

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005



VIOLENCE AND INJURY PREVENTION PROGRAM

**BUREAU OF HEALTH PROMOTION AND RISK REDUCTION
OFFICE OF HEALTHY OHIO
OHIO DEPARTMENT OF HEALTH**

DATA PROVIDED BY THE OHIO HOSPITAL ASSOCIATION



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October 2008

Acknowledgements

Special thanks go to Dave Engler and Dan Paoletti of the Ohio Hospital Association for their assistance.

This publication was supported by the Cooperative Agreement Award Number 5U17CE52524801-03 from the Centers for Disease Control and Prevention, National Center for Injury Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

THE OHIO VIOLENCE AND INJURY PREVENTION PROGRAM

The Violence & Injury Prevention Program (VIPP) is developing a comprehensive injury prevention program for the State of Ohio.

The VIPP strives:

- To coordinate surveillance systems that collect injury data.
- To assess the burden of injuries and violence, and communicate information for the purpose of action.
- To promote evidence-based injury prevention interventions for at-risk populations.
- To coordinate and collaborate with partners in building program infrastructure.
- To encourage the adoption of policies and programs that lead to the prevention of injuries.
- To provide technical support and training as needed.
- *Ultimately, to make Ohio a safer place to live, work and play by reducing death and disability associated with intentional and unintentional injury.*

The goal of the program is to continue development of a comprehensive injury prevention program through the establishment and sustainment of a solid infrastructure for injury prevention that includes statewide injury surveillance to inform and evaluate public policy, as well as comprehensive injury prevention and control programs. The Ohio Department of Health's VIPP initiatives include:

- **Ohio Injury Prevention Partnership (OIPP)** – The OIPP is a group of professionals representing a broad range of agencies and organizations concerned with building Ohio's capacity to address the prevention of injury, particularly related to the group's identified priority areas of falls, poisonings, motor vehicle traffic (pedestrian) and violence prevention (suicide and firearm related). The mission is, *To prevent injuries in Ohio using data and collaborative partnerships*. The vision for injury prevention is, *Working together to create a safe and injury-free Ohio*. The OIPP was convened in November 2007 and is a partnership of ODH with funds from the Centers for Disease Control and Prevention (CDC) National Center for Injury Prevention and Control (NCIPC). The OIPP helps to improve statewide collaboration around injury and will assist ODH with establishing priorities and future directions regarding injury and violence prevention in Ohio.
- **Local Injury Prevention Grant Program** - Through the CDC's Preventive Health and Health Services Block Grant (PHHSBG), the VIPP provides more than \$512,000 annually to local programs targeting injury. The goal of this grant program is to reduce injury and injury-related deaths to Ohioans through the development of comprehensive, multi-faceted, population-based programs at the local level that address the risks associated with injuries. The 15 currently-funded projects (2005-2009 cycle) receive approximately \$35,000 annually and are focusing on the following injury areas: fall prevention in older adults, fire safety; pedestrian and bicycle safety; youth in agricultural settings; playground safety; suicide prevention; bullying prevention; shaken baby syndrome prevention; and the prevention of head injuries in general.

- **Child Passenger Safety (CPS) Program** – With fine monies collected through enforcement of Ohio’s child restraint law (Ohio Revised Code 4511.81), ODH’s CPS Program provides child safety seats to eligible low-income families in all Ohio counties, and targets the high-risk population of children ages 7 years and younger. The overall goal of this program is to increase the availability of child safety seats for needy families in Ohio and increase proper use and correct installation of child safety seats. These programs work in coordination with nine regional occupant protection coordinators, funded by the Ohio Department of Public Safety, who serve as liaisons between ODH and the local program contacts. ODH distributes approximately 45-60 seats to all 88 counties each year based on the availability of funds.

- **Surveillance Activities**
 - **Injury Surveillance** - The Injury Surveillance program assesses the burden of overall injury and specific types of injury in Ohio through the examination of multiple data sets including hospital discharge, death, trauma registry and emergency medical services (EMS) data. It monitors trends and emerging injury issues, produces annual reports and responds to requests for data.

 - **Census of Fatal Occupational Injuries (CFOI)** – With funding from the Bureau of Labor Statistics and the general revenue fund, the CFOI program provides the public, employers and safety personnel with comprehensive data surrounding fatal occupational-related injuries in Ohio. Data are collected from several sources including death certificates, workers’ compensation reports, Occupational Safety and Health Administration (OSHA) reports, traffic crash records, agricultural injury reports and media clippings. The data are collated at the national level and used to establish occupational safety policies and programs.

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THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO

INTRODUCTION

This report is the first in a series examining the burden of injury in Ohio through analysis of death certificate data from the Office of Vital Statistics, hospital inpatient discharge (HID) and emergency room (ER) data provided by Ohio hospitals through the Ohio Hospital Association.

Injuries are a clear public health problem in Ohio for all ages. They are the leading cause of death for Ohioans aged 1 to 34 and the fifth-leading cause of death overall.¹ Injuries, including suicide and homicide, cause more deaths of children and young adults from ages 1 to 34 than all other causes combined, including heart disease, stroke and cancer. In just one year in Ohio, the number of deaths caused by *unintentional* injuries alone exceeds that of one large jet crash per month, each causing 360 fatalities. When intentional and all other injuries are included, the toll from injury increases to an average of 541 lives lost each month in Ohio.

- In 2005, 6,502 Ohioans lost their lives to injury and violence.¹
- 29,960 Ohioans died from injury and violence from 2001 to 2005.¹

On average, there is an injury-related hospitalization every 9½ minutes and an injury-related ER visit every 24 seconds in Ohio, amounting to more than 53,000 inpatient hospitalizations and 1.29 million ER visits each year. Of these injuries, many lead to serious or life-long consequences such as traumatic brain injury or permanent loss of function.

The medical, work loss and quality of life costs of fatal injuries in Ohio total \$14.4 billion annually.

Table 1. Annual cost¹ of fatal injuries in Ohio²

Medical Cost	\$60,329,900
Work Loss Cost	\$4,777,218,900
Quality of Life Cost	\$9,592,862,400
Total	\$14,430,411,200

¹in 2004 dollars

²based on 1999-2002 incidence

In just one year in Ohio, the number of deaths caused by unintentional injuries alone exceeds that of one large jet crash per month, each causing 360 fatalities.



DEFINITIONS

Injury

The National Safety Council defines injury as:

physical harm or damage to the body resulting from an exchange, usually acute, of mechanical, chemical, thermal, or other environmental energy that exceeds the body's tolerance.

Injuries can be further classified by the intent or purposefulness of occurrence in two categories, intentional and unintentional injuries. Intentional injuries are purposely inflicted and often associated with violence. These include child and elder maltreatment, domestic violence, sexual assault, aggravated assault, homicide and suicide. Unintentional injuries include only those injuries that occur without intent of harm and are not purposely inflicted.

In this series of reports, we will examine the burden of unintentional injury as well as injury resulting from intentional acts such as suicide attempts/completions and assault/homicide. The term “unintentional injury” will be used to describe what may commonly be referred to as an “accident.” The term “accident” implies a random act; however, most injuries are predictable and preventable. Like diseases, they follow recognizable patterns that can be studied and used to inform prevention strategies such as policy and behavior change.

Falls and Fall-related Injury

The State and Territorial Injury Prevention Directors’ Association (STIPDA) has convened a Surveillance Workgroup on fall-related injury². This workgroup conducted a literature review of definitions for fall and fall-related injury and adopted the following definitions, which it recommends for public health surveillance purposes:

Fall: An event which results in a person coming to rest on the ground or other lower level precipitated by a misstep such as a slip, trip, or stumble; from loss of grip or balance; from jumping; or from being pushed, bumped, or moved by another person, animal or inanimate object or force.

Fall-related injury: An injury precipitated by a fall (as defined above) and caused by striking an injury-producing surface.

METHODS

DATA SOURCES

This report primarily used data from Ohio hospital discharge records and death certificates to study fall-related injury among Ohio residents for 2002 through 2005.

Hospital Discharge Records

Hospital discharge records are collected and maintained by the Ohio Hospital Association (OHA) from information provided by member hospitals. For this report, a fall-related injury was defined as a primary diagnosis of injury with the first listed four-digit external cause code ('E'-code) in the range of E880-E886, or equal to E888, and occurring to an Ohio resident who was treated in one of Ohio's acute care hospitals. Both injuries and their external causes were classified according to the 9th Revision of the International Classification of Diseases, Clinical Modification (ICD-9-CM).

Death Records

Death records are maintained by the Ohio Department of Health's (ODH) Office of Vital Statistics. A death was determined to be a fatal fall when a coroner or certifying physician identified a fall as the underlying cause of death. Subsequent assignment of an ICD-10 code in the range of W00-W19 by ODH nosologists enabled inclusion of the information in this research.

Other sources of data are used throughout the report in the following ways:

- **Ohio CFI Program** – CFI was described in the Ohio VIPP section. Fatal occupational-related falls data for 2003 through 2006 are presented.
- **Children's Safety Network Economics and Data Analysis Resource Center (CSN EDARC)** at Pacific Institute for Research and Evaluation (PIRE)
http://www.childrensafetynetwork.org/publications_resources/EDARC.asp - Fatal injury cost (medical, work-loss, quality-of-life) data based on 1999-2002 average incidence, in 2004 dollars, are presented.
- **CSN EDARC and the West Virginia Injury Control Research Center**
<http://www.hsc.wvu.edu/icrc/AHRQFORM.asp> - Nonfatal, hospital-admitted injury cost (medical, work-loss, quality-of-life) data based on 2003 injury incidence, in 2005 dollars, are presented.
- **Web-based Injury Statistics Query and Reporting System (WISQARS™)** from the Centers for Disease Control and Prevention - <http://www.cdc.gov/ncipc/wisqars/default.htm> - National fatal and nonfatal injury rates and fall-related years-of-potential-life-lost (YPLL) in Ohio are presented.
- **Behavioral Risk Factor Surveillance System (BRFSS)** – BRFSS collects population-based statewide health data on Ohioans through a random-digit-dialed telephone survey of adults aged 18 years and older. Two questions on falls were included in the 2006 survey: "In the past three months, how many times have you fallen? (i.e., unintentionally come to rest on the ground or another lower level)." For those who fell, a follow-up question was asked, "How many of these falls caused an injury (i.e., resulted in a doctor visit or restricted activity for at least one day.);" The 2006 BRFSS data on falls were analyzed by the Chronic Disease and Behavioral Epidemiology program at the Ohio Department of Health.

DATA ANALYSIS

This analysis was limited to descriptive statistics, which were generated through the use of Statistical Analysis System (SAS) Version 9.1, Cary, N.C.

LIMITATIONS OF FALL-RELATED INJURY SURVEILLANCE USING DEATH AND HOSPITAL DISCHARGE DATA

Interpretation of these results is subject to the usual constraints inherent in research based on administrative data.

1. In each year of the study period, at least 28 percent of hospitalized injury cases were not assigned an E-code. This most likely resulted in an underestimate of total costs and incidence rates, because not all injuries due to falls could be identified and included.
2. Of the non-fatally injured, only those who sought medical care were captured for this analysis.
3. Discharges, not individuals, were the unit of measurement, thereby resulting in duplication when readmissions for the same injury occurred.
4. For both hospital and Vital Statistics data, circumstances surrounding the fall, including location and type of fall were frequently missing, increasingly so with age of the victim. The *unspecified fall* code is used increasingly as the type of fall with advancing age of the faller.
5. Race and ethnicity were not available in the hospital data.
6. Ohio residents treated in out-of-state hospitals are not consistently included, thereby affecting rates, particularly of border counties.
7. Medical charges were based on billing data and not actual costs.
8. Severity of injury was assumed based on type of medical treatment received (i.e., inpatient treatment was for more severe injuries than ER visits).

LIMITATIONS OF BEHAVIORAL RISK FACTOR SURVEILLANCE (BRFSS) SURVEY DATA:

1. The BRFSS definition of a fall-related injury does not specify severity; an injury could be as minor as a small bruise or as severe as a broken hip. This broad definition could have obscured age-related differences if, for example, persons aged 45-64 years sustained less severe injuries and persons aged 65 years and older experienced more severe injuries.
2. The broad definition of injury might have led participants to report minor falls as injurious, resulting in an estimate of fall-related injuries that is higher than other research assessing fall prevalence.
3. BRFSS is a telephone-based survey and excludes households without landline telephones, so the results might be subject to selection bias.
4. Data are self-reported and subject to recall bias; therefore, prevalence estimates of falls might be distorted (e.g., respondents may forget falls or may mention falls that occurred more than three months ago.)
5. BRFSS does not include institutionalized persons, thereby excluding persons in long-term-care facilities, who are most at risk for falls.
6. The low response rate and possible response bias might have affected the representativeness of these data.

EXECUTIVE SUMMARY

This report addresses fatal and nonfatal unintentional falls among Ohio residents from 2002-2005. The data were derived from Ohio death certificates and the OHA's hospital inpatient discharge (HID) and emergency room (ER) datasets, compiled from all OHA member hospitals. Conclusions drawn from these data about falls in Ohio from 2002-05 include:

Falls contribute substantially to the burden our health care system faces.

- Falls are the overall leading cause of injury-related ER visits and HIDs in Ohio. Forty-five percent of all injury HIDs and 27 percent of all injury ER visits are due to falls. For adults aged 65 and older, these percentages increase to 83 and 61 percent, respectively.
- For children younger than 14 years and adults aged 45 years and older, falls lead to more hospitalizations than any other injury.
- From 2002-2005, 66,845 fall-related HIDs resulted in 303,895 days of hospital stay. In addition, 817,074 ER visits were caused by fall-related injuries.
- Fall-related mean length of stay decreased by 5 percent from 2002-05. However, due to the 24 percent growth in the number of inpatients, total days stay actually increased 18 percent.

Fall-related injury rates are on the rise.

- From 2002-05, the overall number and rate of fall-related HIDs increased each year. , the inpatient discharge rate increased 18 percent from 121.4 per 100,000 in 2002 to 143.5 in 2005.
- Fatal fall rates increased an even greater amount, (30 percent), during this time period: from 5.6 per 100,000 in 2002 to 7.3 in 2005.

Falls are extremely costly and costs continue to grow.

- Fall-related HIDs resulted in \$1.2 billion in medical charges in Ohio from 2002-05, more than those associated with treating hospital-admitted injuries from motor vehicle traffic, self-harm, assault and unintentional poisoning combined.
- Overall, charges for persons treated for fall-related injury increased 58.4 percent, from \$229,707,264 in 2002 to \$363,849,305 in 2005.
- The total estimated cost of fatal falls (medical, lost work and decreased quality of life), was \$646 million annually in Ohio of which medical costs (\$11.7 million) represented only 2 percent. Indirect costs such as work-loss (\$145 million) and diminished quality-of-life (\$489 million) were far more substantial. The same is true for non-fatal, hospital-admitted falls; medical costs represent only 8 percent, (\$496 million) of the staggering \$6.2 billion annually in Ohio. Work-loss costs (\$526 million) for non-fatal falls were slightly higher, while quality-of-life costs accounted for the overwhelming majority (84 percent).

Falls result in severe injuries.

- Hip fractures were the most frequent fall-related injuries, followed by lower limb and upper limb fractures. In Ohio, more than 25,000 fall-related hip fractures occurred from 2002-05.
- Most (79 percent) females hospitalized for a fall fractured their lower or upper limb, pelvis and/or hip.
- A significant number of treated fallers (8,211) also required treatment for traumatic brain injury (TBI). More than one in four TBIs in Ohio were associated with falls.
- From 2002-05, the proportion of fall-related HIDs with TBI increased each year, as did HID rates with fall-related TBI.

The circumstances of a fall (i.e., type and location of fall) can be useful in designing prevention efforts; however, they are frequently missing in injury data.

- The type (e.g., stairs/steps, furniture) of fall was unspecified for more than half of all fatal falls. For HIDs, the proportion of unspecified fall type increased with age from 8 percent for infants to nearly half (47 percent) for ages 85 and older. A more thorough accounting of the circumstances surrounding these falls would greatly enhance future prevention efforts.
- For location of fall, the percent missing or unknown was 69 for ER visits, 60 for HIDs and 15 for deaths. When location was known, most falls occurred in the home: 61 percent of ER visits, 84 percent of HIDs and 70 percent of deaths. The proportions were greatest for those ages 4 and younger and 65 and older.
- Children and youth are at higher risk for specific types of falls at different age groups. For example, infants and toddlers fall more from furniture and down stairs while older children fall more during sports- and recreation-related activities.
- There are gender differences in risk for type of fall. For sports- and recreation-related falls in particular, young males were at the highest risk, except for playground-related falls where the risk was nearly identical for both males and females.

There are significant gender differences in fall-related injury .

- Females accounted for approximately two out of three fall-related HIDs (44,049 of 66,845).
- Among younger persons (through age 54) treated for a fall-related injury, males were overrepresented, while older fallers were increasingly more likely to be female.
- Both mean charges and length of stay were greater for males than females in every age group.
- Nearly three-fourths of treated, fall-related hip fractures occurred among women: 18,605 females and 6,711 males. Males are at greater overall risk for TBIs.

Falls are a notable problem in the workplace.

- Falls are the second-leading cause of fatal occupational injury after transportation-related injury. From 2003-06, 87 deaths in the workplace were due to falls, accounting for 11 percent of all fatal occupational-related injuries.

FALLS AMONG OLDER OHIOANS- AGES 65 AND OLDER

Falls are particularly harmful to older adults. Falls and fall-related injury seriously affect older adults' quality of life and present a substantial burden to the Ohio health-care system. They easily surpass all other mechanisms of injury as a cause of ER visits, hospitalization and death. For this reason, the falls report focuses special attention on this urgent public health issue. Important findings related to falls among older adults include:

Falls among older adults have reached epidemic proportions and rates continue to rise.

- From 2002-05, there were more than two and a half (2.6) fall-related ER visits for every 100 Ohio older adults and nearly eight (7.7) fall-related HIDs for every 1,000 Ohio older adults.
- Fall death rates among older Ohioans have increased 56 percent since 1999, and will continue to increase as the baby-boomers skew population dynamics. The proportion of Ohioans aged 65 and older is projected to increase by 50 percent from 2010 – 2030. The 515 fatal falls among those 65 or older in 2002 are expected to increase to nearly 900 by 2009.

Older adults account for a disproportionate share of fall-related injury.

- In 2005, persons 65 and older accounted for 20 percent of all fall-related ER visits, 71 percent of fall-related inpatient discharges and *81 percent of deaths*, while they represented only 13 percent of the overall Ohio population.
- Fall-related ER visit and hospitalization rates for Ohioans 65 years and older were higher than rates for all other injuries combined.

The likelihood of falling and the severity of fall-related injury increases with age, and therefore the risk for hospitalization and death.

- Mean age increased when comparing fall-related ER visits (37.5 years), HIDs (70.1 years) and deaths (76.2 years).
- Younger Ohioans were more likely to be treated in an ER for fall-related injuries and not to require an overnight stay in the hospital. Mean length of stay in days increased with age.
- More than 90 percent of fall-related hip fractures occurred among those 65 years and older, and nearly half (48.7 percent) of fall-related HIDs among those 65 and older had a hip fracture.

Age and gender play a large role in determining risk for type of fall.

- For males, type of fall was largely determined by their activities, while for females, health issues frequently associated with aging may have played a greater role.
- The likelihood that a fall occurred on the same level from a slip, trip, or stumble as opposed to falling from one level to another (e.g., down stairs, off a cliff, etc.) increases with age, particularly for females.

Older adults with poor health status and those who are isolated are at greater risk for falling.

- BRFSS respondents with diabetes, eye disease, obesity, heart disease or stroke had a higher prevalence of falls in the past three months than those without. Social isolation is a risk factor for fatal falls. Married elders were significantly less likely to die from a fall than the unmarried.

Fatal and medically-treated falls represent only a proportion of all falls among older adults.

- As reported in the 2006 BRFSS results, 14.3 percent of Ohio respondents aged 65 and older indicated that they fell during the previous three months, projecting to a total of approximately 215,000 persons who suffered at least one fall. Nearly one-third of those who fell (31.6 percent), or an estimated 69,000, reported sustaining an injury that resulted in a doctor visit or restricted activity.
- The psychological consequences of a fall can be severe, resulting in fear and decreased quality of life from self-imposed restriction of activities, social isolation and depressive symptoms.

Additional resources for prevention of falls among older adults are needed.

- Due to the large and growing burden of fall-related injury in Ohio, especially among older Ohioans over 65 years, additional resources are needed at both the state and local level for evidence-based prevention initiatives.
- **Falls are not a normal part of aging.** There are simple steps that older adults can take to reduce their risk for a fall. Additional resources including checklists and brochures are available from the CDC at: <http://www.cdc.gov/ncipc/duip/preventadultfalls.htm>.

DEFINING THE BURDEN OF FALLS IN OHIO, 2002-2005

Falls are the leading cause of nonfatal, medically attended injuries, and the third-leading cause of unintentional injury death for all ages, in Ohio and the United States.¹ Approximately 95 percent of fatal falls in Ohio and nationwide are unintentional or “accidental.” About 4 percent are the result of suicide and only 0.1 percent the result of homicide. Almost all (99.6 percent) non-fatal fall-related injuries in the United States are unintentional.²

The number and rates of fall-related injuries have been increasing over time, in large part due to an aging population increasingly disposed to fall.³

In the United States and Ohio, females had higher rates of fall-related HIDs (217 and 159 per 100,000, respectively), compared to males (186 and 115 per 100,000, respectively), Table 2. Lack of E-coding for 28 percent of injury-related HIDs from Ohio hospitals may account for much of the disparity between the state and national rates.

Males were more likely to be the victim of a fatal fall (8.57 and 8.96 per 100,000, respectively) than were females (4.86 and 5.49 per 100,000, respectively). The Healthy People 2010 goal is three fatal falls per 100,000 persons each year, (<http://www.healthypeople.gov>), which Ohio currently exceeds.

Table 2. Fall death and hospital inpatient discharge rates¹ for Ohio and United States, 2005

FALLS	HID Rates			Death Rates		
	total	male	female	total	male	female
Ohio	143.5 ^{2,3}	115.3 ^{2,3}	158.5 ^{2,3}	6.93 ⁴	8.96 ⁴	5.49 ⁴
US	208.05 ⁵	186.29 ⁵	216.69 ⁵	6.37 ⁶	8.57 ⁶	4.86 ⁶

¹ Age-adjusted, per 100,000

² Source: Ohio Hospital Association

³ E-codes missing for 28% of injury-related discharges

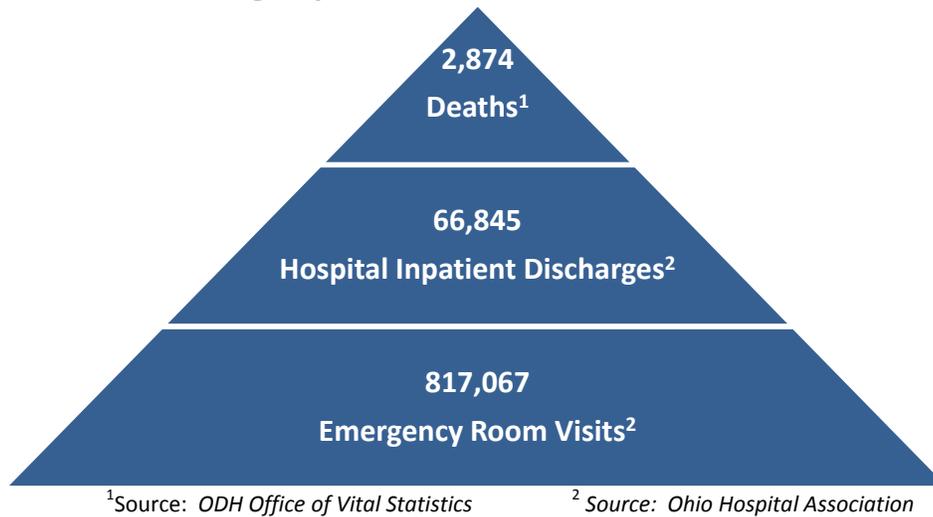
⁴ Source: Ohio Department of Health, Office of Vital Statistics

⁵ Source: National Electronic Injury Surveillance System, (NEISS), 2005

⁶ Source: Web-based Injury Statistics Query and Reporting System (WISQARS™), Deaths 2005
<http://www.cdc.gov/ncipc/wisqars/>

Although deaths are clearly the most serious consequences of falls, they represent only the tip of the iceberg when assessing the burden of falls in Ohio. From 2002-2005, there were 2,874 deaths, 66,845 HIDs and 817,067 ER visits due to falls, Figure 1. For this period, there were 303,895 hospital days and \$1.2 billion in direct medical charges. These charges do not begin to represent the total cost of fall-related injuries to society, including lost productivity, rehabilitation and other intangible costs such as quality-of-life. West Virginia University Injury Control Research Center has produced state-specific injury data tables examining the cost of nonfatal, hospital-admitted injuries by Ohio residents based on 2003 incidence. Nonfatal, hospital-admitted unintentional falls cost Ohioans \$526 million in work loss costs, \$488 million in medical costs and \$5.2 billion in quality of life costs for a total of **\$6.2 billion** (in 2005 dollars) for just one year.⁴

Figure 1. Number of fall-related deaths, hospital inpatient discharges and emergency room visits, Ohio residents, 2002-05.



