, hospital charges associated with fall-related injuries among older MA residents totaled over \$630 million.**

Fig. 7. Median Hospital Charge for Fall-related Injuries, by Visit Type, MA Residents Ages 65+, 2010



Not surprisingly, the vast majority of all hospital charges (81%) associated with fall-related injuries to older adults were associated with hospital admissions (\$512

<sup>15</sup> Hospital charge data includes transfers and deaths that occur in the hospital.

million); ED visits and observation stays accounted for additional charges of \$100 million and \$19 million respectively.

Median charges for hospital admissions vary by fall circumstance. Median charges for the most common fall circumstances among older adults in 2010 were:

Median Charge	Description
\$19,289	Fall on/from stairs or steps
\$18,618	Fall from chair
\$18,078	Fall from slipping, tripping, or stumbling
\$17,766	Fall from bed

## Prevention and Control

Increasing age can lead to decreased activity and strength, impaired balance, osteoporosis, illnesses, dementia, and impaired vision. Older adults may be taking medications that cause dizziness or multiple medications which can interact with each other and/or with alcohol, increasing the risk for a fall. In addition to a decrease in physical functioning, falls among older adults can impact mental well being by producing feelings of social isolation, depression, and helplessness.

Most falls, however, **are** preventable! Many of these falls can be prevented by making changes in the physical environment such as reducing household hazards, having regular health screenings like eye exams, and making lifestyle changes such as getting more exercise to improve balance and strength.

For more information on how to prevent falls among older adults, call **1-800-227-SAFE** or check out the Department's website at:

[Injury Prevention for Older Adults](#)<sup>16</sup>

<sup>16</sup> (URL for Injury Prevention for Older Adults)  
<http://www.mass.gov/eohhs/gov/departments/dph/programs/community-health/dvip/injury-prevention/injury-prevention-for-older-adults.html>)

## Resources

### Injury Surveillance Program (ISP)

Massachusetts Department of Public Health  
 Bureau of Health Information, Statistics,  
 Research, and Evaluation  
 250 Washington Street, 6<sup>th</sup> Floor  
 Boston, MA 02108  
 (617) 624-5648

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

### Injury Prevention and Control Program (IPCP)

Massachusetts Department of Public Health  
 Bureau of Community Health and Prevention  
 250 Washington Street, 4<sup>th</sup> Floor  
 Boston, MA 02108  
 (617) 624-5413

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

### Falls Prevention Coordinator

Massachusetts Department of Public Health  
 250 Washington Street  
 Boston, MA 02108  
 (617) 624-5965

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

### Executive Office of Elder Affairs

One Ashburton Place  
 Boston, MA 02108  
 (617) 727-7750

[www.mass.gov/elders](http://www.mass.gov/elders)

### Centers for Disease Control and Prevention

National Center for Injury Prevention and  
 Control (NCIPC)  
 4770 Buford Hwy, NE  
 MS K-65

Atlanta, GA 30341-3717

1 (800) CDC-INFO (232-4636)

TTY: 1 (888) 232-6348

FAX: (770) 488-4760

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

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## Notes

Fall-related injuries are classified according to specific codes in the International Classification of Disease (ICD) manual. These codes provide information on the “nature and anatomic location” of the injury (e.g., fracture to the hip) and “cause” of injury (e.g., fall on or from steps and stairs).

As 99% of fall-related deaths and injuries among adults ages 65 and over are unintentional, rather than self-inflicted or assault-related, this bulletin focuses solely on unintentional falls among older adults.

Hospital data used in this report track the number of visits for fall-related injuries, rather than the number of individuals or falls. That is, an individual who requires two hospitalizations following one fall incident, and an individual who is hospitalized twice after two different falls, would both be counted as two hospitalizations for fall-related injuries.

Throughout this report, the term “injuries”, when used alone, refers to nonfatal injuries.

All hospital visits and charges discussed refer to those at MA acute care hospitals. For the purposes of this report, we combined inpatient hospital discharges and outpatient observation stays into one category referred to as “Hospital Stays.”

Due to how the data is reported, all data on deaths are based on calendar year and all data on nonfatal injuries treated in acute care hospitals are based on fiscal year.

Deaths occurring during an ED visit, observation stay or hospitalization were excluded from analyses except when calculating hospital charges or discharge status (disposition). Transfers following hospital admission were also excluded except when calculating hospital charges or discharge status.

Age-adjusted rates are presented when comparing MA with U.S. rates, trends in rates over time, or when generating a rate for a multi-year time span (i.e. fall death rates by race/ethnicity). Otherwise, crude rates per 100,000 persons are presented.

## Data Sources

**Deaths:** Massachusetts data from MA Registry of Vital Records and Statistics, MA Department of Public Health. Data reported are for calendar years 2002-2010 (January 1, 2002 to December 31, 2010); U.S. data from the Web-based Injury Statistics Query and Reporting System (WISQARS), CDC National Center for Injury Prevention and Control:  
<http://www.cdc.gov/injury/wisqars>.

**Inpatient Hospitalizations:** MA Inpatient Hospital Discharge Database, MA Division of Health Care Finance and Policy. Data reported are for fiscal years 2002-2010 (October 1, 2001 to September 30, 2010).

**Outpatient Observation Stays:** MA Outpatient Observation Stay Database, MA Division of Health Care Finance and Policy. Data reported are for fiscal years 2002-2010 (October 1, 2001 to September 30, 2010).

**Emergency Department Visits:** MA Emergency Department Discharge Database, MA Division of Health Care Finance and Policy. Data reported are for fiscal years 2002-2010 (October 1, 2001 to September 30, 2010).

**Statewide Survey Data:** 2010 MA Behavioral Risk Factor Surveillance Survey (BRFSS), MA Department of Public Health.

**Population Data:** Data for 2002-2009 are from Intercensal estimates July 1, 2000 – July 1, 2009 and data for 2010 are from Postcensal estimates July 1, 2010 – July 1, 2011; National Center for Health Statistics, U.S. Census Bureau, 2012.