For each fall-related death in Ohio in 2005, there were approximately 23 HID and 284 ER visits, Table 3. These ratios are less than the national estimates, likely due to incomplete E-coding and underreporting of Ohioans treated at hospitals outside the state. Nevertheless, on average, there was a fall-related ER visit every 2.4 minutes in Ohio.

Table 3. Ratio of fall-related HID and ER visits to fatal falls, Ohio and United States, 2005.

	Ratio of:	
	HID to deaths ²	ER visits ¹ to deaths ²
Ohio	23	284
US	39	399

¹Source: Ohio Hospital Association

²Source: ODH Office of Vital Statistics

Falls that resulted in more serious consequences, i.e. death or hospital admission, were more likely to occur in the elderly than those that required only treatment at (and release from) an ER. Females made up almost two-thirds of fall-related discharges, but less than half of the fatal falls, Table 4.

Table 4. Mean age and proportion of females for fall-related outcomes, Ohio residents, 2002-05.

	mean age (years)	proportion female
Deaths¹	76.2	49.2%
HIDs²	70.1	65.9%
ER visits²	37.5	55.5%

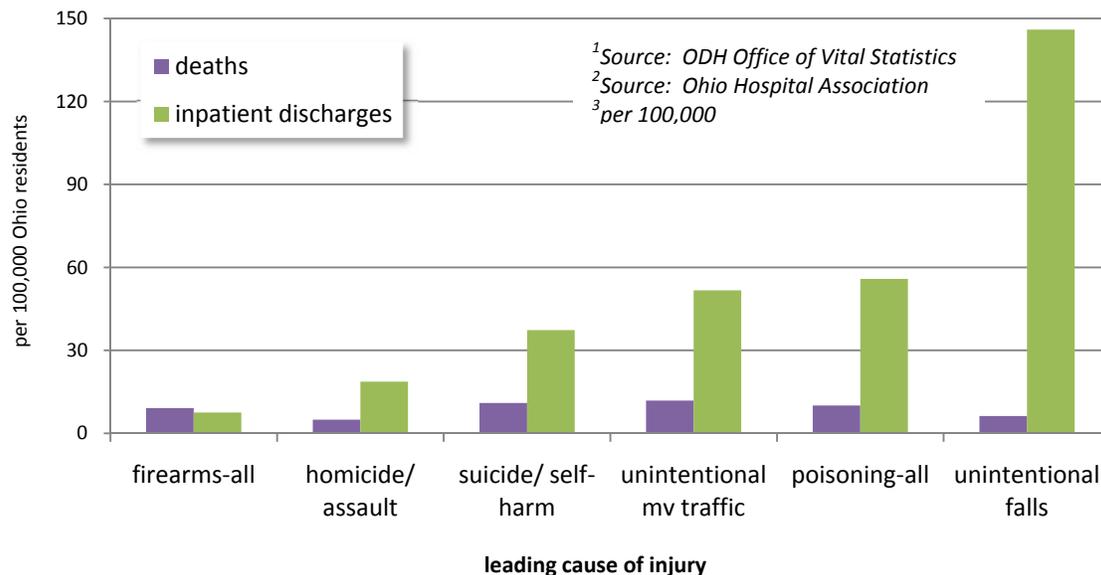
¹Source: ODH Office of Vital Statistics

²Source: Ohio Hospital Association

THE BURDEN OF FALLS IN COMPARISON TO OTHER INJURIES

Figure 2. demonstrates the relatively high HID rates of fall-related injury (145.6 per 100,000) compared to other leading causes of injury. For the period 2002-2005, the fall-related average annual HID rate was 130 percent higher than the HID rate for the second-leading cause of injury, poisonings of all intents. Although falls accounted for about 45 percent of injury-related HIDs, this did not correspond to a higher rate of death; motor vehicle traffic crashes were responsible for the greatest number of fatal injuries.

Figure 2. Average annual injury death¹ and inpatient discharge² rates³ for leading causes of injury, Ohio, 2002-05



As Table 5. demonstrates, among the leading causes of unintentional injury death by age, falls are ranked first for Ohioans aged 75 years and older, third for those aged 65 – 74 years, fourth for ages 55-64 years and fifth for ages 35-54 years (data not shown).

Falls are the leading cause of injury-related inpatient hospitalization at both ends of the age spectrum in Ohio and the United States.¹ For children 14 years and younger and adults aged 45 years and older, falls lead to more hospitalizations than any other injury. They are also the third-leading cause of hospitalizations for ages 35 to 44 and the fourth for ages 15 to 34 (Table 5).

Table 5. Leading causes of injury deaths¹ by intent²; hospital inpatient discharges³ and emergency room visits³ by age-group, Ohio residents, 2002-2005

Age-Group	Leading Causes (All Intents ⁴)	Deaths by Intent ² (Unintentional unless Homicide/Suicide)	Hospital Inpatient Discharges	Emergency Room Visits
<1	1. Suffocation (194) 2. Drowning (14) 3. MV Traffic (8) 4. Fire/burn (8)	1. Suffocation (178) 2. Homicide (57) 3. Drowning (10) 4. MV Traffic/Suffocation/Undetermined (8 ea)	1. Falls (193) 2. Assault (191) 3. Other Specified (41) 4. Poisoning (35)	1. Falls (9,294) 2. Struck by/against (2,617) 3. Other Specified (1,559) 4. Ntl Environment (819)
1-4	1. Drowning (66) 2. Fire/burn (53) 3. MV Traffic (48) 4. Suffocation (28)	1. Drowning (62) 2. Homicide (57) 3. MV Traffic (48) 4. Fire/burn (43)	1. Falls (572) 2. Poisoning (407) 3. MV Traffic (253) 4. Hot Object/burn (141)	1. Falls (75,619) 2. Struck by/against (34,312) 3. Other Specified (18,606) 4. Ntl Environment (14,129)
5-14	1. MV Traffic (177) 2. Suffocation/hanging (65) 3. Fire/burn (58) 4. Drowning/Firearm (42 ea)	1. MV Traffic (177) 2. Suicide (57) 3. Homicide (49) 4. Fire/burn (44)	1. Falls (1,385) 2. MV Traffic (1,084) 3. Struck by/against (514) 4. Oth land transport (489)	1. Falls (131,982) 2. Struck by/against (115,452) 3. Overexertion (39,295) 4. Cut (37,266)
15-24	1. MV Traffic (1,359) 2. Firearms (834) 3. Poisoning (453) 4. Suffocation/hanging (288)	1. MV Traffic (1,354) 2. Suicide (646) 3. Homicide (633) 4. Poisoning (367)	1. MV Traffic (5,976) 2. Self-harm (3,932) 3. Assault (2,546) 4. Falls (1,473)	1. Struck by/against (115,612) 2. MV Traffic (106,304) 3. Falls (99,403) 4. Overexertion (85,893)
25-34	1. MV Traffic (832) 2. Firearms (809) 3. Poisoning (803) 4. Suffocation/hanging (282)	1. MV Traffic (830) 2. Suicide (817) 3. Poisoning (626) 4. Homicide (559)	1. MV Traffic (3,889) 2. Self-harm (3,794) 3. Assault (2,111) 4. Falls (1,827)	1. Falls (91,975) 2. Overexertion (84,952) 3. Struck by/against (70,484) 4. MV Traffic (68,565)
35-44	1. Poisoning (1,354) 2. MV Traffic (845) 3. Firearms (668) 4. Suffocation/hanging (320)	1. Poisoning (1,034) 2. Suicide (1,019) 3. MV Traffic (835) 4. Homicide (391)	1. Self-harm (4,561) 2. MV Traffic (3,963) 3. Falls (3,350) 4. Assault (1,887)	1. Falls (96,488) 2. Overexertion (72,837) 3. Struck by/against (56,332) 4. MV Traffic (56,205)
45-54	1. Poisoning (1,325) 2. MV Traffic (757) 3. Firearms (696) 4. Suffocation/hanging (247)	1. Suicide (1,045) 2. Poisoning (1,009) 3. MV Traffic (755) 4. Homicide (282)	1. Falls (5,081) 2. MV Traffic (3,389) 3. Self-harm (2,979) 4. Poisoning (1,412)	1. Falls (90,173) 2. Overexertion (45,445) 3. MV Traffic (41,536) 4. Struck by/against (36,702)
55-64	1. MV Traffic (482) 2. Firearms (413) 3. Poisoning (378) 4. Fall (231)	1. Suicide (608) 2. MV Traffic (480) 3. Poisoning (237) 4. Falls (222)	1. Falls (5,906) 2. MV Traffic (2,047) 3. Self-harm (888) 4. Poisoning (747)	1. Falls (61,668) 2. MV Traffic (20,991) 3. Overexertion (18,800) 4. Cut/pierce (18,030)
65-74	1. MV Traffic (373) 2. Falls (370) 3. Firearms (298) 4. Suffocation/hanging (138)	1. MV Traffic (370) 2. Suicide (365) 3. Falls (362) 4. Unspecified (121)	1. Falls (9,044) 2. MV Traffic (1,301) 3. Poisoning (628) 4. Self-harm (274)	1. Falls (51,049) 2. MV Traffic (10,752) 3. Cut/pierce (9,140) 4. Struck by/against (8,256)
75-84	1. Falls (930) 2. MV Traffic (409) 3. Firearms (280) 4. Suffocation/hanging (264)	1. Falls (928) 2. MV Traffic (409) 3. Unspecified (381) 4. Suicide (342)	1. Falls (19,859) 2. MV Traffic (1,296) 3. Poisoning (495) 4. Unspecified (393)	1. Falls (66,885) 2. MV Traffic (6,708) 3. Struck by/against (6,482) 4. Cut (5,287)
85+	1. Falls (1,032) 2. Suffocation/hanging (285) 3. MV Traffic (169) 4. Firearm (87)	1. Falls (1,027) 2. Unspecified (711) 3. Suffocation/hanging (263) 4. MV Traffic (169)	1. Falls (18,148) 2. MV Traffic (440) 3. Unspecified (329) 4. Poisoning (215)	1. Falls (42,512) 2. Struck by/against (2,847) 3. Overexertion (1,577) 4. Cut (1,504)
Totals	1. MV Traffic (5,459) 2. Poisoning (4,433) 3. Firearms (4,134) 4. Falls (2,994)	1. MV Traffic (5,435*) 2. Suicide (5,023*) 3. Poisoning (3,459*) 4. Falls (2,874*)	1. Falls (66,845*) 2. MV Traffic (23,670*) 3. Self-harm (17,089*) 4. Assault (8,545*)	1. Falls (817,067*) 2. Struck by/against (465,438*) 3. Overexertion (370,253*) 4. MV Traffic (337,825*)

¹ Source: Ohio Dept. of Health, Office of Vital Statistics

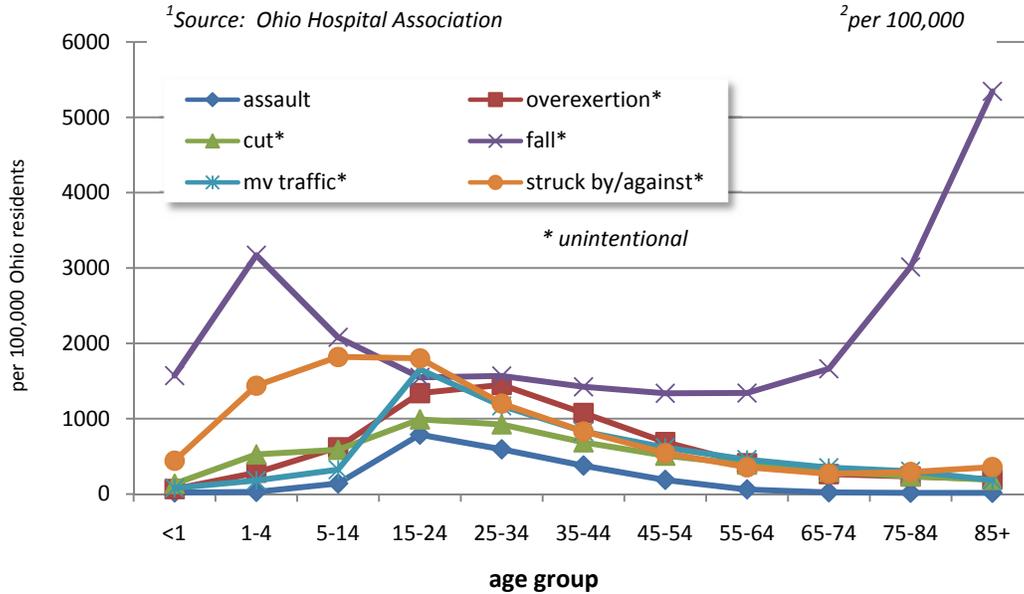
² Intent: The state of mind of persons involved in an injury episode which forms the basis for categorizing an injury as unintentional (traditionally termed accidental), as homicide/assault, as suicide/self-inflicted or as unable to be determined

³ Source: Ohio Hospital Association

⁴ Includes all injury deaths for this leading cause, whether unintentional, suicide/self-inflicted, homicide, pending investigation or could not be determined

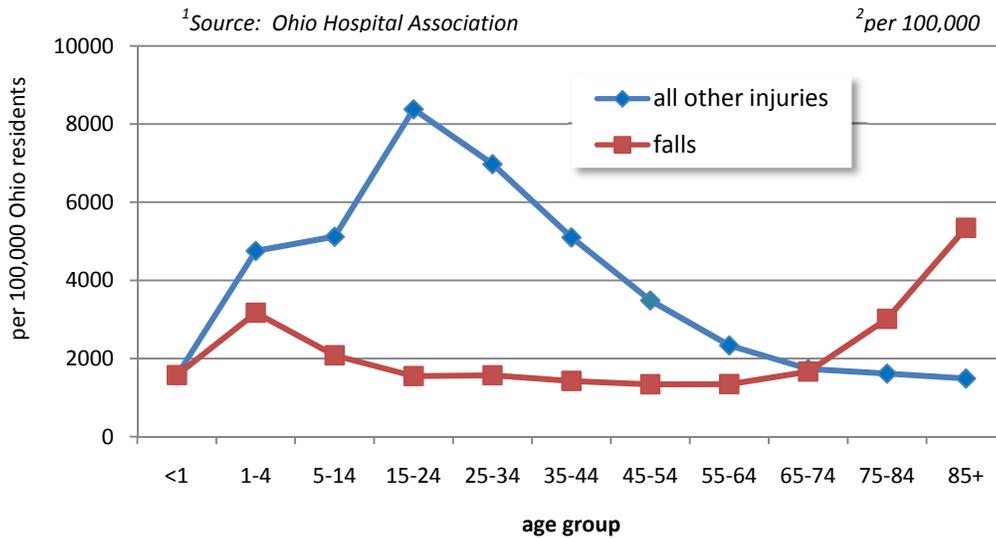
Falls were the leading cause of injury-related ER visits for all age groups except 15-24-year-olds, for which they were the third-leading cause, Figure 3. On average, each year, there was an injury-related ER visit for one of every 12 15-24-year-olds, (total visits for all causes not shown).

Figure 3. Average annual emergency room visit rates^{1,2} for leading causes of injury, by age group, Ohio, 2002-05



For those 65 and older, fall-related ER visit rates were higher than those for all other (non-fall) injuries combined, Figure 4. However, 15-34-year-olds were the most likely to visit an ER.

Figure 4. Average annual fall-related and all other injury ER visit rates^{1,2}, by age group, Ohio, 2002-05

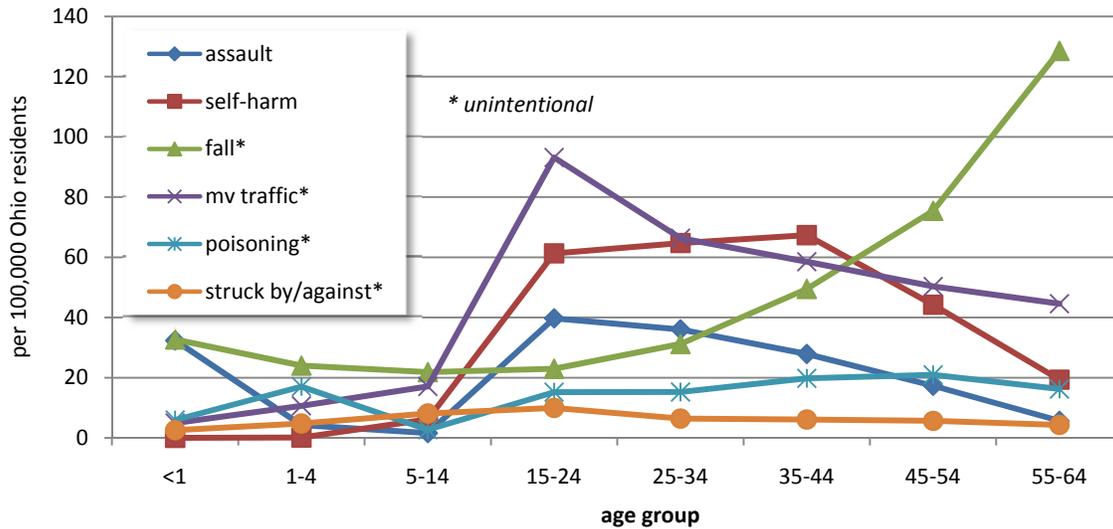


For the most part, fall-related HID rates increased as age increased, with the exception of those 4 years of age or younger. Other types of injuries peaked in the early- to mid-adult age groups, Figures 5-7. Although other injury rates peaked at younger ages than those for falls, there was considerable variability as to which age group was the most vulnerable to a specific type of injury, Figure 5. For the time period under study, 35-44-year-olds were the most likely to be hospitalized for self-harm and 45-54-year-olds for unintentional poisoning, while 15-24-year-olds were the most likely to be victims of an assault or a motor vehicle crash.

Figure 5. Average annual inpatient discharge rate^{1,2}, for leading causes of injury, by age group, ages 0-64, Ohio, 2002-05

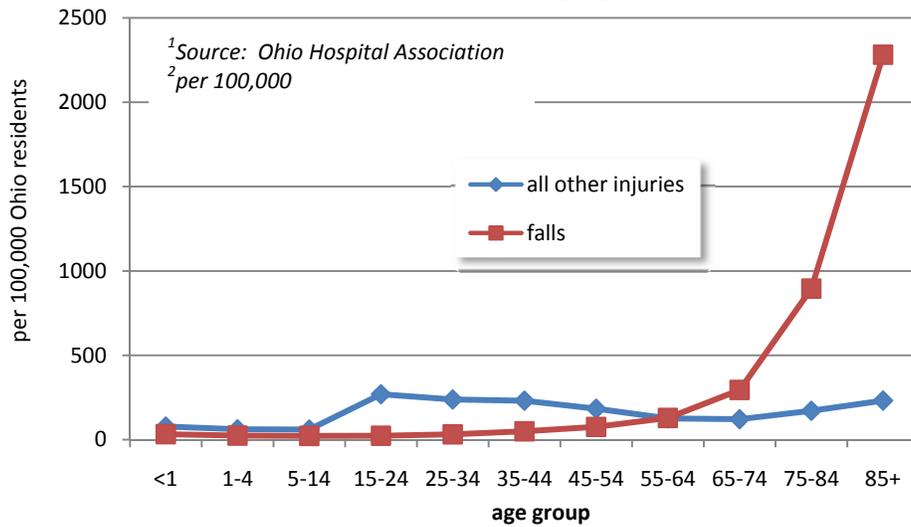
¹Source: Ohio Hospital Association

²per 100,000



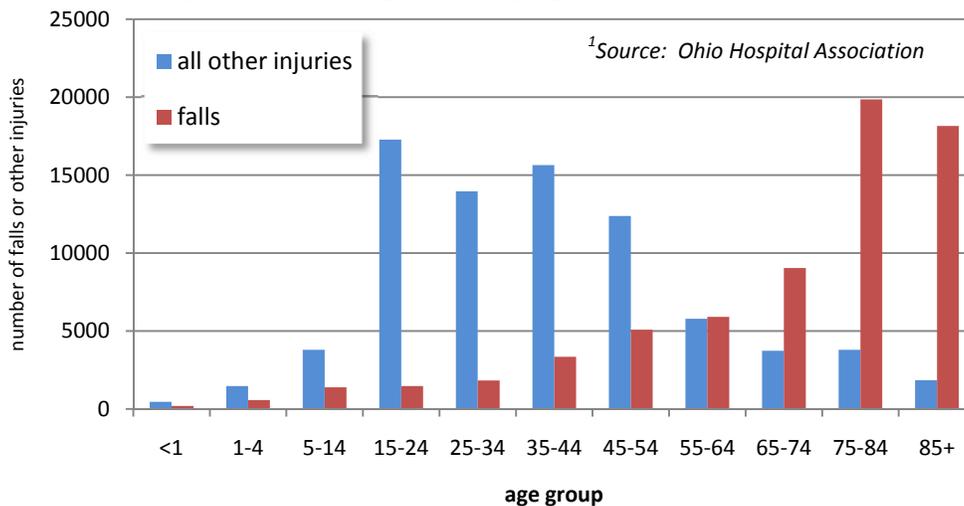
The average fall-related injury hospitalization rates were greater than the average rates for all other injuries combined among older adults (65+ years), Figure 6. In each year from 2002 to 2005, there was more than one fall-related discharge for every 50 Ohioans aged 85 years or older (average rate = 2,282 per 100,000). For all other injuries combined (i.e., excluding falls), discharge rates peaked among 15-24-year-olds, averaging a little more than one of every 400 Ohioans of that age group each year (average rate = 269 per 100,000).

Figure 6. Average annual fall and all other injury combined hospital discharge¹ rates², by age group, Ohio, 2002-05



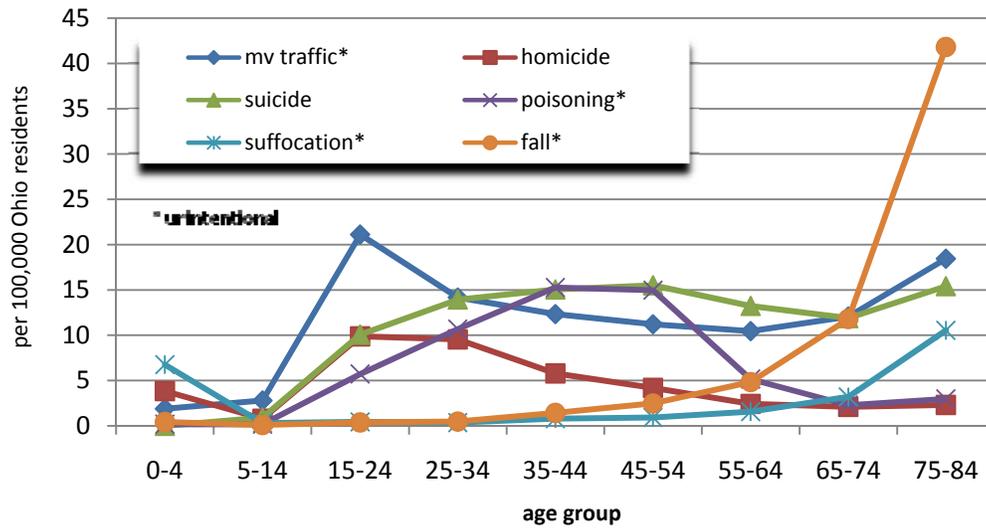
By examining the actual number of fall-related discharges versus all other injury discharges, the burden of falls on older Ohioans becomes very clear. After age 55, falls accounted for more discharges than all other injury causes combined, Figure 7.

Figure 7. Number of fall-related and all other injury inpatient discharges¹, by age group, Ohio, 2002-05



Similar to HID rates, fall-related death rates were highest among the oldest age groups, Figure 8. Death rates associated with motor vehicle traffic crashes and homicides (assaults) peaked among 15-24-year-olds, as was also noted with HID rates, Figure 5.

Figure 8. Average annual death rates^{1,2}, for leading causes of injury, by age group, ages 0-84, Ohio, 2002-05

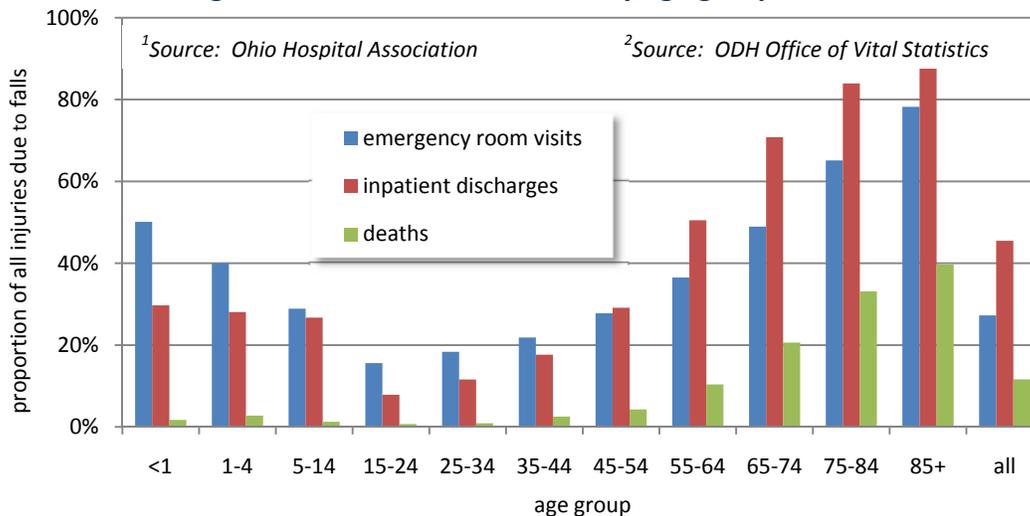


¹Source: ODH Office of Vital Statistics

²per100,000

For all Ohioans, falls accounted for 45 percent of injury-related inpatient hospitalizations and 27 percent of ER visits in the study period, Figure 9. The proportions of hospitalizations and ER visits attributable to a fall decreased with age up to 24, and then increased consistently from age 25 and up. Fall-related injuries represented the smallest proportion of all hospitalized injuries among ages 15-24 (6.3 percent). For persons 85 or older, nine out of 10 injury-related inpatient hospitalizations and 78 percent of injury-related ER visits were due to falls. Falls accounted for half of all injury-related ER visits and nearly one-third of inpatient hospitalizations among infants. For children younger than 14 years, approximately 28 percent of injury-related hospitalizations and 39 percent of ER visits were due to falls, Figure 9.

Figure 9. Proportion of injury-related ER visits¹, inpatient discharges¹, and deaths² due to falls, by age group, Ohio, 2002-05



¹Source: Ohio Hospital Association

²Source: ODH Office of Vital Statistics

FATAL FALLS

FATAL FALLS BY RACE, GENDER, AGE GROUP

From 2002-2005, 2,874 Ohioans died from a fall. Overall, the number of such fatalities climbed consistently each year, with a dramatic increase (15 percent) from 2004 to 2005, Table 6. Whites were at considerably greater risk than blacks. White males were almost twice as likely to die from a fall as black males, and white females almost three times as likely as black females to die from a fall.

Table 6. Number and annual rate (per 100,000) of fatal falls by sex and race, Ohio, 2002-2005

year	white male		black male		white female		black female		overall ¹	
	no.	rate	no.	rate	no.	rate	no.	rate	no.	rate
2002	308	6.43	17	2.58*	298	5.92	11	1.51*	635	5.56
2003	299	6.23	27	4.06	327	6.50	16	2.17*	672	5.87
2004	362	7.53	26	3.87	324	6.44	16	2.16*	729	6.36
2005	388	8.07	29	4.29	397	7.90	22	2.95	838	7.31
total #/ avg rate	1,357	7.07	99	3.70	1,346	6.15	65	2.20	2,874	6.28

*Rates may be unstable due to small numbers

¹ Overall numbers and rates include all races, (in addition to black and white)

Figure 10 shows the number of fatal falls by gender and race. From 2002 to 2005, 2,703 whites and 164 blacks died after falling. White males and females alternated each year of the four-year period as to who contributed the greatest number to fall mortality.

Figure 10. Number of fatal falls¹ by race, gender, year, Ohio, 2002-05

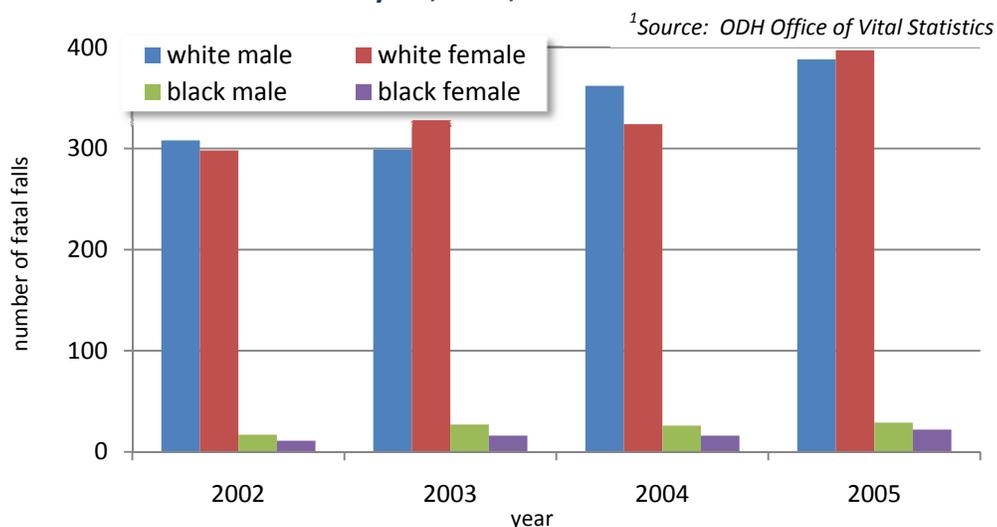
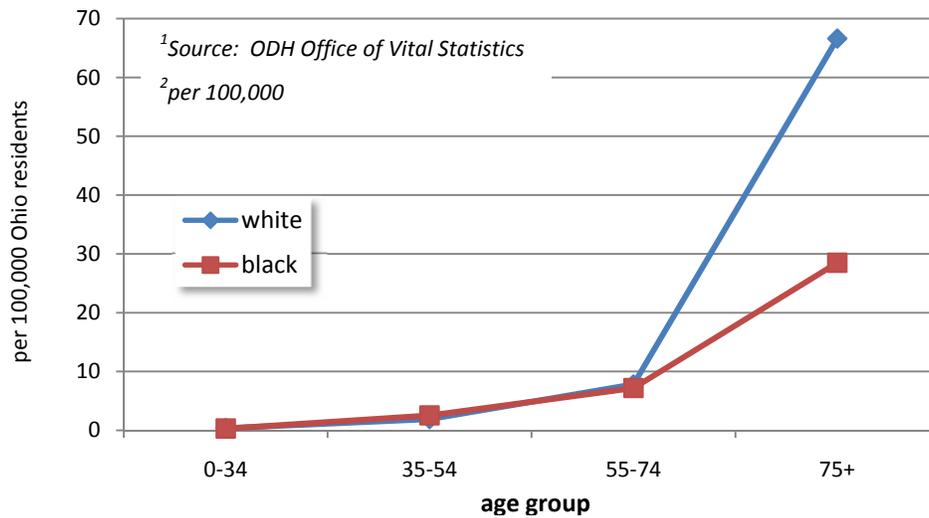


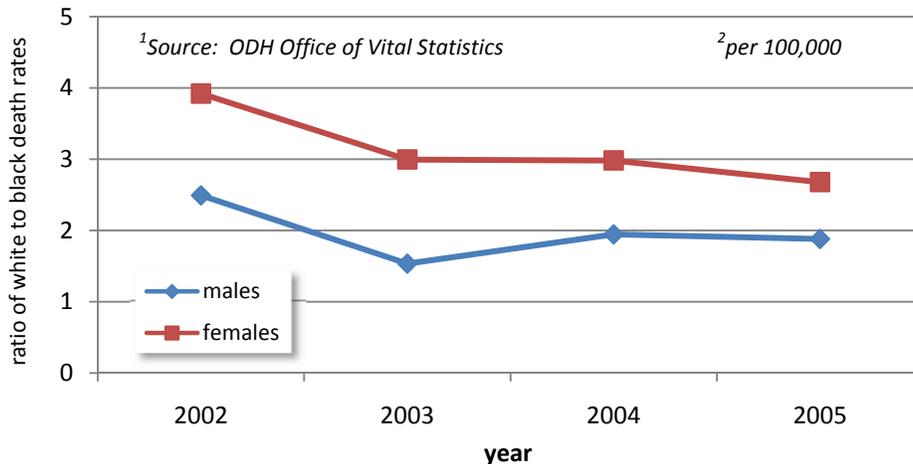
Figure 11 clearly illustrates that the excess risk of dying from a fall exhibited by whites is almost entirely attributable to the elderly. Until age 75, race-specific rates are nearly identical. After this point, rates for whites (66.6 per 100,000) are more than double those for blacks (28.5 per 100,000).

Figure 11. Average annual fall death rate^{1,2}, by race, age group, Ohio, 2002-05



The ratios of fatal fall rates of white to black Ohioans decreased for both males and females, indicating that the elevated risk to whites moderated slightly over the four-year period, Figure 12. In 2002, white females were nearly four times as likely to die from a fall as black females; in 2005, it decreased to less than three times. Following a similar pattern, the risk ratio for white to black males was two and a half in 2002, decreasing to two in 2005.

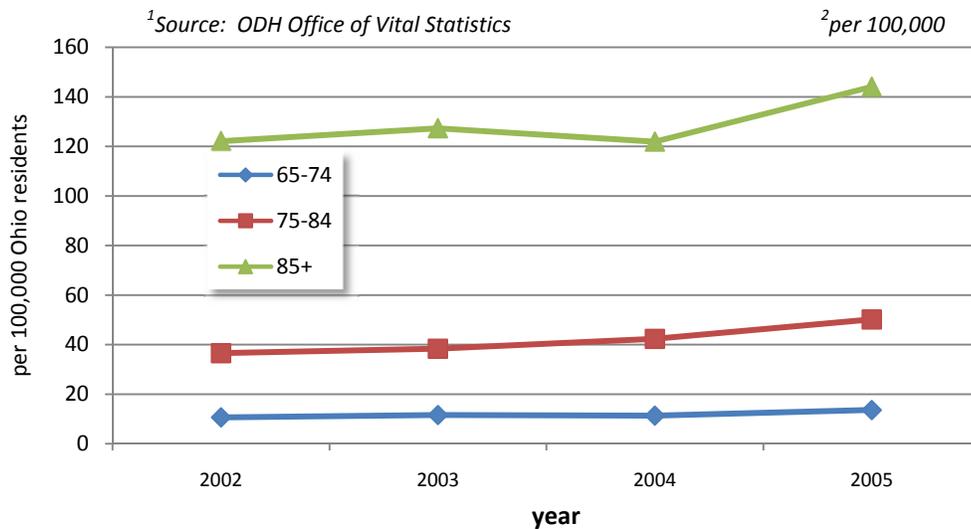
Figure 12. Ratios of fatal fall rates^{1,2} between whites and blacks, by sex, year, Ohio, 2002-05



Most fatal falls (2,317 of 2,874) occurred in Ohioans older than 65 years. For each of the older age groups, from 2002 to 2005, rates have increased by: 28 percent (10.6 – 13.6 per 100,000) for those aged 65 to 74 years; 37 percent (36.5 – 50.1 per 100,000) for 75-84-year-olds; and 18 percent (122.0 – 144.0 per 100,000) for those 85 and older, Figure 13.

These increases were seen for each of the genders. From 2002-2005, the death rate increased 26.7 percent (38.7 – 49.0 per 100,000) for males and 34.9 percent (30.8 – 41.6 per 100,000) for females aged 65 and older, (data not shown).

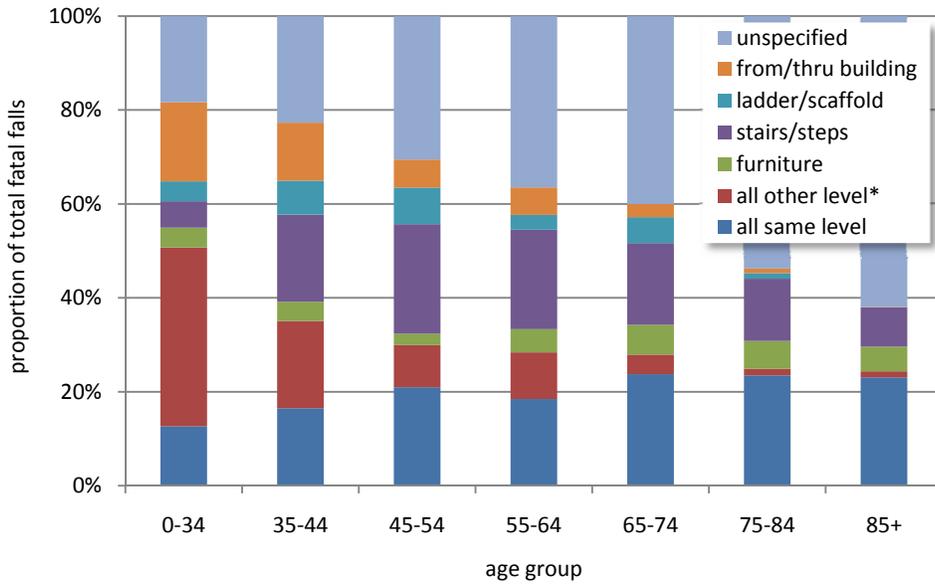
Figure 13. Fatal fall rates^{1,2}, by age group, year, ages 65 and older, Ohio, 2002-05



FATAL FALLS BY TYPE OF FALL, AGE GROUP, SEX

Examining type of fatal falls, the proportion of *unspecified* falls (see Appendix B or ‘How do Ohioans Fall’ section for a description of fall type categories) increased with age while the proportion of falls from one level to another (*all other level*) decreased, Figure 14. Fifty-nine percent of the fatal falls among those aged 34 and younger, resulted from falls to “all other level,” which accounted for only 1.4 percent of deaths among those 85 and older, (Figure 16 depicts *ladder/scaffold* and *from/thru building* separately). Among specified falls, *stairs/steps* accounted for the greatest proportion of deaths among those aged 45 to 64. The proportion of fatal falls attributable to *all same level* ranged from 12.7 percent for those 34 and younger to 23.1 percent for those 85 and older. *Unspecified* falls ranged from 18.3 percent for those 34 or younger to 61.9 for persons 85 and older.

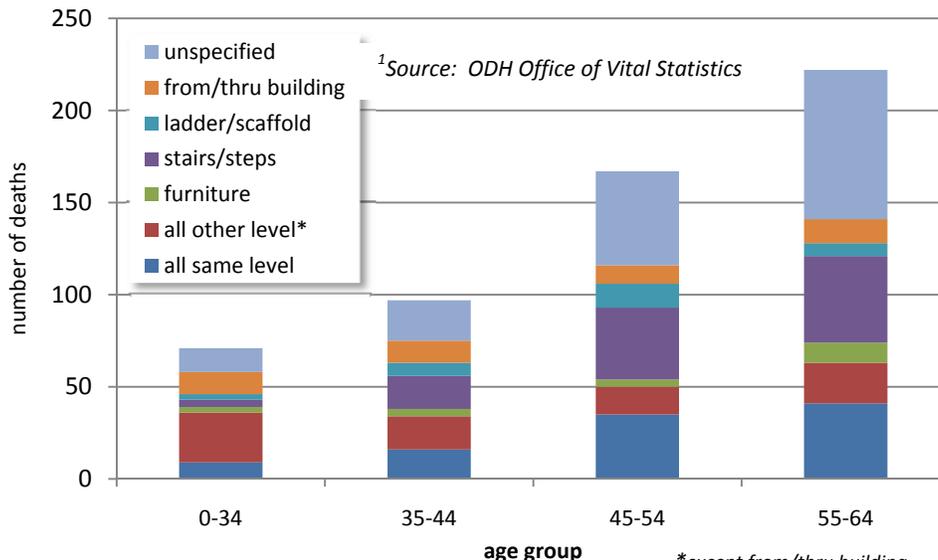
Figure 14. Proportional distribution of types of fatal falls¹, by age group, Ohio, 2002-05



¹Source: ODH Office of Vital Statistics *except from/thru building, ladder/scaffold

Excluding the elderly, Figure 15, it is easier to see that the number of falls on *all same level*, on *stairs/steps* and *unspecified* falls contributed an ever larger number of deaths with each succeeding age group, while the number of falls from *all other level* and *from/thru building* either decreased or remained fairly constant as age increased.

Figure 15. Number of deaths¹, by type of fall, age group, ages 0-64, Ohio, 2002-05

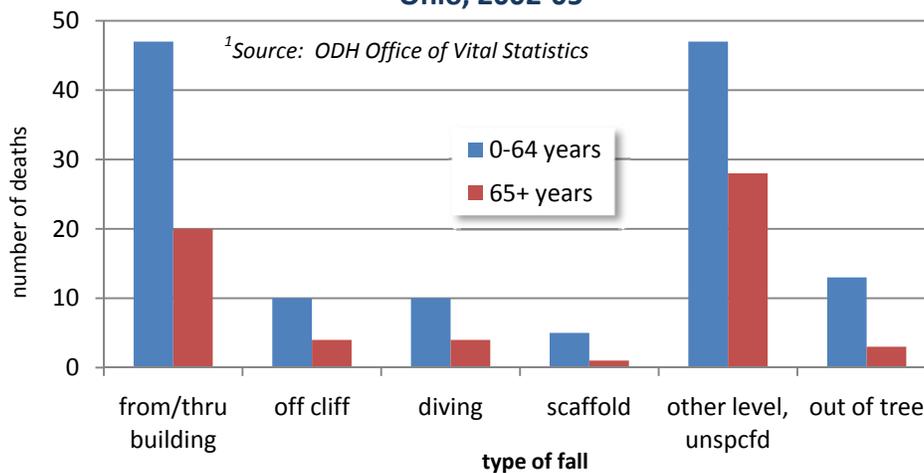


¹Source: ODH Office of Vital Statistics

*except from/thru building, ladder/scaffold, furniture

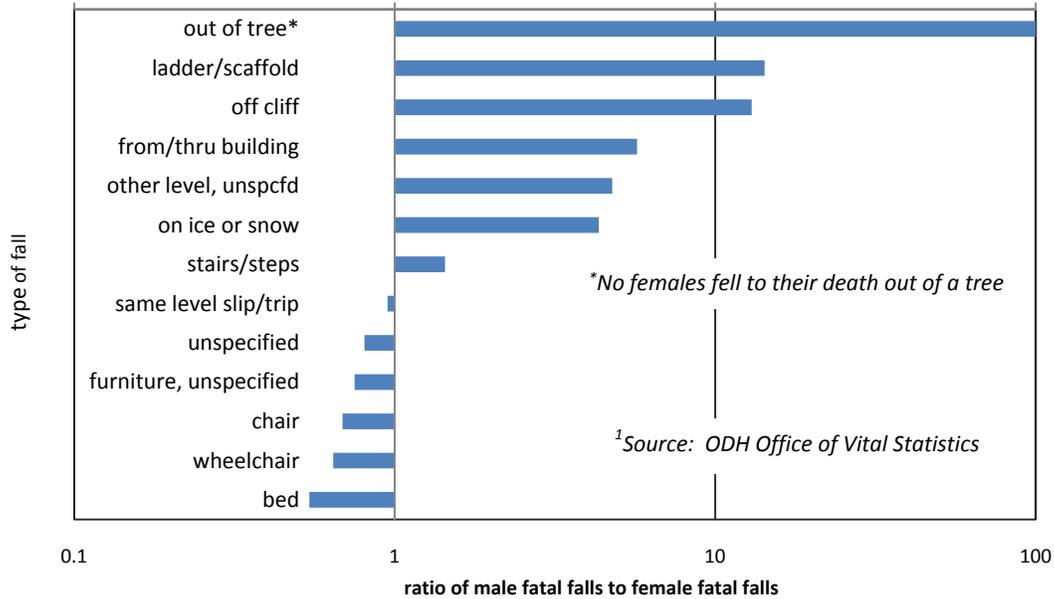
From 2002 to 2005, Ohioans 65 and older accounted for four times as many total fatal falls (n=2,317) as did those younger than 65 (n=557). Figure 16 depicts the few circumstances for which the non-elderly experienced more fatalities than did those aged 65 years and older. Each of these latter types of falls are more likely to be associated with active work or more adventuresome activities likely involving greater height.

Figure 16. Types of falls that resulted in more fatalities¹ among persons 64 or younger compared to 65 or older, Ohio, 2002-05



From 2002-2005 in Ohio, there were 1,460 fatal falls among males and 1,414 among females. The crude death rates for males and females were 6.6 and 6.0 per 100,000, respectively. Figure 17 displays the ratio of male to female deaths, by type of fall. Females were more likely to suffer a fatal fall from furniture: *furniture, unspecified*; a *chair*, a *bed* or a *wheelchair*. Males were more likely to fall from greater height: *ladder/scaffold*; *off cliff*; *from/thru building*; or *other level, unspecified*. Eleven percent of females were younger than 65 when they fell to their death, while 28 percent of fatal falls among males were in this age group, (data not shown).

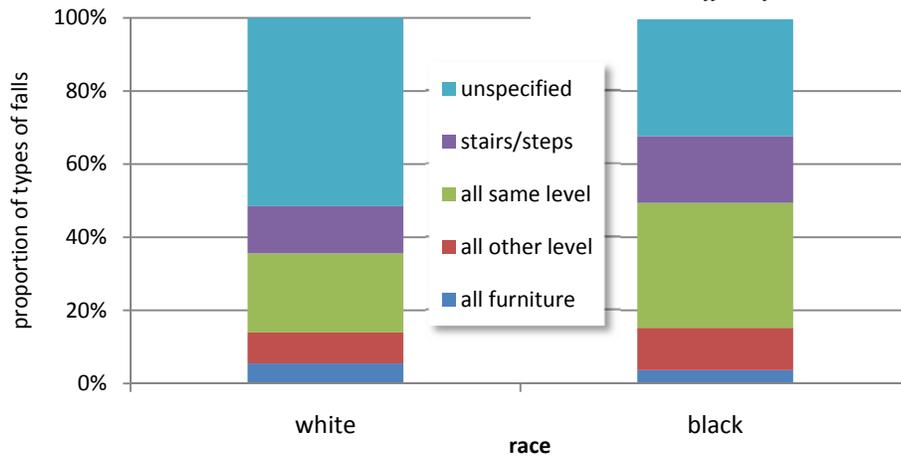
Figure 17. Ratio of male to female deaths¹ for selected types of falls, Ohio, 2002-05



Deaths among blacks appeared more likely to be attributable to falls from *all same level* (33.5 percent) or on *stairs/steps* (18.3 percent) when compared to whites (20.9 percent and 12.9 percent, respectively), Figure 18. However, because such a large proportion of fatal falls were classified as *unspecified*, (51.5 percent among whites and 32.3 percent among blacks), the true nature of race-specific fatal fall risk was not discernable.

Figure 18. Proportional distribution of types of fatal falls¹, by race, Ohio, 2002-05

¹Source: ODH Office of Vital Statistics



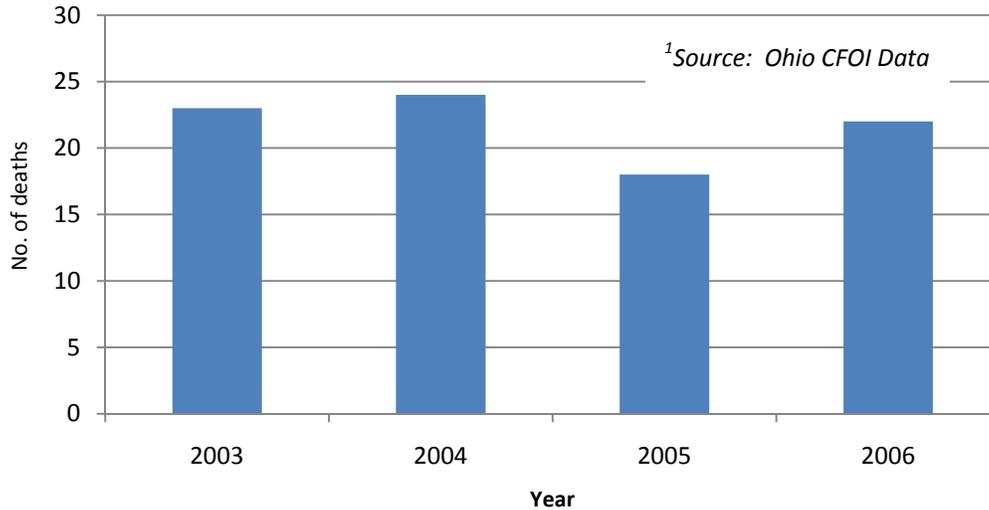
FATAL OCCUPATIONAL-RELATED FALLS IN OHIO

This section presents data from the Census of Fatal Occupational Injuries (CFOI) Program. CFOI collects data from multiple sources including death certificates, media articles, workers’ compensation records, traffic crash records, agricultural injury reports and OSHA reports, for each work-related injury death in Ohio. These data examine fatal occupational-related falls in Ohio from 2003 to 2006.

Falls are a significant problem in the workplace, and are the second-leading cause of work-related injury deaths. There were 769 occupational fatalities from 2003 to 2006 in Ohio. Eleven percent (87) of these deaths were attributed to falls, which is an average of nearly 22 deaths per year. From 2003 to 2006, the most fatal occupational-related falls occurred in 2004 (24), Figure 2.0.

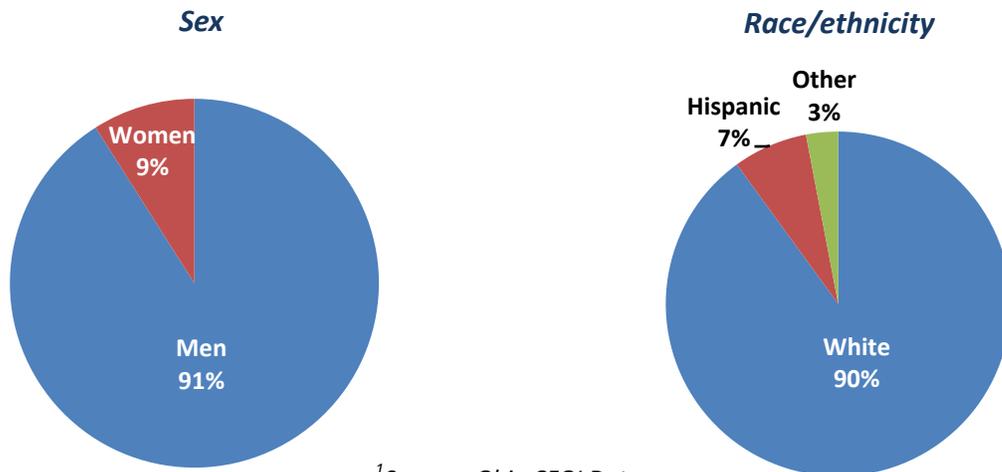


Figure 2.0 No. of fatal occupational-related¹ falls by year, Ohio, 2003-06



As with all occupational fatalities, the majority of fatal occupational-related falls from 2003 to 2006 were among males, whites and persons aged 45 and older, Figures 2.1 and 2.2. Males accounted for 91 percent of fatal occupational-related falls. Ninety percent of fatal occupational-related falls were among white, non-Hispanics.

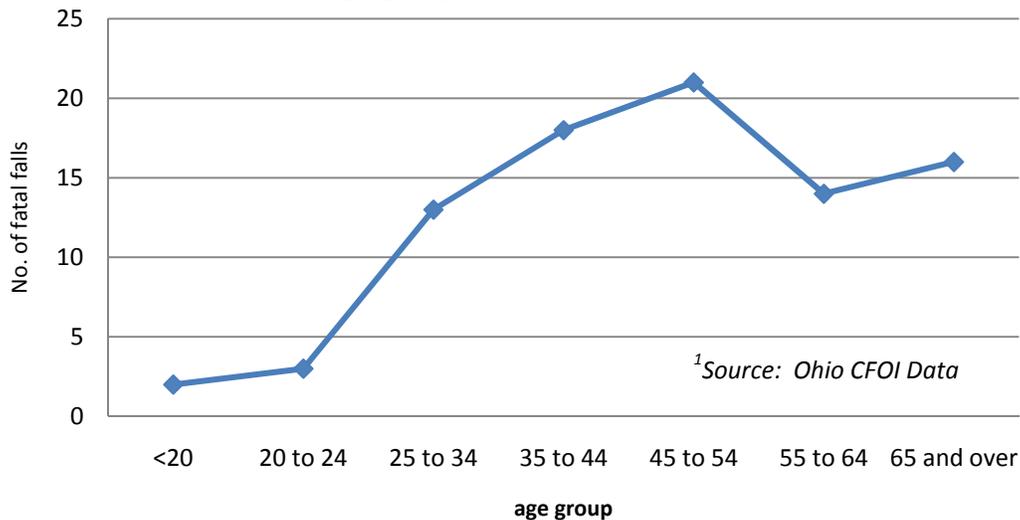
Figure 2.1 Proportion of fatal occupational-related falls¹ by sex and race/ethnicity, 2003-06, Ohio



¹Source: Ohio CFOI Data

The age group with the largest percentage of fatal occupational-related falls was persons 45 to 54 years of age (24 percent), Figure 2.2.

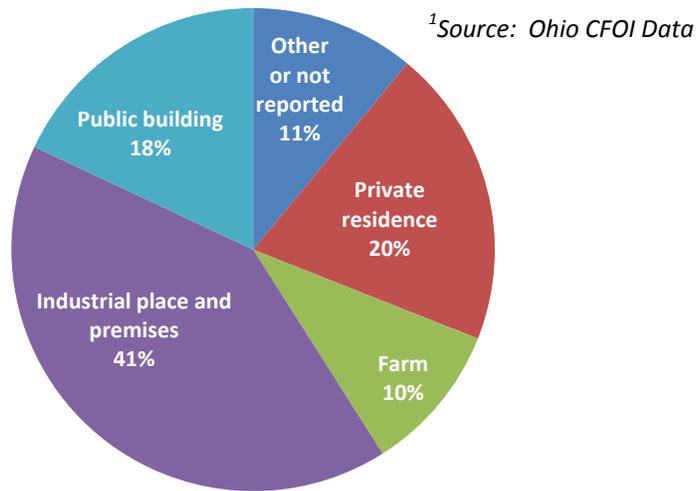
Figure 2.2 No. of fatal occupational-related falls¹ by age group, Ohio, 2003-06



¹Source: Ohio CFOI Data

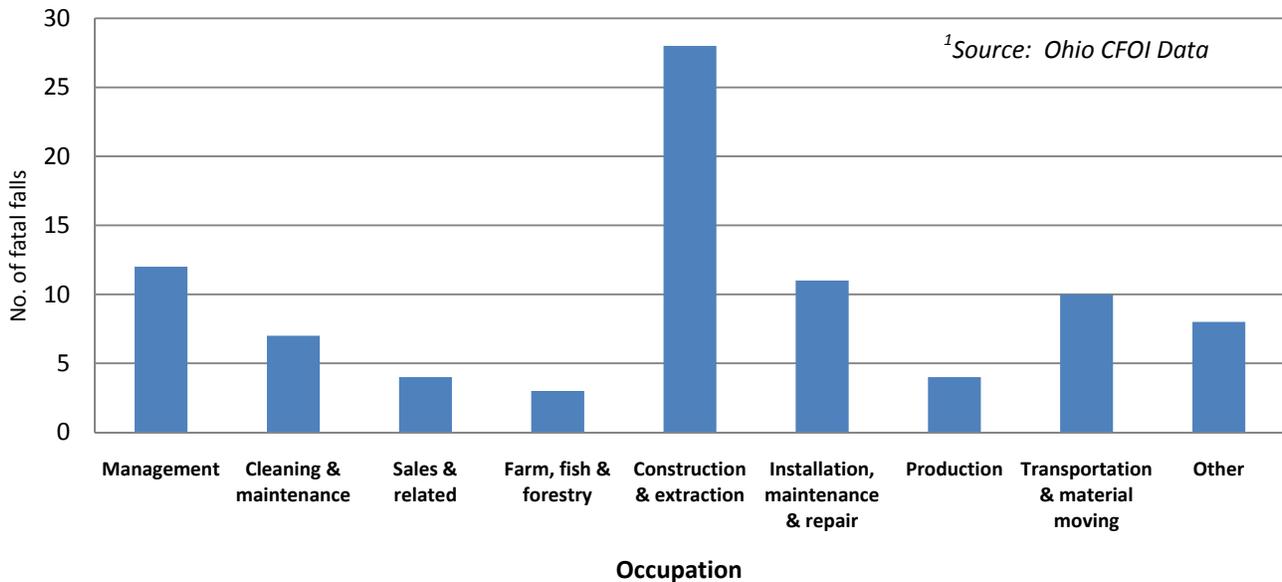
The largest percentage of fatal occupational-related falls occurred at industrial places and premises (41 percent). This was followed by private residences (20 percent), public buildings (18 percent) and farms (10 percent), Figure 2.3.

Figure 2.3 Proportional distribution of fatal occupational-related falls¹ by location, Ohio, 2003-06



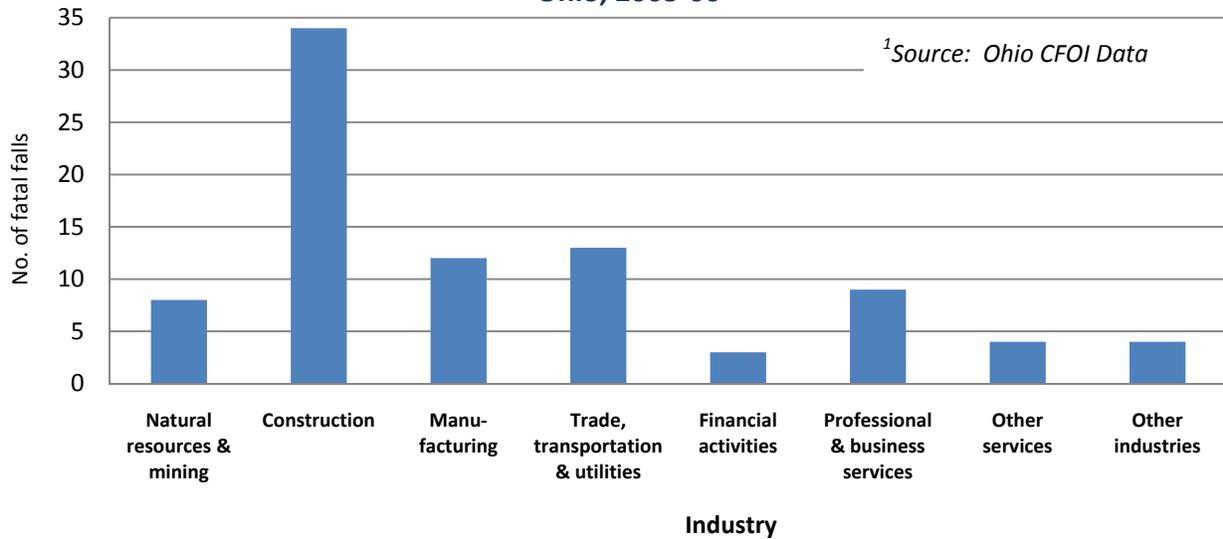
Construction and extraction occupations had the largest percentage of fatal falls (32 percent), Figure 2.4. Other occupations that attributed to fatal falls include management occupations (14 percent), installation, maintenance and repair occupations (13 percent) and transportation and material moving occupations (11 percent).

Figure 2.4 No. of fatal occupational-related falls¹ by occupation, Ohio, 2003-06



Ninety-eight percent of fatal occupational-related falls occurred in the private sector, Figure 2.5. The construction industry had the largest percentage of fall fatalities (39 percent). Other industries that contributed to fatal falls include trade, transportation and utilities (15 percent), manufacturing (14 percent) and professional and business services (10 percent).

Figure 2.5 No. of fatal occupational-related falls¹ by industry, Ohio, 2003-06

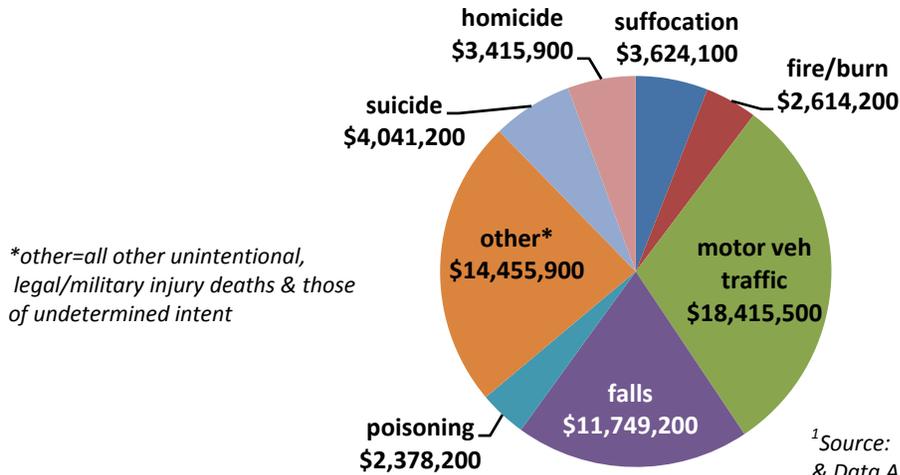


COST OF FATAL FALLS

The Children’s Safety Network Economics & Data Analysis Resource Center at Pacific Institute for Research and Evaluation calculated the costs of fatal injuries in Ohio using average incidence from 1999-2002 and state-specific price adjusters.⁵ The following information presents their results on the medical, quality-of-life and work-loss costs of fall-related deaths, in 2004 dollars.

Unintentional falls accounted for 19 percent of the \$60,329,900 average annual medical costs associated with injury deaths, (or \$11,749,200), Figure 19.⁵ For individual causes of injury death, only motor vehicle traffic crashes tallied higher total medical costs. Falls had higher average costs (\$21,285 per fatality, Table 7) than any other cause of injury death (data not shown).

Figure 19. Proportional distribution of average annual medical costs¹, by cause of injury death, Ohio, 1999-2002



Medical costs (total \$11,749,200) represented only a small proportion (2 percent) of the true estimated costs of injury. Indirect costs such as work-loss (total \$145,362,200) and diminished quality-of-life (total \$488,893,800) were far more substantial and had a disproportionate impact on the young, Table 7.

Table 7. Total and average medical, work-loss and quality-of-life annual costs¹ of fatal falls in Ohio², by age group, 1999 – 2002

Age group	Medical Costs		Work-loss Costs		Quality-of-Life Costs		Total Costs	
	Total	Average	Total	Average	Total	Average	Total	Average
0-19	\$66,000	\$9,429	\$8,947,100	\$1,278,157	\$17,381,800	\$2,483,114	\$26,394,900	\$3,770,700
20-44	\$887,300	\$23,350	\$51,196,200	\$1,347,268	\$84,319,000	\$2,218,921	\$136,402,500	\$3,589,539
45-64	\$1,741,000	\$21,494	\$55,428,100	\$684,298	\$127,771,700	\$1,577,428	\$184,940,800	\$2,283,220
65-84	\$5,213,500	\$21,193	\$24,810,700	\$100,857	\$190,874,700	\$775,913	\$220,898,900	\$897,963
85+	\$3,841,300	\$21,223	\$4,980,100	\$27,514	\$68,546,600	\$378,710	\$77,368,000	\$427,448
total	\$11,749,200	\$21,246	\$145,362,200	\$262,861	\$488,893,800	\$884,076	\$646,005,200	\$1,170,299

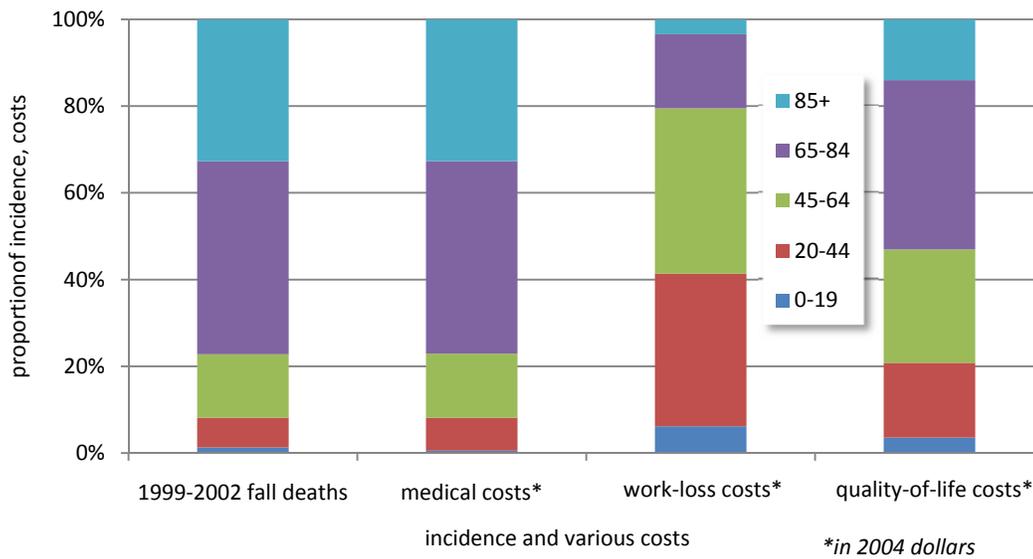
¹In 2004 dollars

²Source: The Children's Safety Network Economics & Data Analysis Resource Center

When examined by age group, deaths among those 65 years and older accounted for more than three-fourths of the medical costs, approximately half of the quality-of-life costs and less than 20 percent of the work-loss costs, Figure 20. In contrast, those aged 20-64 accounted for approximately 20 percent of the medical costs and nearly three-fourths of the work loss costs.

Figure 20. Proportion of fatal falls and costs¹, by age group, Ohio, 1999-2002

¹Source: Children's Safety Network Economics & Data Analysis Resource Center



YEARS OF POTENTIAL LIFE LOST DUE TO FALLS

Another measure of the burden of injury is years of potential life lost (YPLL), or life lost by a premature death. YPLL measures the total number of years a group of people would have been expected to live had they not died prematurely from the injury (or other cause of interest). From 2002-2005, fatal falls in Ohio accounted for 30,483 YPLL before age 85. Sixty-nine percent (21,117) of these occurred between ages 65-85.¹ (Data not shown.)

CIRCUMSTANCES OF ER VISITS & INPATIENT DISCHARGES FOR FALL-RELATED INJURY

Non-fatal falls place a tremendous burden on our health care system. The OHA's 2002-2005 HID and ER databases were examined to determine who fell, the circumstances surrounding the fall, discharge outcomes and the associated costs, in terms of medical charges, LOS and injuries incurred.

From 2002 through 2005, there were 817,074 ER visits for fall-related injuries. Females comprised 55.5 percent (453,479) of the 817,074 ER visits for fall-related injury, Table 8. The average age for those treated in ERs was 37.5 years, (Table 3, pg. 6). For this same period, there were 66,845 inpatient discharges of Ohioans from hospitals due to injuries sustained from a fall. These injuries led to 303,895 total hospital days and \$1,193,948,569 in total charges. Forty-five-and-one-half percent of all E-coded, injury-related HIDs were falls. Females accounted for approximately two out of three cases (44,049 of 66,845). The average age of those discharged was 70.1 years, Table 3.

Table 8 displays the number of fall-related inpatient discharges, average and total charges, average and total LOS, crude and adjusted HID rates and number of ER visits, by sex and year for 2002-2005. From this table, several trends are noteworthy. From 2002-2005, the overall number of fall-related HIDs and discharge rates increased each year for both males and females. Overall, the age-adjusted, fall-related discharge rate increased from 121.4 per 100,000 in 2002 to 143.5 per 100,000 in 2005.

Fall-related mean LOS decreased by 4.7 percent from 2002 to 2005. However, due to the 23.7 percent increase in the number of inpatients, there was actually a 17.9 percent increase from 2002 to 2005 in total days stay for fall-related injury. Overall, charges for persons treated for fall-related injury increased 58.4 percent from \$229,707,264 in 2002 to \$363,849,305 in 2005, Table 8.



Table 8. Number of fall-related HIDs, average and total charges and lengths of stay, crude² and age-adjusted HID rates² and number of ER visits¹, by sex, year, Ohio, 2002-05

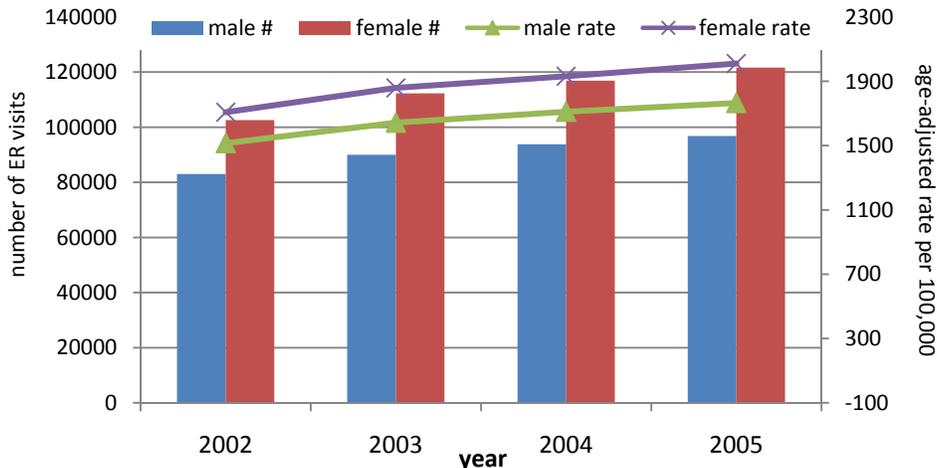
year	sex	No. of HIDs	mean charges	total charges	mean LOS (days)	total days	crude rate	age adjusted rate	no. of ER visits
2002	male	5,031	\$17,734	\$89,220,609	4.76	23,948	90.7	101.3	82,993
	female	9,603	\$14,632	\$140,506,967	4.65	44,654	163.9	130.5	102,626
	total	14,634	\$15,697	\$229,707,264	4.68	68,487	128.3	121.4	185,619
2003	male	5,703	\$18,692	\$106,598,366	4.51	25,721	102.5	112.2	89,995
	female	10,988	\$15,770	\$173,282,188	4.58	50,325	187.2	147.8	112,289
	total	16,691	\$16,767	\$279,854,993	4.55	75,944	146.0	136.1	202,284
2004	male	6,023	\$20,925	\$126,030,070	4.55	27,405	108.0	116.8	93,802
	female	11,392	\$17,076	\$194,534,235	4.5	51,264	193.9	151.3	116,916
	total	17,415	\$18,406	\$320,537,007	4.52	78,716	152.1	140.4	210,718
2005	male	6,039	\$22,683	\$136,983,966	4.44	26,813	108.1	115.3	96,805
	female	12,066	\$18,803	\$226,878,205	4.48	54,056	205.3	158.5	121,648
	total	18,105	\$20,097	\$363,849,305	4.46	80,748	157.9	143.5	218,453
overall total		66,845		\$1,193,948,569		303,895			817,074
percent change 2002 to 2005		23.7%	28.0%	58.4%	-4.7%	17.9%	23.1%	18.2%	17.7%

¹Source: Ohio Hospital Association

²per 100,000

More females than males were treated in ERs for fall-related injuries in each of the years of interest, - on average, 25 percent more. The number of males treated for falls in ERs increased 17 percent from 2002-2005, while females had a 19 percent increase over the period, to more than 121,000 in 2005, Figure 21.

Figure 21. Number and age-adjusted rate¹ of fall-related ER visits², by year, sex, Ohio, 2002-05



¹per 100,000

²Source: Ohio Hospital Association

Age-adjusted HID rates have been increasing for males and females, Figure 22. From 2002 to 2005, this adjusted rate for Ohio males increased 13.8 percent (101.3-115.3 per 100,000) and 21.5 percent for females (130.5-158.5 per 100,000). The disparity between the number of female versus male fall-related discharges widened slightly over the study period; in 2005, for every 100 fall-related discharges for males, there were 199.8 for females.

Figure 22. Number and age-adjusted rate¹ of fall-related inpatient discharges², by year, sex, Ohio, 2002-05

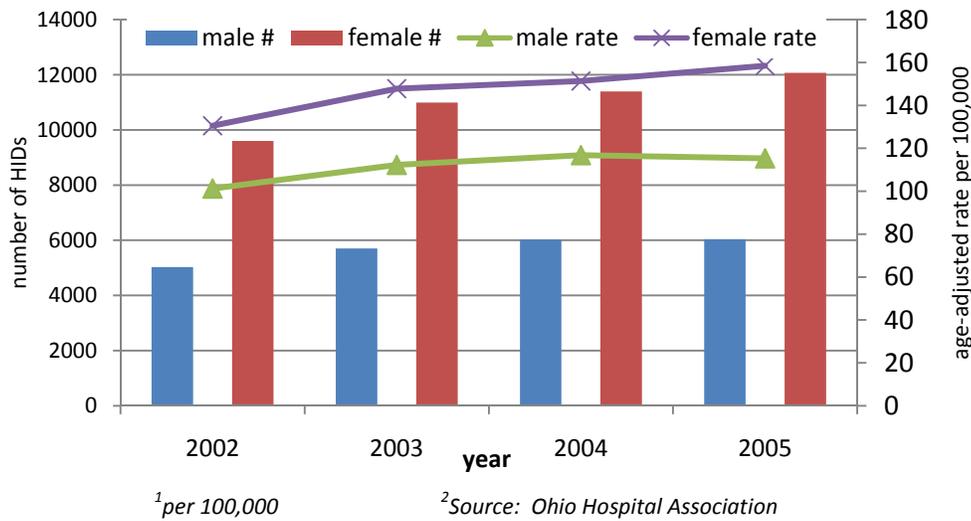
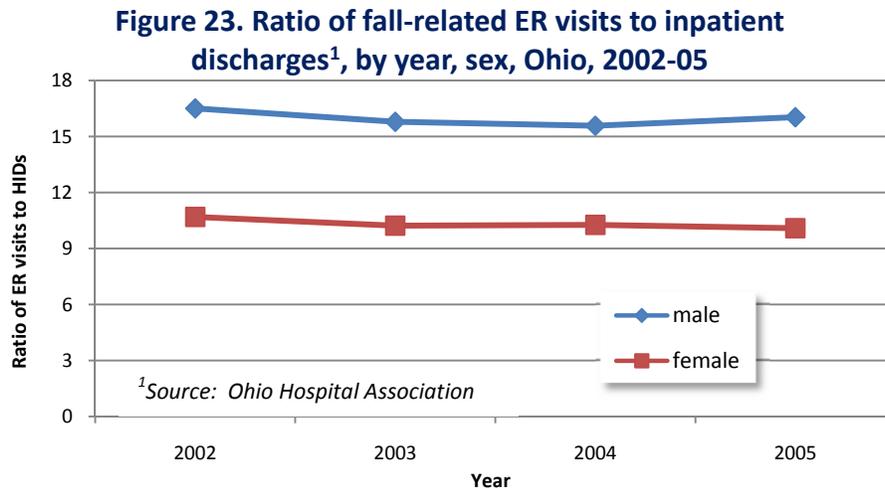


Figure 23 shows that for every fall-related inpatient discharge from 2002-05, there were approximately 16 fall-related ER visits for males and 11 for females. This disparity between sexes in likelihood of admittance to a hospital may be associated with age. Females are at higher risk for fall-related injuries when older and the consequences of falling are more severe.⁶ In addition, a larger proportion of older women than men are frail, which leads to higher likelihood of injury during a fall.^{7,8} Some studies have found that older women are only slightly more likely to fall than older men, but much more likely to suffer an injury when falling.⁹ This may be related to hormonal changes loss of muscle strength among middle-aged and older women.¹⁰

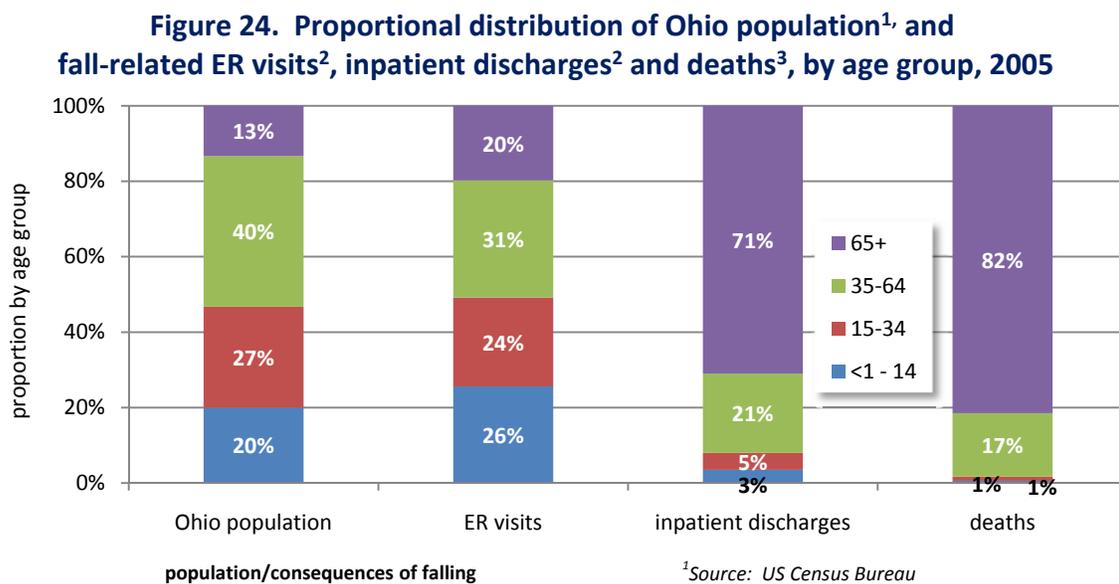




FALL-RELATED INJURY ACROSS THE LIFESPAN

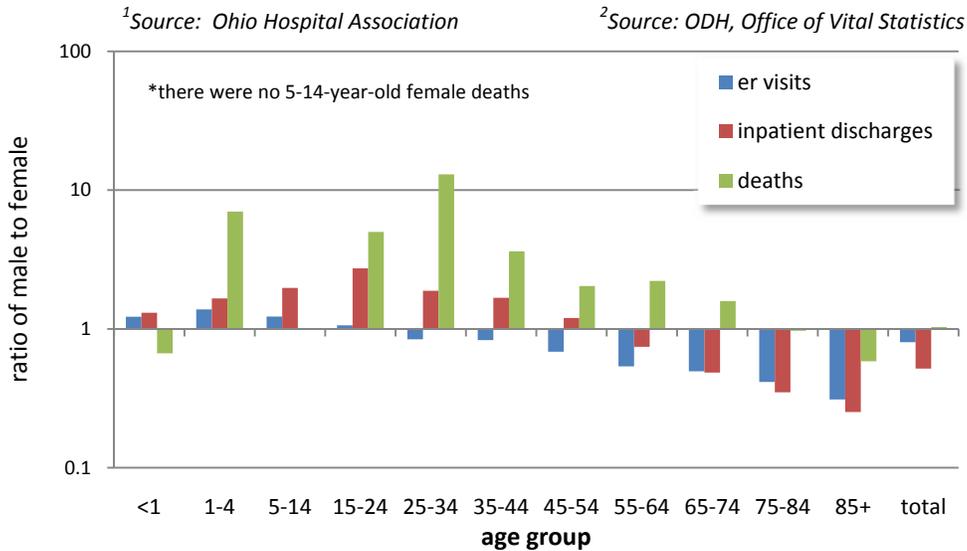
The risk factor that has by far the greatest impact on likelihood of experiencing a fall-related injury or at least receiving medical treatment for a fall is, undoubtedly, age. When comparing fall-related deaths, HIDs and ER visits, it becomes readily apparent that the severity of fall-related injury increases with age. Children fall often; however, they are more likely to be treated in an ER and discharged home with no further treatment. The older the faller, the more likely he or she is to be hospitalized or die. Falls among elders are associated with numerous adverse health consequences, decreased quality-of-life and high health care costs.^{3,11}

In 2005, persons 65 and older accounted for 20 percent of all fall-related ER visits, 71 percent of fall-related inpatient discharges and 81 percent of deaths, while they represented only 13 percent of the overall Ohio population, Figure 24. Mean age increased when comparing fall-related ER visits (37.5 years), HIDs (70.1) and deaths (76.2.), respectively (Table 4).



Among young persons who fell, males were overrepresented, while with advancing age, fallers were increasingly more apt to be female, Figure 25. A greater number of males fell to their death at every stage in the life cycle, except at less than 1 year and after age 74. However, due to the preponderance of fatal falls among the elderly, overall, an equivalent number of each sex died from a fall.

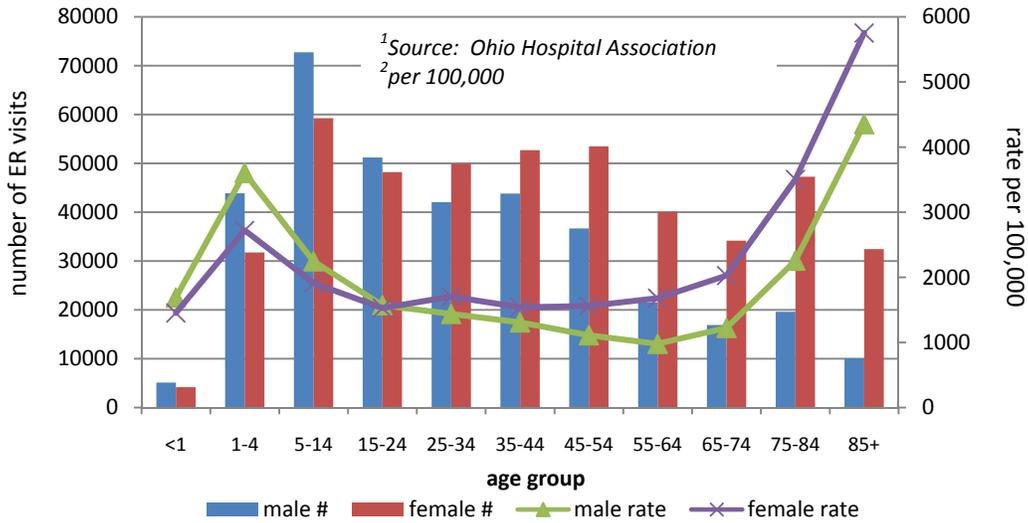
Figure 25. Ratio of male to female fall-related ER visits¹, inpatient discharges¹ and deaths², by age group*, Ohio, 2002-05



EMERGENCY ROOM VISITS

From 2002-2005, there were 817,067 ER visits of Ohio residents for fall-related injury, accounting for more than \$945.6 million in medical charges. (Data not shown). As with discharge rates, ER visit rates increased dramatically among seniors. In contrast to deaths, fall-related ER visits by age and sex exhibit a bimodal distribution, with the highest rates found at both ends of the age spectrum. Ohio children aged 1 to 4 years had higher fall-related ER rates (male 3.8/female 2.9 per 100) than any other age group until ages 85 and older, at which point female rates were 6.0 per 100 and males 4.6 per 100. Males had higher fall-related ER rates than females for ages 0-24, while female rates were higher from age 25 years and older. Fall-related ER rates for females aged 15 to 65 remained relatively constant, while rates for comparable males declined steadily with advancing age. At age 65, rates for both males and females increased dramatically. Although rates were highest among seniors, males aged 5-14 accounted for the greatest number of visits. The numbers for males thereafter generally decreased throughout the remainder of the lifespan.

Figure 26. Number and rate¹ of fall-related ER visits,¹ by age group, sex, Ohio, 2002-05



INPATIENT DISCHARGES

Fall-related hospital discharge rates for Ohioans aged 65 years and older were much higher compared to those of younger age groups, thereby making visual comparisons difficult, Figure 27. From 2002-2005, hospitalization rates ranged from lows of 12.5 per 100,000 for females aged 15-24 and 28.4 per 100,000 for males aged 5-14 to highs of 2,569.9 per 100,000 for females and 1,578.4 per 100,000 for males 85 and older, Figure 28. From ages 65 and older, female risk for fall-related injury skyrocketed, with the disparity between male and female rates widening with advancing age. In terms of actual numbers of fall-related hospitalizations, there were two women treated for every man among 65-74-year-olds and there was a 4:1 female/male fall-related treatment ratio for those aged 85 years and older (see Figure 74 in 'Types of Falls Among Older Adults, Ages 65 and Older' Section).

Figure 27. Average annual fall-related hospital discharge¹ rates², by age group, sex, Ohio, 2002-05

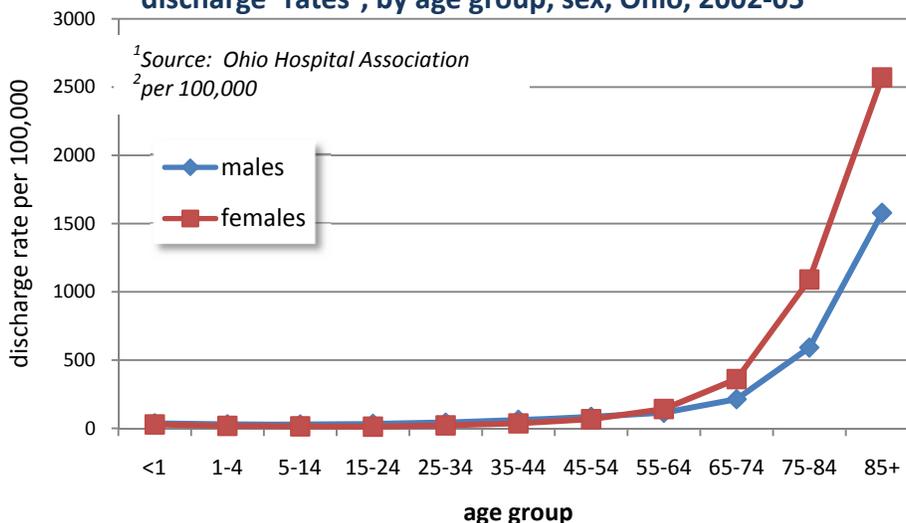
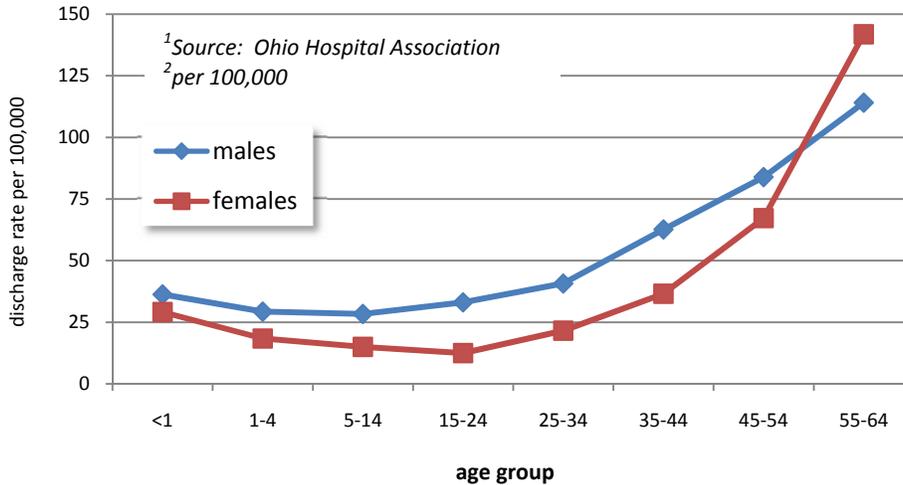


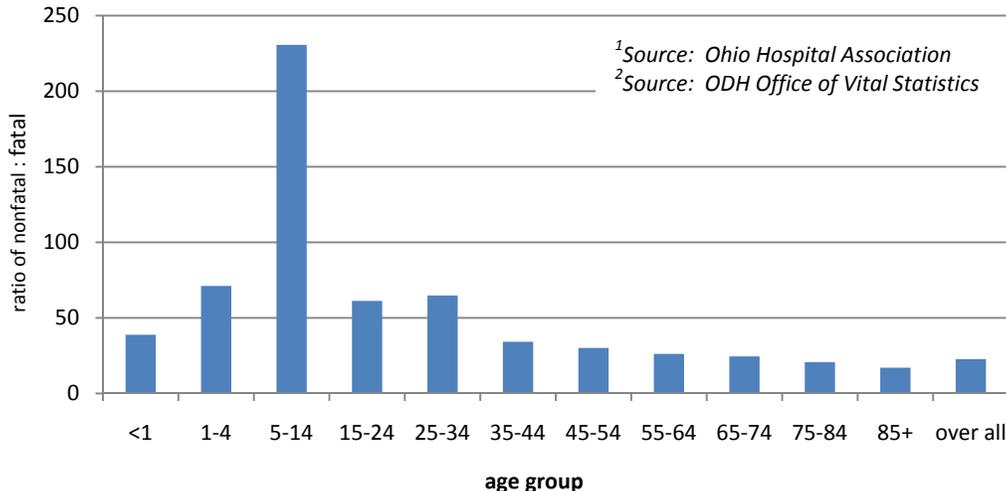
Figure 28 provides a more informative visual representation of fall-related hospital discharge patterns for male and female Ohioans younger than age 65. Fall-related discharge rates were higher for males until after age 54. Rates for females steadily decreased from less than 1 year to age 24, after which time they increase with advancing age.

Figure 28. Average annual fall-related discharge¹ rates², by age group, sex, age 0-64, Ohio 2002-05



Persons aged 5-14 years had the highest non-fatal fall-related hospital discharge to fatal fall ratio, by far (230 discharges per 1 death), Figure 29. For all age groups, there were approximately 22 fall-related discharges for each fatal fall

Figure 29. Ratio of non-fatal, fall-related discharges¹ to fatal falls², by age group, Ohio, 2002-05



WHERE DO OHIOANS FALL?

The place where a fall occurred was frequently unknown or unspecified, except when a fatality resulted, Table 9. When known, the majority of falls occurred in the home.

Table 9. Proportion of fall-related ER visits¹, HIDs¹ and deaths² where location was known, occurred in home and occurred at residential institutions, Ohio, 2002-05

	ER visits	Inpatient Discharges	Deaths
location of fall known	31%	40%	85%
fall occurred at home*	54%	70%	56%
fall occurred at residential institution*	7%	14%	14%

¹Source: Ohio Hospital Association

* among those with known location

²Source: Ohio Dept of Health, Office of Vital Statistics

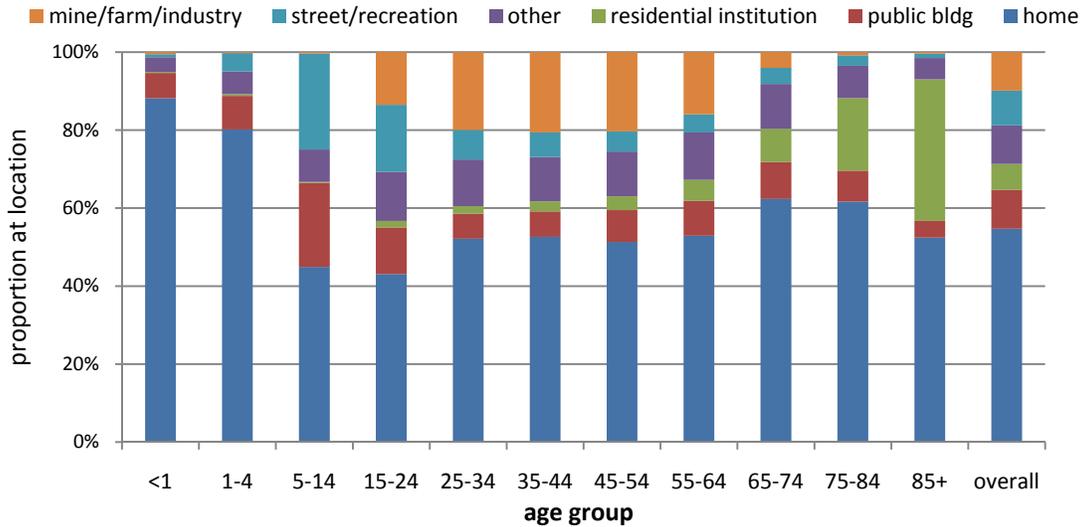
EMERGENCY ROOM VISITS BY LOCATION

For the 250,086 ER visits where location was specified, 61 percent of all falls occurred where the faller lived, i.e. at home or in a residential institution, Figure 30. Approximately 10 percent of the falls occurred in each of the following locations: public building, street or place of recreation; at a mine, farm or industrial setting; or other location.

The patterns for location of falls reflects where individuals spend most of their time, i.e., young children and older adults at home or in a residential institution, older children during recreation or on the street and adults at work. The proportion attributable to falling in a public building is the most consistent location across age groups, although greatest for ages 5-24. For this population, public building probably refers to school much of the time. As would be expected, the greatest proportion of falls in occupational settings (i.e., mine/farm/industry) occurred among those aged 25 to 54 for both ER visits and HIDs, Figures 30 and 31. By age group, the patterns are very similar to that of more serious fall-related inpatient hospitalizations.



Figure 30. Proportional distribution of location of fall¹ among ER visitors², by age group, Ohio, 2002-05



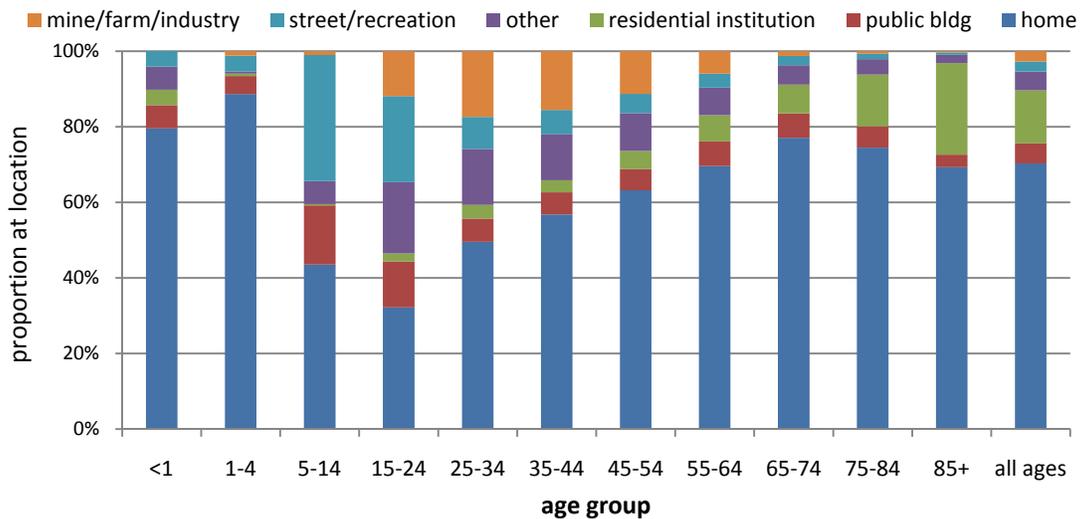
¹among those with known location

²Source: Ohio Hospital Association

HOSPITAL INPATIENT DISCHARGES BY LOCATION

Among fall-related HIDs, the place of occurrence was missing more frequently for younger than older fallers, (e.g., 79 percent of the time for ages 5-14 and 55 percent of the time for ages 75-84, data not shown). For the 26,431 discharges where location was specified, the great majority of falls (84 percent) occurred where the victim lived, Figure 31. Young children and elders had the highest proportion of their falls occur at home, with residential institutions playing an increasingly more prominent role with advancing age. By age group, the patterns are very similar to that of ER visitors.

Figure 31. Proportional distribution of location of fall¹ for inpatient discharges², by age group, Ohio, 2002-05



¹among those with known location

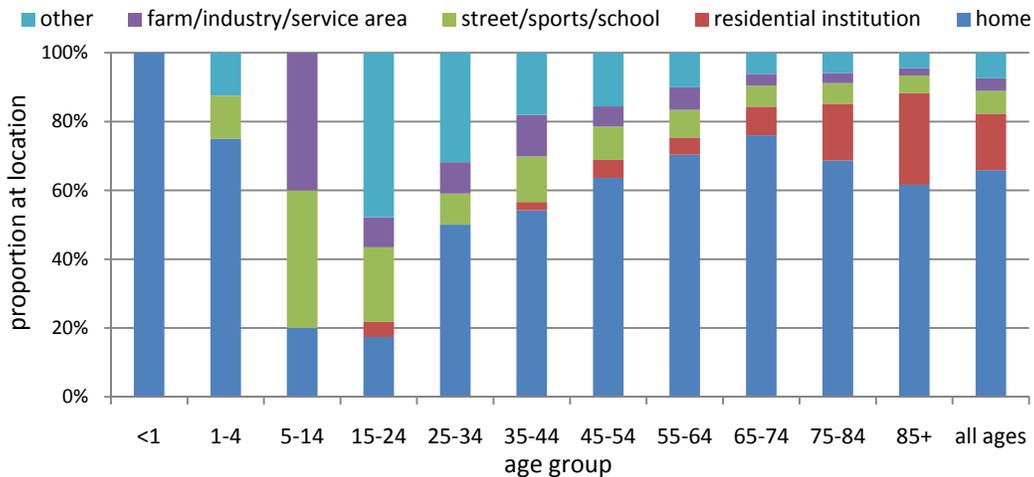
²Source: Ohio Hospital Association

FATAL FALLS BY LOCATION

For younger children and after age 35, a majority of these fatal falls occurred in the home, Figure 32. As with hospital discharges (Figure 31), residential institutions were increasingly likely to be the site of the fall as age increased, with 22 percent of fatal falls among those 85 or older taking place at such a site. Among older children and youth, fatal falls occurred in a variety of settings with little information available to identify discernible patterns due to the small numbers among younger age groups (i.e., there were 70 total fatal falls for those 34 years and younger).



Figure 32. Proportional distribution of location of fall¹ among fatalities², by age group, Ohio, 2002-05



¹among those with known location

²Source: Ohio Hospital Association

HOW DO OHIOANS FALL?

CLASSIFYING TYPES OF FALLS

In addition to specific types of falls represented by single International Classification of Diseases (ICD)-9 E-codes for HID and ER data, or ICD-10 codes for Vital Statistics data, intermediate and broad categories were created for use in this report (Appendices D-G). Due to inherent differences between versions of the ICDs, slightly different categories were formulated for displaying discharge and ER data as compared to fatalities. Furthermore, specific types of falls were extracted from these larger categories and displayed separately when of explicative value.

HID and ER Intermediate Categories:

- **Recreation:** nonmotor scooters, skateboards, skis, snowboards, roller skates
- **Furniture:** chair, commode, wheelchair, other furniture
- **Ladder/scaffold:** ladder, scaffold

HID and ER Broadest Categories:

- **Unspecified:** unspecified
- **Stair/steps:** stairs, steps, escalator
- **All same level:*** same level unspecified, recreation (nonmotor scooter, skis, skateboard, roller skates and snowboard), sidewalk, sports, conveyance, accidentally pushed
- **All other level:*** ladder/scaffold (ladder, scaffold), from playground equipment, into well, into hole/manhole, from or through building, off cliff, while diving, furniture-related (from bed, chair, other furniture, commode, wheelchair) and other falls from one level to another

Fatal Fall Intermediate Categories:

- **Ladder/scaffold:** ladder, scaffold

Fatal Fall Broadest Categories:

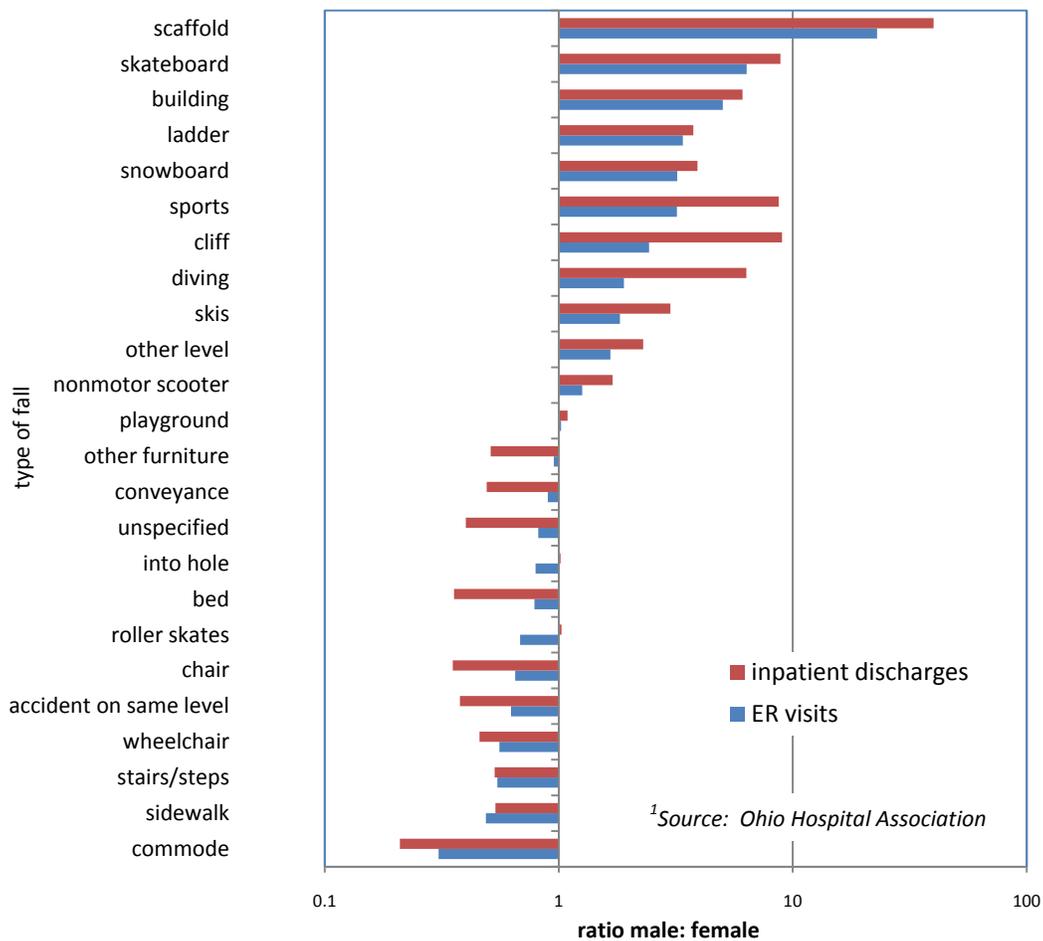
- **Unspecified:** unspecified
- **Stairs/steps:** stairs, steps, escalator
- **Furniture:** bed, chair, other furniture, wheelchair
- **All same level:*** ice/snow, same level slip/trip, skates/skis, accidentally pushed, same level unspecified
- **All other level:*** ladder/scaffold (ladder, scaffold), from playground equipment, from/thru building, cliff, diving, other level unspecified

**in graphics, if not all inclusive, exclusions noted*

SPECIFIC TYPES OF FALLS ASSOCIATED WITH ER VISITS AND HOSPITAL DISCHARGES

As cited previously, younger fallers were more likely to be male; older ones, female. For males, fall-related injuries were largely determined by their activities (e.g., engaging in sports, skiing, etc. or working on ladders), while for females, health issues frequently associated with aging may have played a greater role, (e.g. falling on the same level or from furniture), Figure 36. Among the recreation-related falls that led to an ER visit, only roller-skating injuries were more common in females than in males. Each of the sexes was almost equally as likely to visit an ER or be hospitalized for falls from playground equipment.

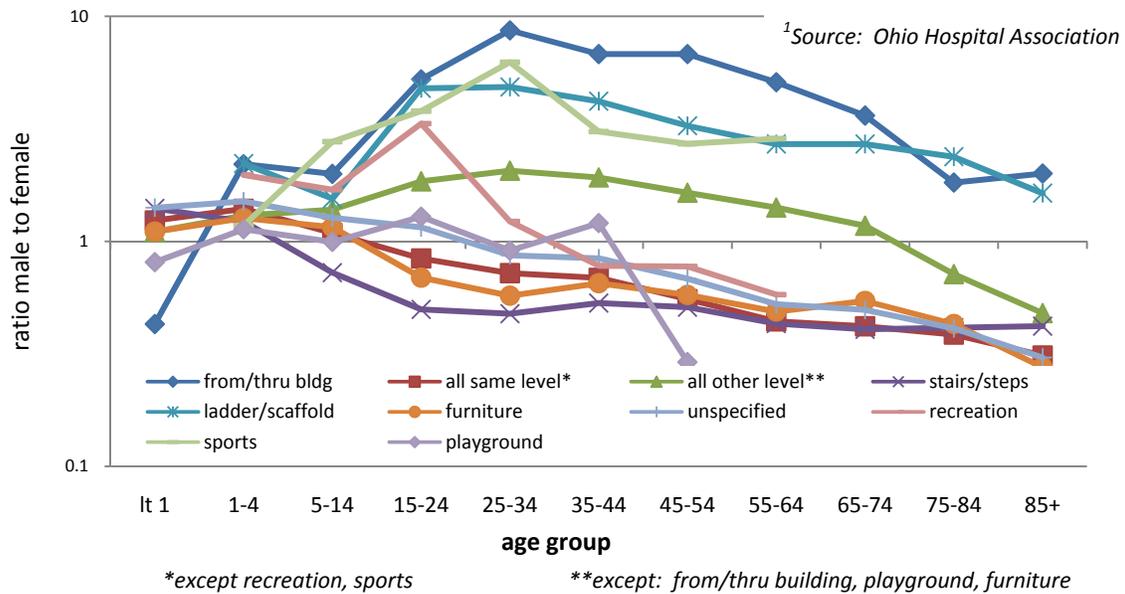
Figure 33. Ratio of male to female ER visits¹ and hospital discharges¹, by type of fall, Ohio, 2002-05



TYPE OF FALLS LEADING TO ER VISITS, BY GENDER

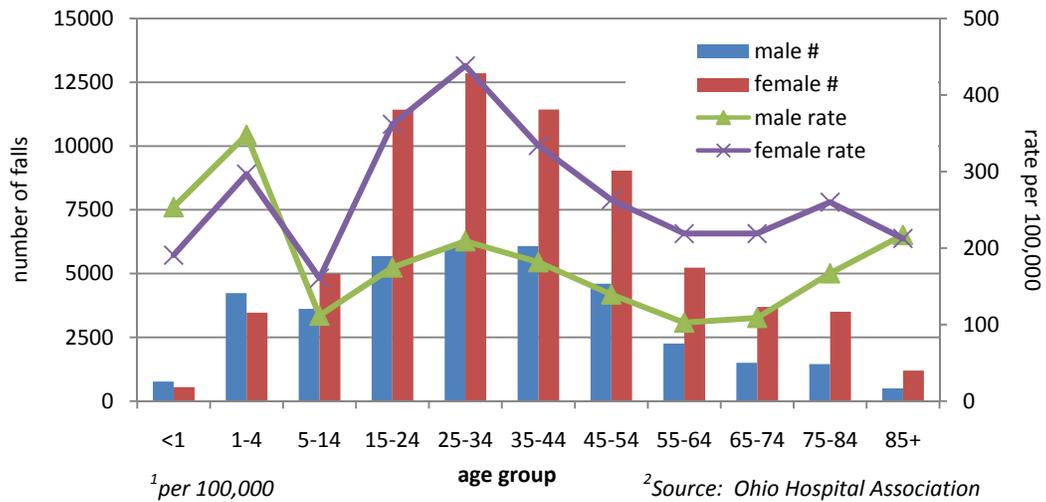
Figure 34 presents the ratio of the number of male to female ER visitors by age group in an attempt to identify who is at increased risk for particular types of falls over the course of a lifetime. For ages 5-74 years, more males than females were treated in the ER for fall from/thru building, sports, other level and ladder/scaffold falls. After age 5, and for the remainder of their lives, more females than males were seen in ERs after falling from furniture, on the same level, on stairs/steps and from unspecified falls.

Figure 34. Ratio of male to female fall-related ER visits¹, by type of fall, age group, Ohio, 2002-05



Stairs/steps were a significant cause of fall-related injury; from 2002-2005, there were 104,213 ER visits after such a fall, 65 percent of which involved a female. Each year, for every age group and either sex, more than 100 persons per 100,000 were treated in an ER for a stair-related fall, Figure 35. Females aged 25 to 34 were at the greatest risk, with more than four per 1,000 being treated, on average, each year. Among males, children aged 1 to 4 years had the highest ER visit rate due to a fall on stairs, while those 5-14 years had the lowest.

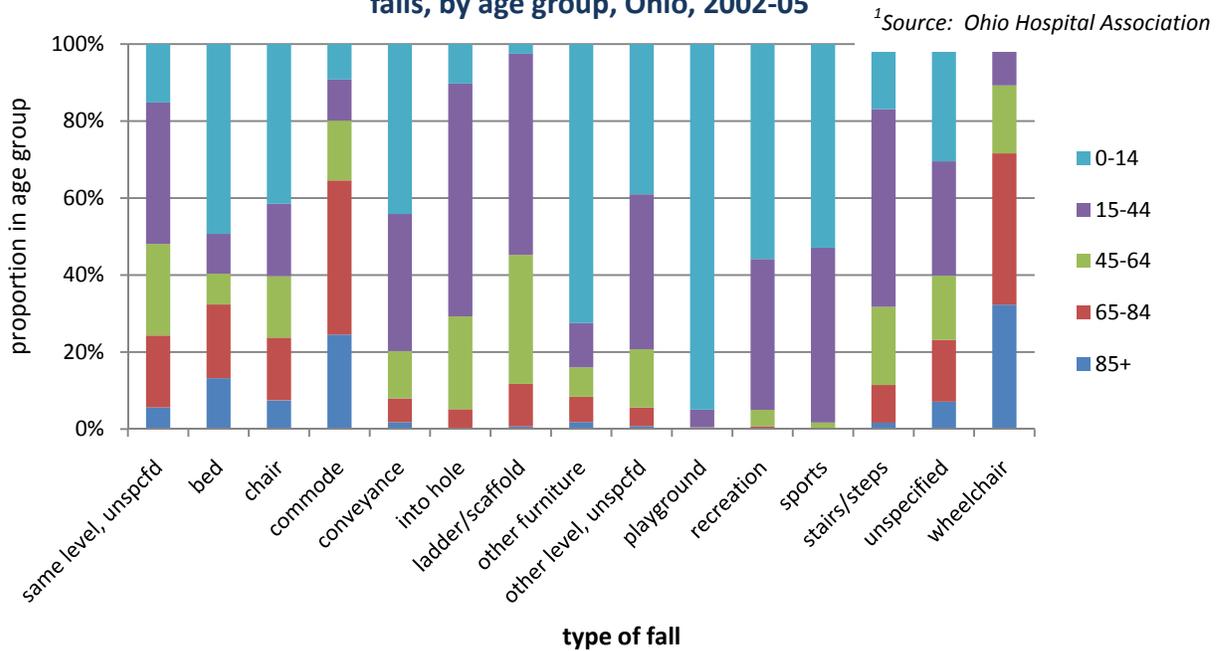
Figure 35. Four-year total and average annual rate¹ of ER visits² after falling on stairs/steps, by age group, sex, Ohio, 2002-05



TYPES OF FALLS BY AGE GROUP

As we saw earlier for falls, persons treated in ERs were younger than those admitted to hospitals. Figure 40 illustrates how, for many types of falls, more than half of the ER visitors were younger than 65. For example, more than 75 percent of falls from *other level, unspecified; from playground equipment; during sports; or from other furniture* were associated with persons 44 years or younger (see Appendix A).

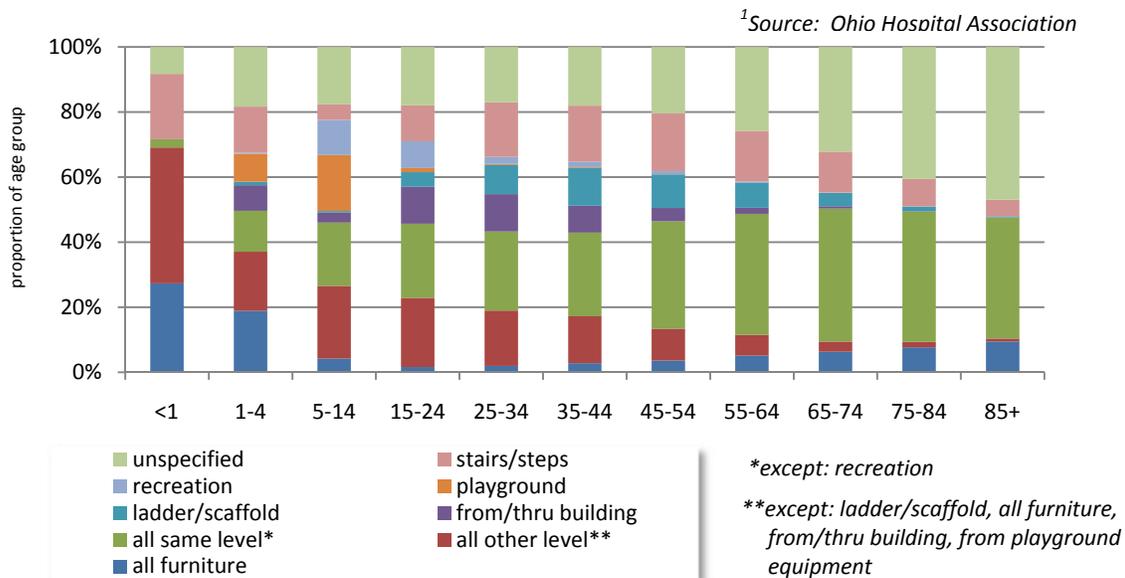
Figure 36. Proportional distribution of ER visits¹ for selected types of falls, by age group, Ohio, 2002-05





All other level was the most common type of fall among discharged infants less than 1 year old, with this manner of injuring oneself generally contributing a steadily declining proportion with succeeding age groups, Figure 39. On the other hand, all same level and unspecified falls proportionally increased with age, for the most part. Falls from ladder/scaffold and from/thru building played their largest roles among persons aged 15-64.

Figure 37. Proportional distribution of fall-related HIDs¹, by type of fall, age group, Ohio, 2002-05



FALLS AMONG THE YOUNG (AGES 0-24)

The physical and cognitive changes marking the developmental stages of children and youth are known to affect risk for specific types of falls.^{12, 13, 14, 15, 16}

- Infants fall from furniture (beds, high chairs,¹⁷ changing tables, cribs) and on stairs. Falls on stairs may involve an adult falling while carrying a child.
- Toddlers fall down stairs, from furniture, buildings (i.e., windows, balconies) and from playground equipment.¹⁸
- Older children fall from playground equipment (climbing equipment, slides, swings), and slip, trip and stumble during sports and recreation (skiing, skating, scooters, etc.).
- Teenagers and young adults fall during sports, recreation.



Between 2002-05, in Ohio, there were 3,624 fall-related HIDs and 316,301 ER visits among youth aged 24 or younger. These accounted for 5.4 percent of all fall-related hospitalizations and 34.7 percent of fall-related ER visits. Fall-related injuries among 0-24-year-olds were more likely to be treated in the ER and not require an overnight stay in the hospital (98.9 percent versus 88.8 percent for persons aged 25 or older.)

Falls were the leading cause of injury-related ER visits and hospitalizations for children in each of the less than 1, 1-4, and 5-14-year age groups. For 15-24-year-olds, falls were the third-leading cause of ER visits and fourth-leading cause of hospital admissions. For the entire 0-24-year age range, falls accounted for 14 percent of injury-related hospital admissions and 24 percent of ER visits.

For fall-related ER visits, Figure 38 depicts the proportional distribution of type of fall for each age group. For Figures 39 and 40, falls were categorized in a manner that enabled evaluation of falls likely to occur among the young.

As can be observed in Figure 38, the proportion of ER visits due to falls from *all furniture* decreased with age, while the proportion of *same level, unspecified* falls increased with age. The highest proportion of fall-related ER visits attributable to *playground equipment* (10.0 percent), *sports* (4.4 percent), and *recreation* (9.3 percent) activities each occurred among children aged 5 to 14 years. *Stairs/steps* were a significant cause of falls requiring ER visits for the whole age range amongst 0-24-year-olds, Appendix A.

Figure 38. Proportional distribution of ER visits¹, by type of fall, age group, ages 0-24, Ohio, 2002-05

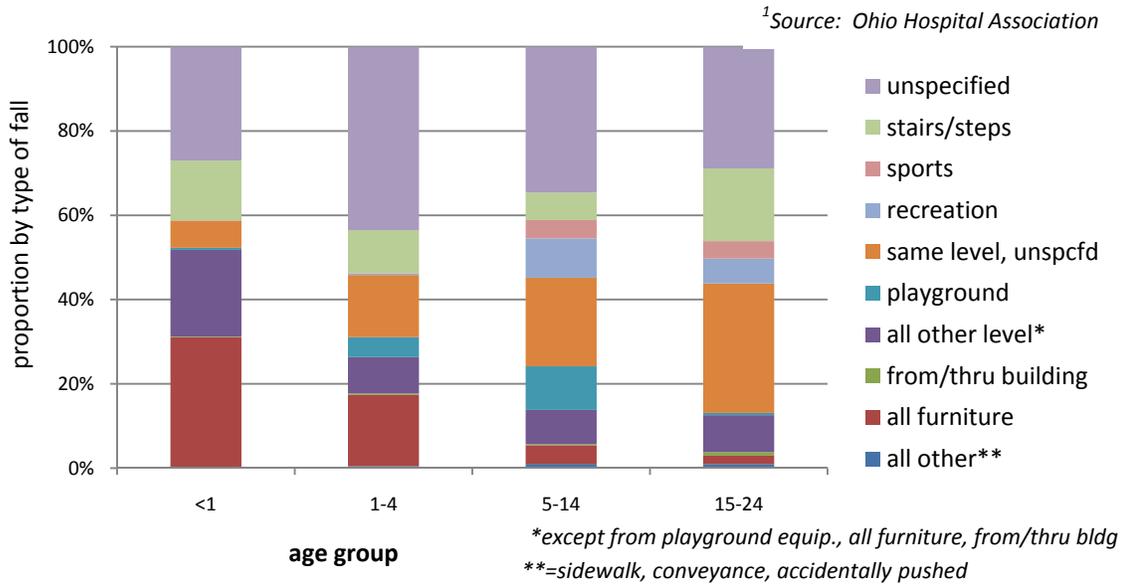
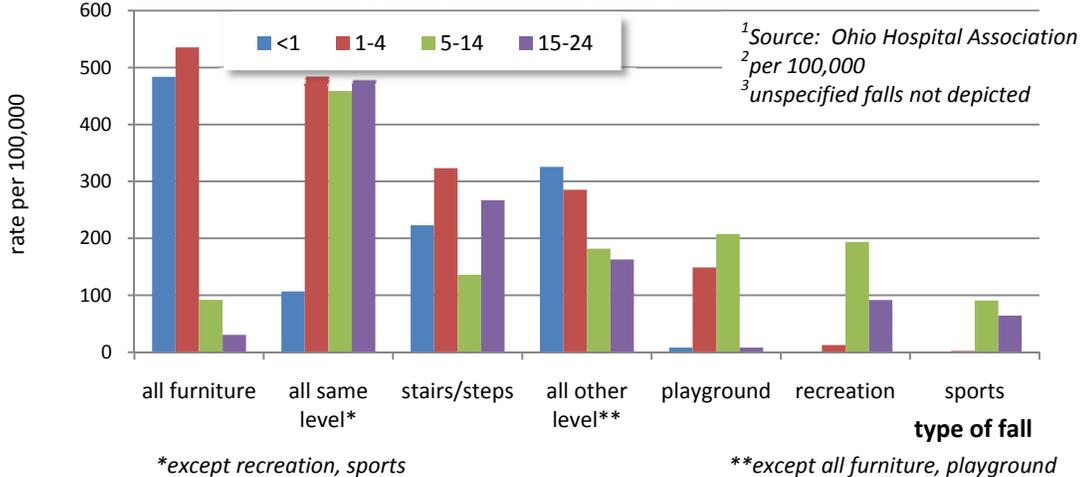


Figure 39 presents the ER visit rates for these same age groups by type of fall. *Stairs/steps* remained a significant cause of fall-related injury among all youth. Rates were highest (325 per 100,000) for children aged 1-4 years and lowest for children 5-14 years.

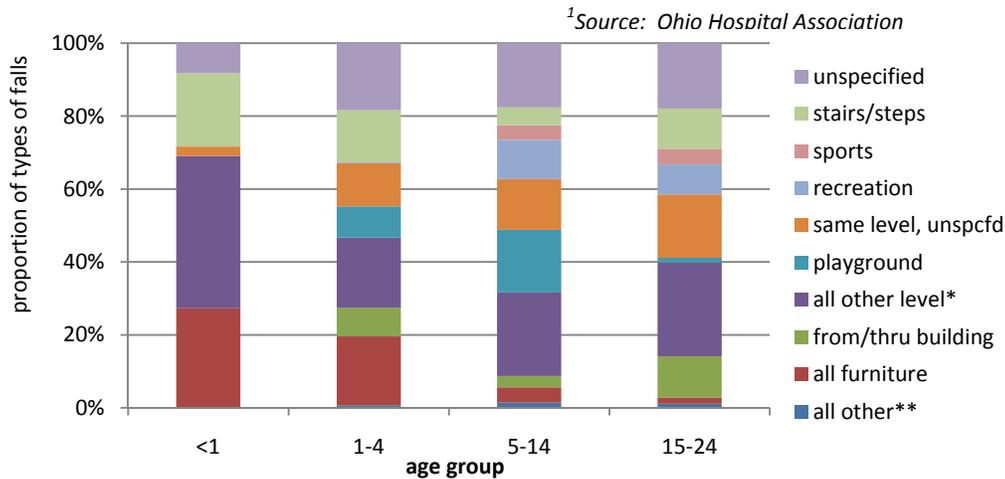
Furniture-related falls lead to the highest ER visit rates for children younger than 4 years. *Playground-equipment* falls had the second-highest ER visit rate for ages 5 to 14, after falls on *all same level*.

Figure 39. Emergency room visit¹ rates², by type of fall³, age group, ages 0-24, Ohio, 2002-05



Nationally, young children are most likely to be injured seriously enough to require hospitalization when they fall from one level to another such as on a *playground*, on *stairs/steps*, from *furniture* or *from/thru a building*, e.g. out of a window.¹⁹ Figures 40 and 41 illustrate this was also the case in Ohio. Almost 90 percent of hospitalized infants less than 1 year old fell from *all other level*, *all furniture* or on *stairs/steps*.

Figure 40. Proportional distribution of hospital discharges,¹ by type of fall, age group, ages 0-24, Ohio, 2002-05

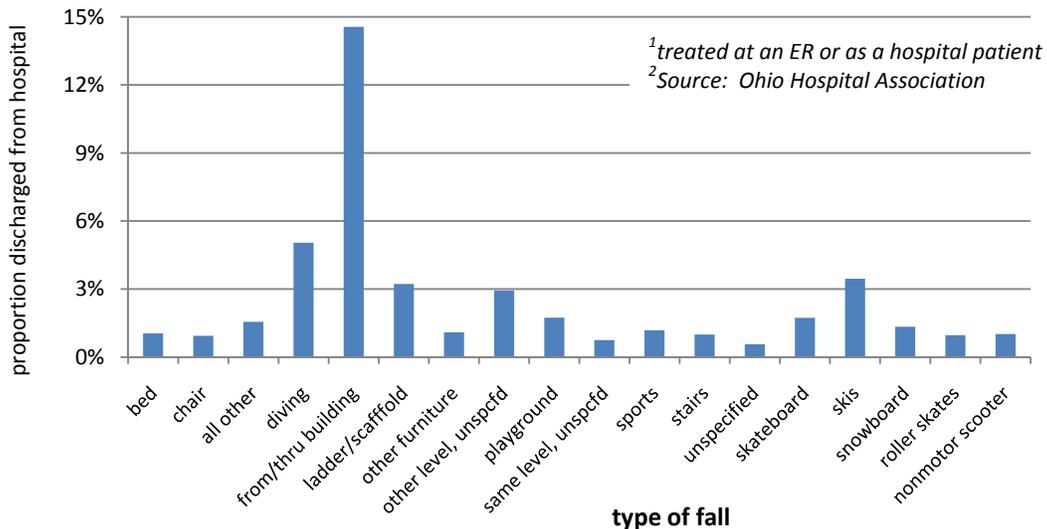


*except all furniture, playground, from/thru building

**=sidewalk, conveyance, accidentally pushed

Figure 41 presents the proportion of all treated falls, (i.e. those seen in an ER or admitted as an inpatient), who were admitted. Overall, among 0-24-year-olds, 1.1 percent of all fall injuries were treated as inpatients. Youth treated for falling *from/thru a building*, had the highest such proportion, 14.6 percent. Other types of falls that were more likely to result in hospitalization were: *diving* (5.0 percent); *skis* (3.5 percent); *ladder/scaffold* (3.2 percent); and *other level, unspecified* (2.9 percent).

Figure 41. Proportion of all treated^{1,2} falls discharged from hospital by type of fall, ages 0-24, Ohio, 2002-05



Falls are among the most common causes of injury in youth; however, fortunately few result in death. When the fall is lethal, it is usually attributable to great height (22 feet or more), or the child’s head hitting a hard surface such as concrete.^{19, 20, 21} For children and youth, the height of the fall and the landing surface determines the amount of kinetic energy transmitted to the victim, and therefore the severity of the injuries.

Falls among youth aged 24 years or younger, who made up 34 percent of the Ohio population, accounted for less than 1.5 percent of the fatal falls in Ohio from 2002-2005. Of the 43 fatal falls, eight occurred off of a *cliff*, and seven each *from/thru a building; other level, unspecified; and unspecified*. The remaining fatal falls among persons 24 years or younger are listed in Table 10.

Table 10. Fall deaths¹ among persons 24 or younger, by type of fall, Ohio, 2002-05

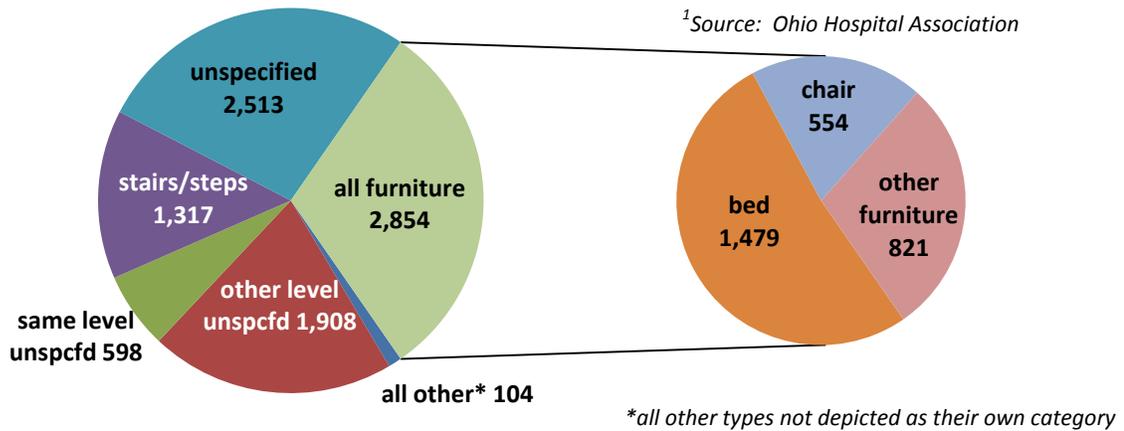
type of fall	number of deaths
bed	1
chair	1
diving	3
dropped	1
from/thru building	7
furniture, unspecified	1
ladder/scaffold	1
off a cliff	8
other level, unspecified	7
same level, unspecified	5
stairs/steps	1
unspecified	7
total	43

¹Source: ODH Office of Vital Statistics

INFANTS – YOUNGER THAN ONE YEAR

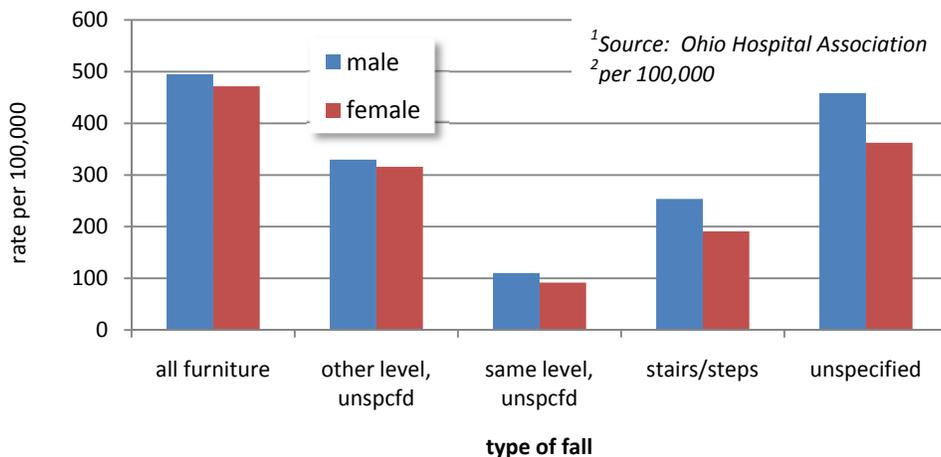
Not only are falls the leading cause of unintentional injury for infants less than 1 year old, this pattern is maintained for each month of their first year of life.²² From 2002-05, in Ohio, there were 9,294 fall-related ER treated cases and 194 hospital discharges of infants less than 1 year old. In Figure 42, we can see that, for infants, *stairs/steps* (14 percent) and *all furniture* (30 percent), particularly *beds* were frequently associated with falls that warranted treatment in an ER. Although level may have been noted, for more than half (54 percent) of these falls, the details were *unspecified*.

Figure 42. Proportional distribution of ER visits¹ among persons less than 1 year old, by type of fall, Ohio, 2002-05



On average, from 2002-05, more than 1,688 male and 1,451 female infants per 100,000 received treatment in an ER each year as the result of a fall, (data not shown). Male infants were at higher risk than females of visiting an ER for an injury from any of the major types of falls, Figure 43. The largest gender discrepancies were for *unspecified* falls, and falls on *stairs/steps*, Appendix A. There is some evidence that for infants, gender differences in injury rates may be at least partially attributable to parenting practices.²²

Figure 43. Annual fall-related ER visit rates^{1,2} for persons less than 1 year old, Ohio, 2002-05



More than one of every 50 infants treated for a fall were discharged from a hospital, the highest proportion among youth ages 0-24 years. Compared to ER visits, a larger proportion of inpatient hospitalizations were due to falls to *other level, unspecified* and a smaller proportion to *same level, unspecified*, Figures 44, 45. This pattern is consistent with other data showing that falls from one level to another among children will result in more serious injuries.^{19,20,21}

Figure 44. Proportional distribution of fall-related hospital discharges¹ among persons less than 1 year old, by type of fall, Ohio, 2002-05

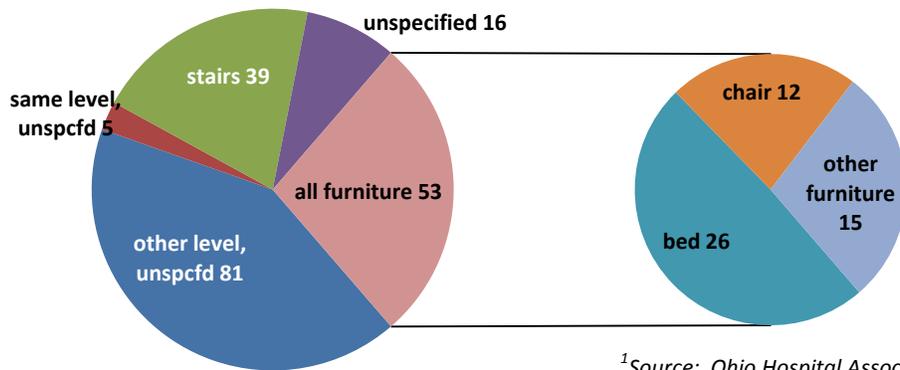
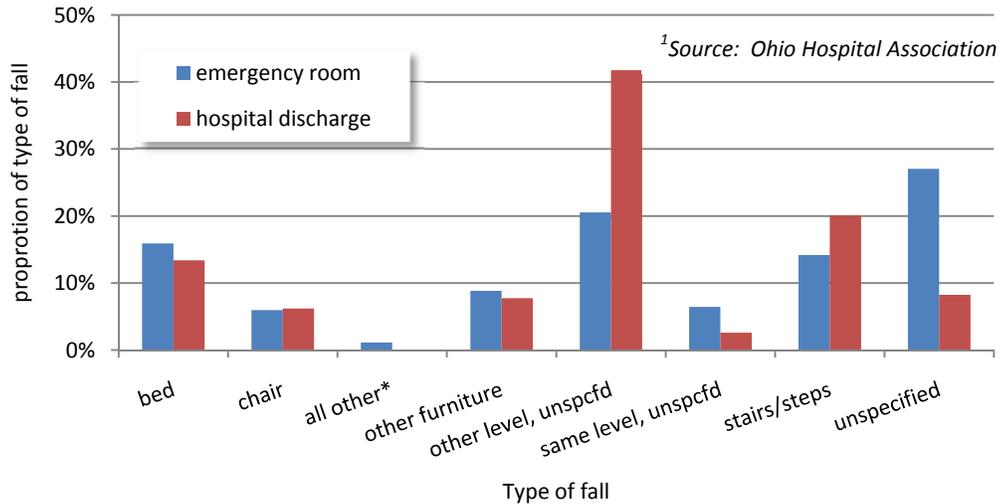
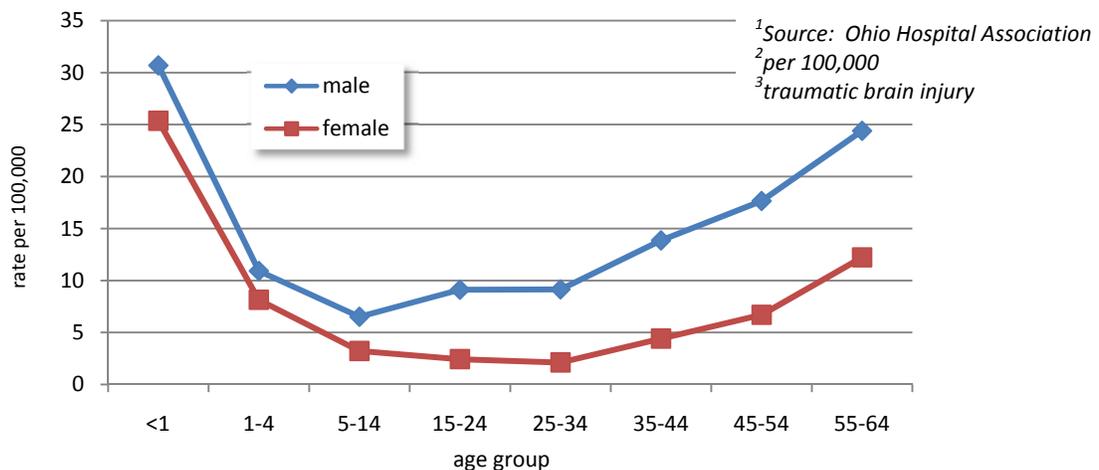


Figure 45. Proportional distribution of types of falls among ER visits and HIDs for infants less than 1 year, Ohio, 2002-05¹



With their proportionally larger heads, infants are uniquely vulnerable to severe consequences resulting from falls, including increased likelihood of traumatic brain injury.^{23,24} From 2002-2005, of the 194 fall-related HIDs among infants, 86 percent were diagnosed with a traumatic brain injury (TBI). Infants had the highest HID rates for fall-related TBI of any age group 0-64 years, with males at greater risk than females, Figure 45.

Figure 46. Hospital discharge¹ rates² of persons with fall-related TBI³, ages 0-64, Ohio, 2002-05



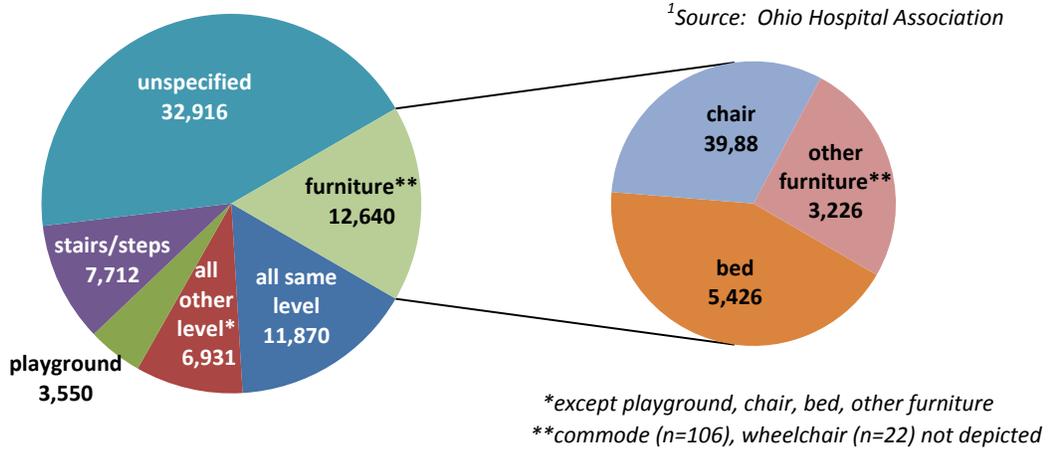
Toddlers – Ages 1-4

Several physiological and developmental characteristics place children aged 1 to 4 at high risk for fall-related injury.^{13, 14, 19, 25} As with infants, their heads are large relative to their bodies, leading to a higher center of gravity that makes falls more likely. In addition, though they are developing increased mobility and agility, they lack an awareness of potential danger and the capability to judge the consequences of their actions. Their natural curiosity renders them particularly vulnerable to falls from one level to another, such as from windows or balconies or down stairs as they start to stand up, walk and explore their environments.



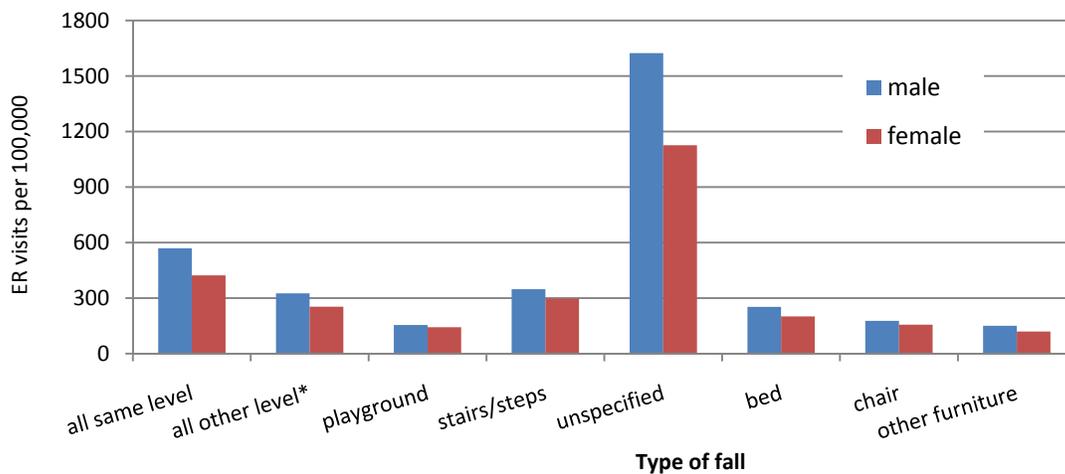
Fall height has been used as a predictor of fall severity due to the amount of kinetic energy transferred to the tissues of the body. In the present study, TBIs were diagnosed in approximately 40 percent of the 572 fall-related hospitalizations of children 1 to 4 years of age. For children this age, falls from furniture remained a significant cause of injury, leading to 12,768 ER visits (when *wheelchairs* and *commodes* are included), from 2002-05, Figure 47. Forty-two percent of the furniture falls were from beds and 31 percent from chairs. Ten percent of all falls leading to ER visits were *down stairs*, 5 percent were *from playground equipment* and 15 percent were on the *all same level*, Appendix A.

Figure 47. Proportional distribution of fall-related ER visits¹, ages 1-4, Ohio, 2002-05



The overall rates for 1-4-year-old fall-related ER visits were 3,603 per 100,000 for males 2,720 for females. As with infants, (Figure 43), males aged 1 to 4 years had higher ER visit rates than females for each of the different types of falls, (Figure 48). Also, as with infants, the greatest gender discrepancy could be found for *unspecified* falls. The smallest difference was for falls *from playground equipment* (155 per 100,000 males and 143 per 100,000 females).

Figure 48. Fall-related ER visit¹ rates² by type of fall, sex, ages 1-4, Ohio, 2002-05



¹Source: Ohio Hospital Association
²per 100,000

*except playground, chair, bed, other furniture
**commode (n=106), wheelchair (n=22) not depicted

Falls from one level to another were more likely to result in injury serious enough to require hospital admission. Among the 1-4-year-olds, such falls (*all other level*, including *from furniture* and *from playground equipment*) made up 46 percent of HIDs, but only 30 percent of ER visits, Figures 49, 50. For this age group, other types of falls that comprised disparate proportions of HIDs vs. ER visits were: *unspecified falls* (18 versus 44 percent) and *from/thru a building* (8 versus 0.3 percent, respectively), data not shown.

Figure 49. Proportional distribution of fall-related HIDs,¹ by type of fall, ages 1-4, Ohio, 2002-05

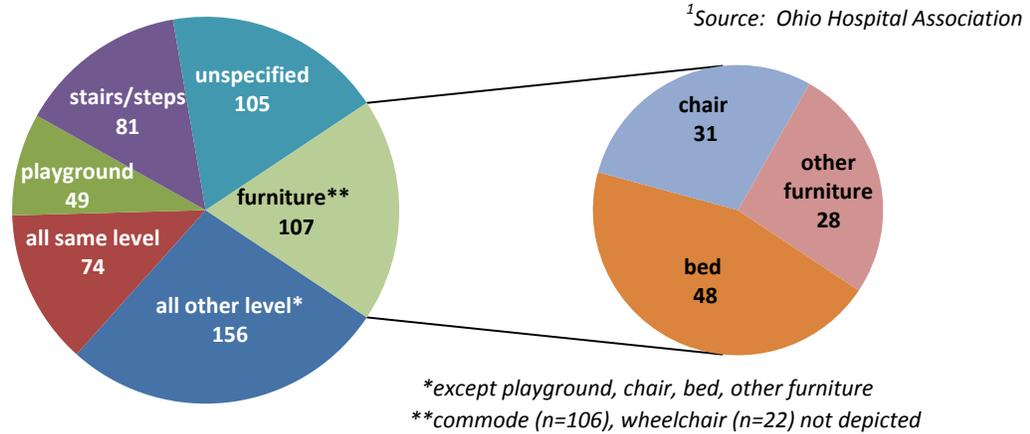
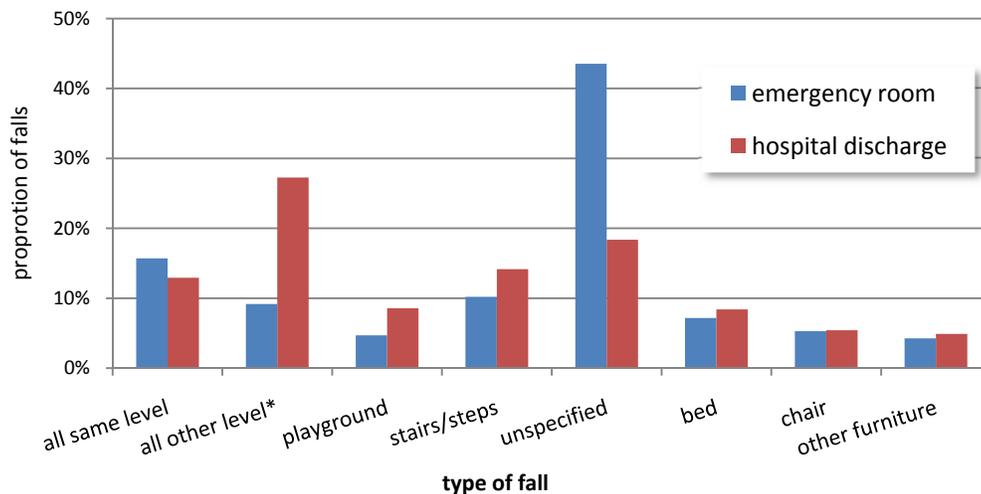


Figure 50. Proportional distribution of types of falls among ER visitors¹ and hospital discharges,¹ ages 1-4, Ohio, 2002-05



¹Source: Ohio Hospital Association

*except playground, chair, bed, other furniture

Elementary and Middle School-aged Youth – Ages 5-14

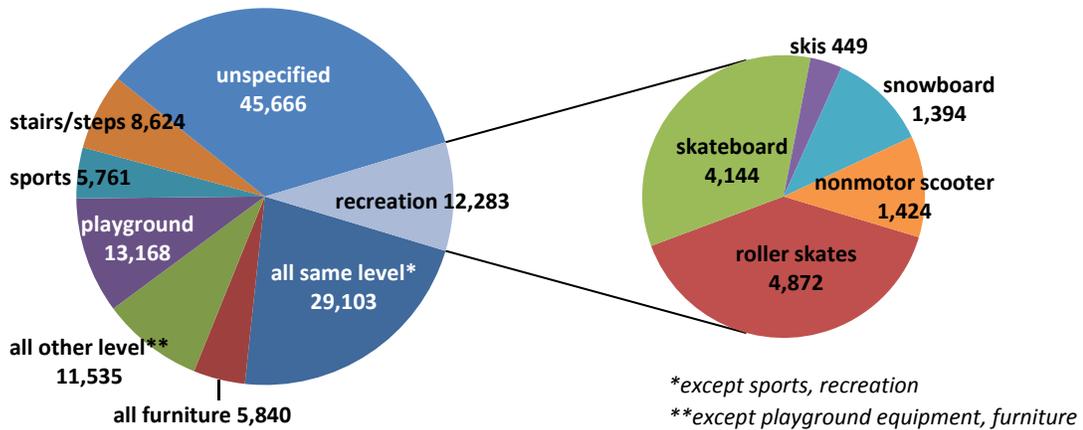
By the time they reach elementary and middle school, children have developed additional motor skills, but may still lack judgment to make appropriate and safe decisions.^{13,14,15} Their desire for greater independence at this age may also contribute to an increased risk for fall-related injury.

From 2002-05, there were 131,980 5-14-year-olds treated in emergency rooms for fall-related injuries. An examination of the data reveals that *from playground equipment* (10 percent), recreation (9 percent) and *sports* (4 percent), were important sources of fall-related injuries serious enough to warrant treatment in an ER, Figure 52. Among the latter, falls from skateboards and roller skates accounted for more than 4,100 visits each.



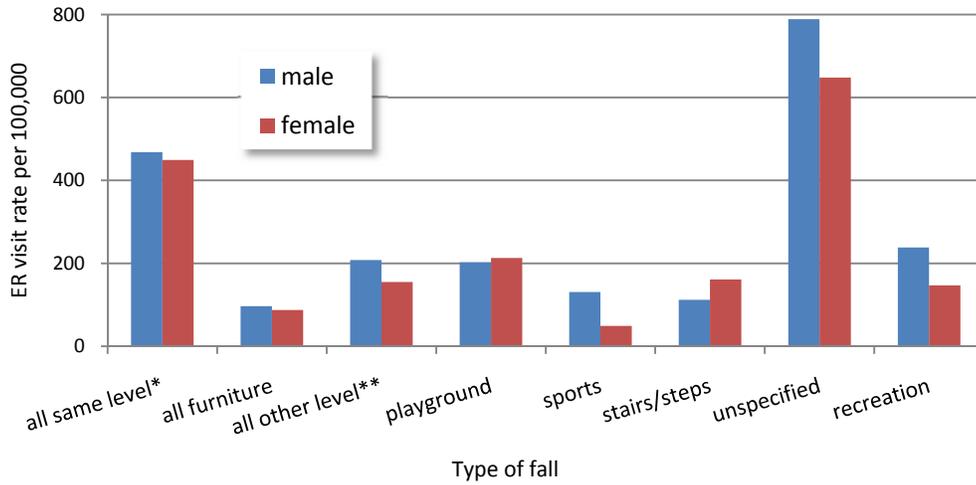
Figure 51. Proportional distribution of fall-related ER visits¹ by type of fall, ages 5-14, Ohio, 2002-05

¹Source: Ohio Hospital Association



Similar to the younger age groups (where males had higher fall-related ER visit rates for every type of fall, females aged 5-14 years demonstrated higher rates than males only for stairs/steps or falls from playground equipment, Figure 52). Overall, on average each year, 2,245 per 100,000 males and 1,909 females visited an ER as a result of a fall-related injury. For sports and recreation falls, male ER visits rates were 165 percent and 65 percent greater than female rates, respectively.

Figure 52. Fall-related ER visit¹ rates² by type of fall, ages 5-14, Ohio, 2002-05

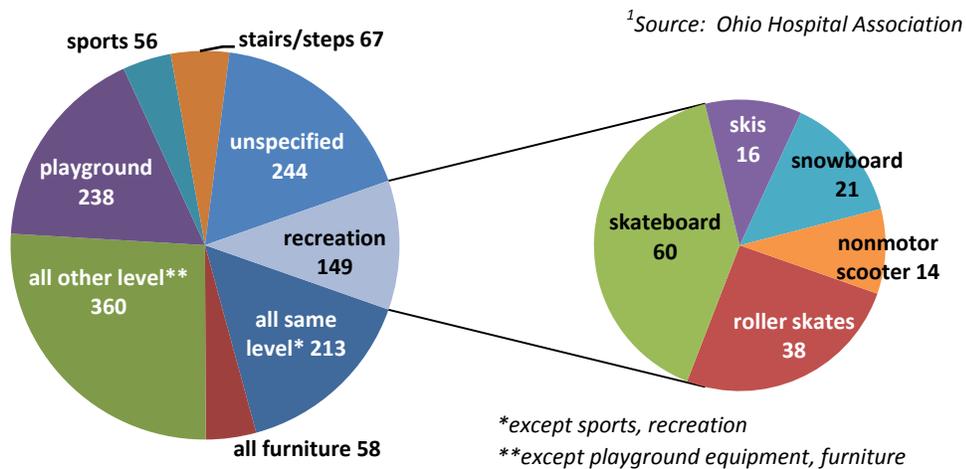


¹Source: Ohio Hospital Association
²per 100,000

*except sports, recreation
**except playground equipment, furniture

Falls from *playground equipment* were responsible for 17 percent of the 1,385 fall-related HIDs for this population, compared to 10 percent of ER visits. *Sports* and *recreation* falls accounted for 4 and 11 percent of HIDs, respectively, Figure 53.

Figure 53. Proportional distribution of fall-related HIDs¹, by type of fall, ages 5-14, Ohio, 2002-05

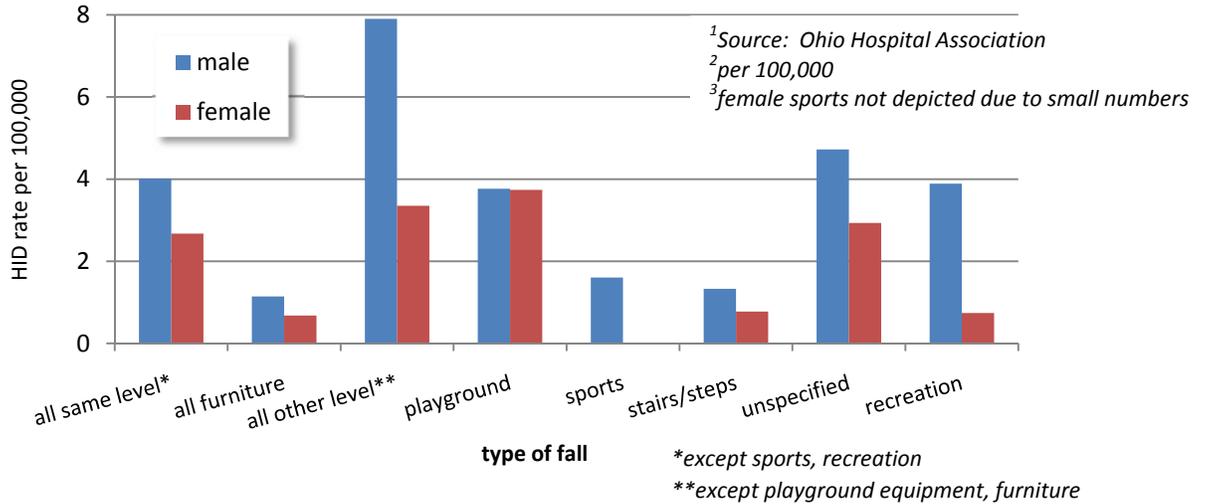


¹Source: Ohio Hospital Association

*except sports, recreation
**except playground equipment, furniture

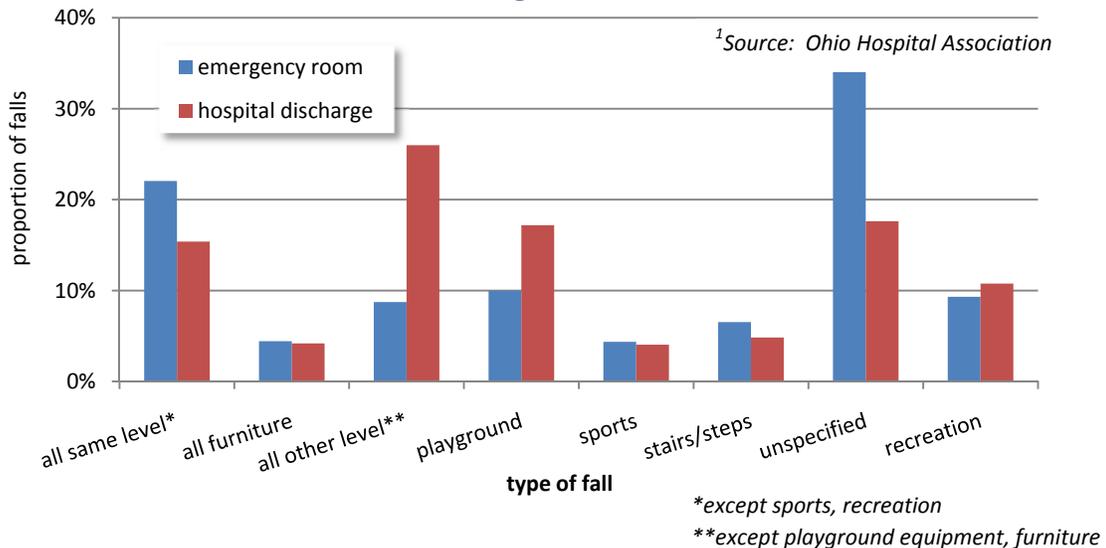
Overall, for this age group, the male fall-related discharge rate was nearly twice that of females, 28.4 versus 15.0 per 100,000. Males were particularly more vulnerable to injury serious enough to require hospitalization from *other level*, *sports* and *recreation* falls, Figure 54.

Figure 54. Fall-related HID¹ rates² by type of fall,³ sex, ages 5-14, Ohio, 2002-05



Nearly half (47 percent) of hospitalizations of 5-14-year-olds resulted from falls to *all other levels* (when *all furniture* and *from playground equipment* are included), compared to 23 percent of ER visits. More than one-third of ER-treated falls were classified as unspecified, compared to less than 18 percent of hospital-admitted.

Figure 55. Proportional distribution of types of falls among ER visits¹ and HIDs,¹ ages 5-14, Ohio, 2002-05

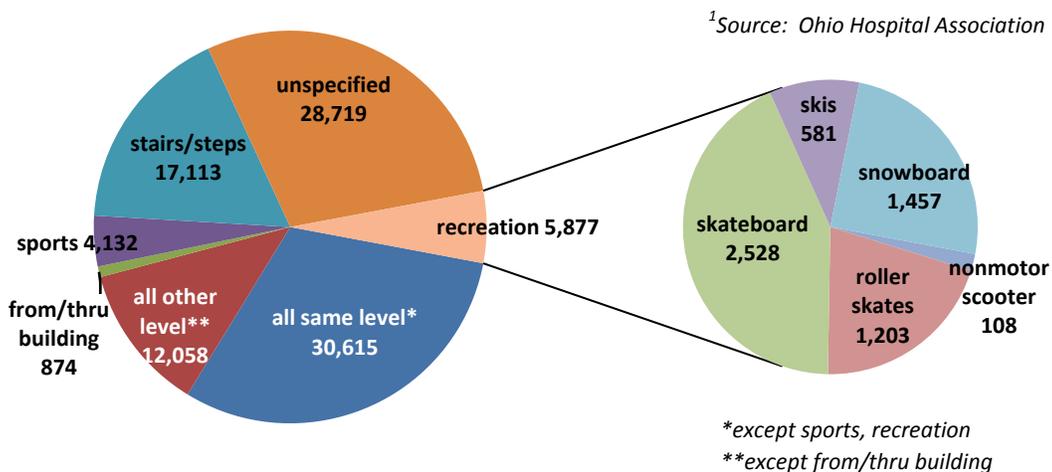


ADOLESCENTS AND YOUNG ADULTS – AGES 15-24

The developmental period of adolescence and young adulthood is marked by risk-taking behaviors, impulsivity and a perceived sense of invulnerability. Sports activities may involve more physical contact resulting in additional transfer of energy.²⁶ Recreation such as skiing, skateboarding, snowboarding, etc., often under the influence of alcohol or other drugs, may become more daring, leading to the potential for increased injury. Additional risk may also be accumulated by those adolescents who start jobs where they must negotiate situations for which they lack knowledge, training and skills.²⁷

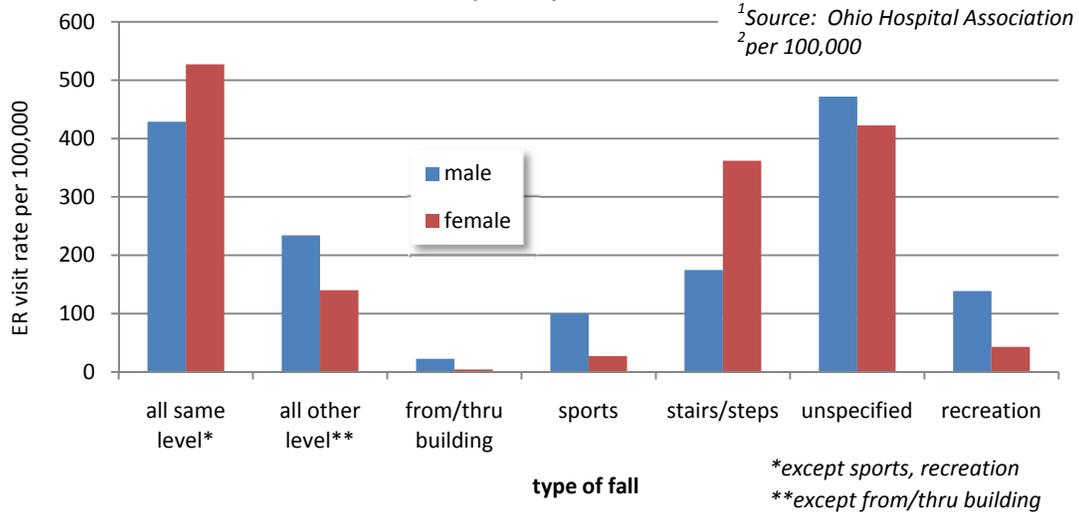
More than 17 percent of the 99,401 fall-related ER visits among 15-24-year-olds were due to falls on *stairs/steps*, Figure 56. *Sports* and *recreation* activities together accounted for one out of 10 fall-related ER visits. Of the 6 percent of recreation-related falls leading to ER visits among 15-24-year-olds, the largest numbers of visits were due to *skateboarding* (n=2,528), followed by *snowboarding* (n=1,457) and *roller skating* (n=1,203).

Figure 56. Proportional distribution of fall-related ER visits,¹ by type of fall, ages 15-24, Ohio, 2002-05



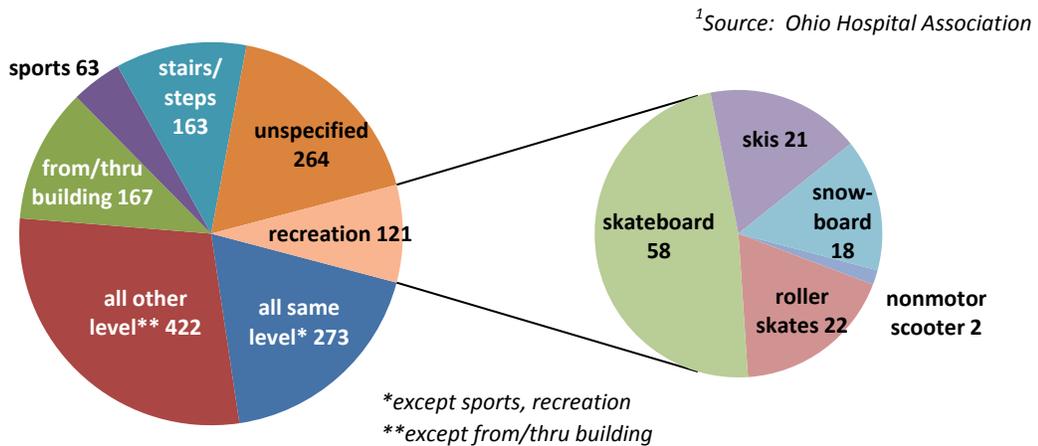
For those aged 15-24 on average each year from 2002-05, there was a fall-related ER visit for every 58 males and 64 females (rates per 100,000 = 1,710 for males and 1,570 for females). *Recreation* fall rates were more than three times greater for males than females, (139 versus 43 per 100,000), Figure 57. Males were at more than 11 times the risk of suffering a skateboard injury serious enough to require treatment at an ER (71 versus six per 100,000 for females), (data not shown). Females were at more than twice the risk of visiting an ER after falling on *stairs/steps*, (363/100,000 versus 175 for males).

Figure 57. Fall-related ER visit¹ rates,² by type of fall, sex, ages 15-24, Ohio, 2002-05



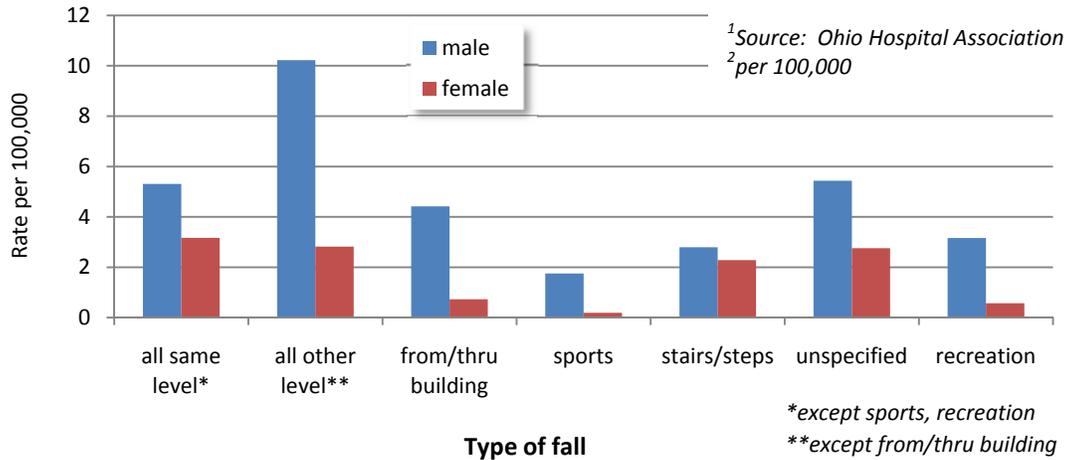
Nearly three-fourths (73 percent) of the 1,473 fall-related HIDs among persons aged 15-24 were among males (n=1,078), (data not shown). For this age group, *from/thru a building* and *stairs/steps* were important contributors to fall-related hospitalizations, with each responsible for 11 percent of the total, Figure 58. Another 8 percent were associated with *recreation*, with *skateboards* contributing nearly half of these.

Figure 58. Proportional distribution of fall-related HIDs,¹ by type of fall, ages 15-24, Ohio, 2002-05



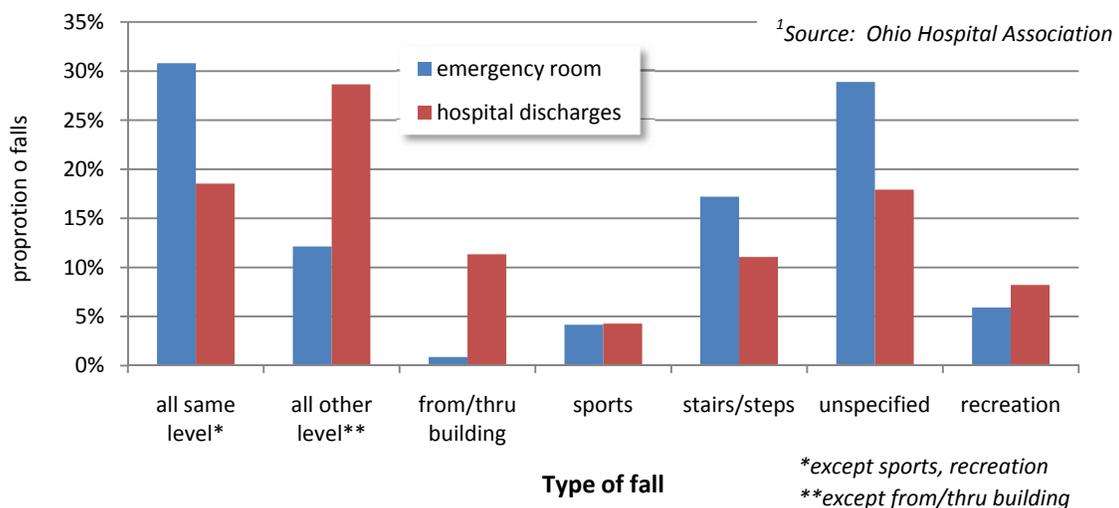
For all falls, males were discharged at an annual average rate of 33 per 100,000, compared to 12 per 100,000 for females. For every type of fall, Figure 59, males were at greater risk. Sex differences were especially apparent for high-impact falls, i.e., from *all other levels*, *sports* or *recreation*, Appendix A.

Figure 59. Fall-related HID¹ rates² by type of fall, sex, ages 15-24, Ohio, 2002-05



Falls to all *other levels* made up 29 percent of hospital-treated falls, but only 12 percent of ER visits, Figure 60. Falls *from/thru a building* or during *recreation* also were responsible for greater proportions of HIDs than ER visits. Only 18 percent of fall-related discharges for this age group were classified as *unspecified*.

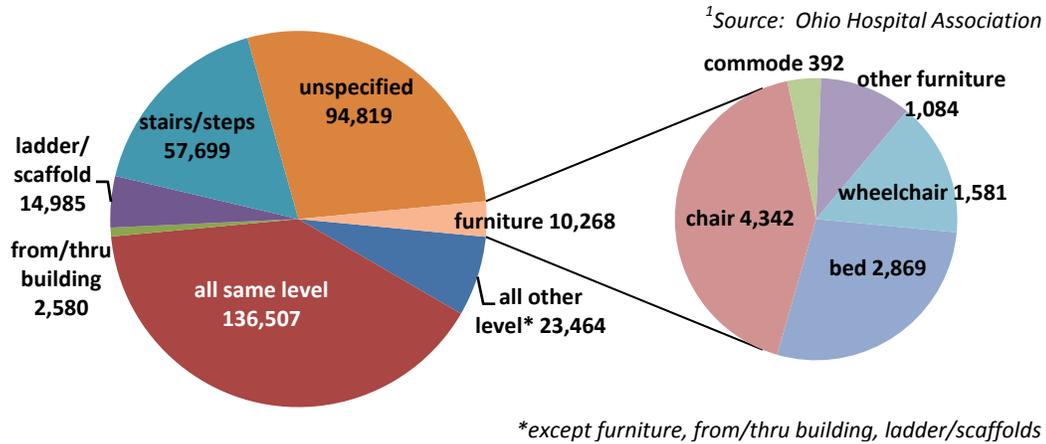
Figure 60. Proportional distribution of fall-related ER visits¹ and HIDs¹ by type of fall, ages 15-24, Ohio, 2002-05



FALLS AMONG ADULTS – AGES 25 – 64 YEARS

From 2002-05, there were 340,322 fall-related ER visits by Ohioans aged 25-64 years. Forty percent of these visits were due to falls on *all same level*, while another 28 percent were *unspecified*, (Appendix A), Figure 61. Within this age range, persons aged 25-34 had the highest likelihood of any age group of being treated at an ER after falling from/thru building.

Figure 61. Proportional distribution of fall-related ER visits,¹ by type of fall, ages 25-64, Ohio, 2002-05



The overall, fall-related ER visit rates for this age group were 1,223 per 100,000 for males and 1,611 for females. This is the first time, among the different age groups examined so far, that females are at greater risk than males. Males were more vulnerable than females for only: *other level*, *from/thru building* and *ladder/scaffold* falls, Figure 62. The ratio of female to male ER visit rates increased with each succeeding age group in this population, with female rates remaining fairly constant and male rates steadily declining, Figure 63.

Figure 62. Fall-related emergency room visit¹ rates,² by type of fall, sex, ages 25-64, Ohio, 2002-05

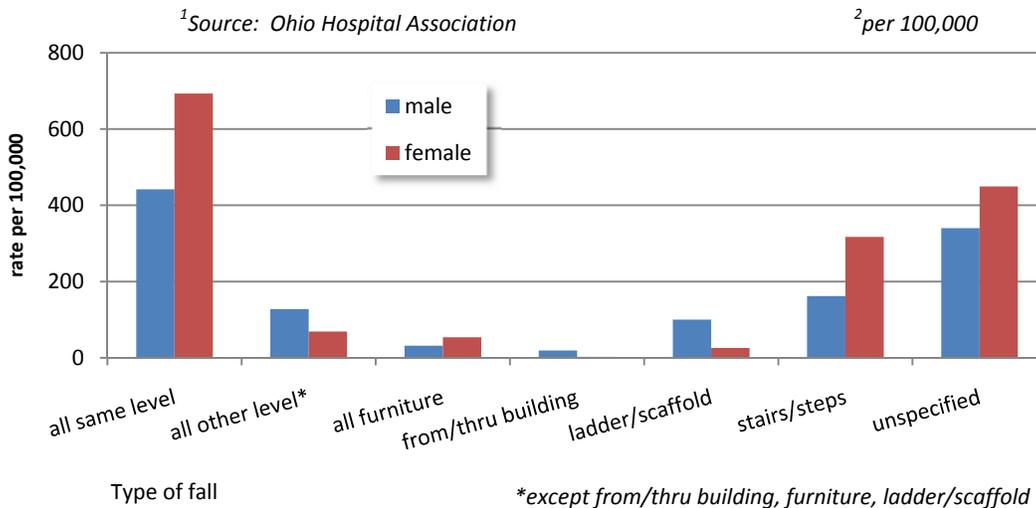
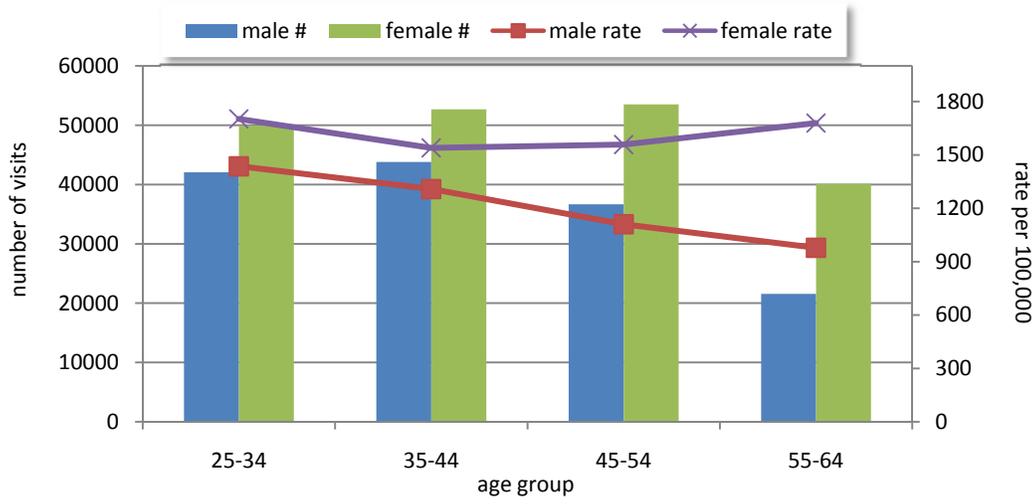


Figure 63. Number and rate¹ of ER visits,² by age group, sex, ages 25-64, Ohio, 2002-05



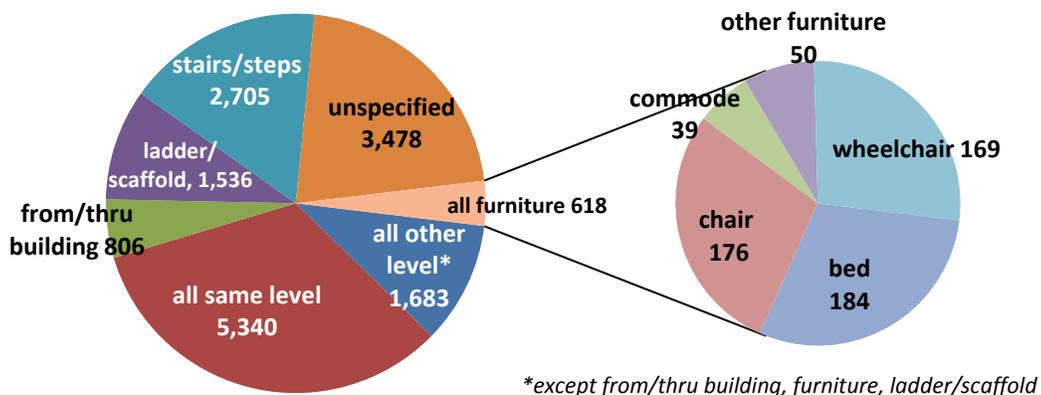
¹per 100,000

²Source: Ohio Hospital Association

For this age group, there were 16,166 fall-related HIDs from 2002-05. One-third of these were *all same level* falls, 22 percent were *unspecified* and 17 percent occurred on *stairs/steps*, Figure 64. There were 360 HIDs resulting from a fall from a bed or chair.

Figure 64. Proportional distribution of fall-related HIDs¹ by type of fall, ages 25-64, Ohio, 2002-05

¹Source: Ohio Hospital Association



*except from/thru building, furniture, ladder/scaffold

The annual fall-related HID rate was 73 per 100,000 for males and 62 for females, Figure 65. Contrary to the pattern we noted with ER visits, males remained at greater risk for fall-related hospitalization in this age group. However, the sex-related pattern of type of fall remained the same; males were more likely to fall from *all other level*, *from/thru building* and *ladder/scaffold* and females from *all same level* and on *stairs/steps*.

Figure 65. Fall-related hospital discharge¹ rates,² by type of fall, sex, ages 25-64, Ohio, 2002-05

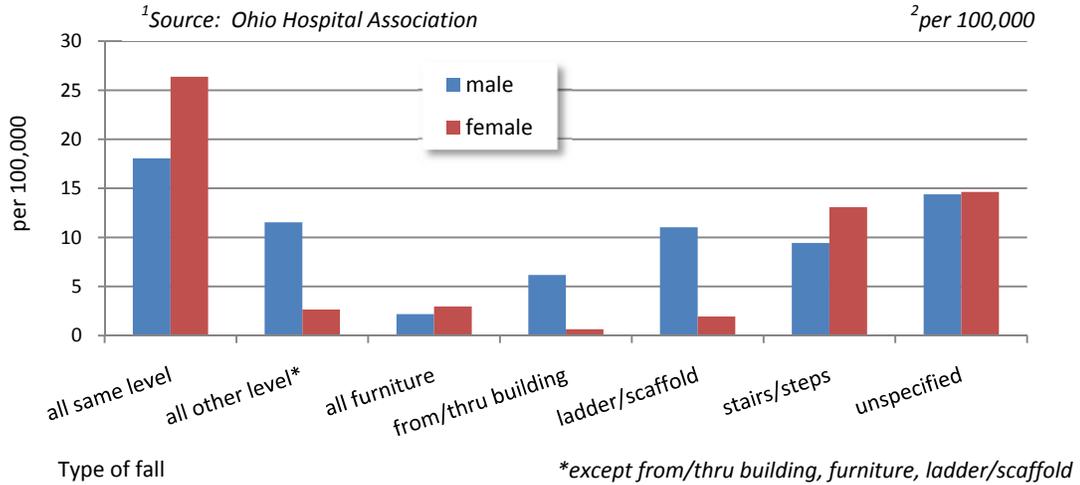
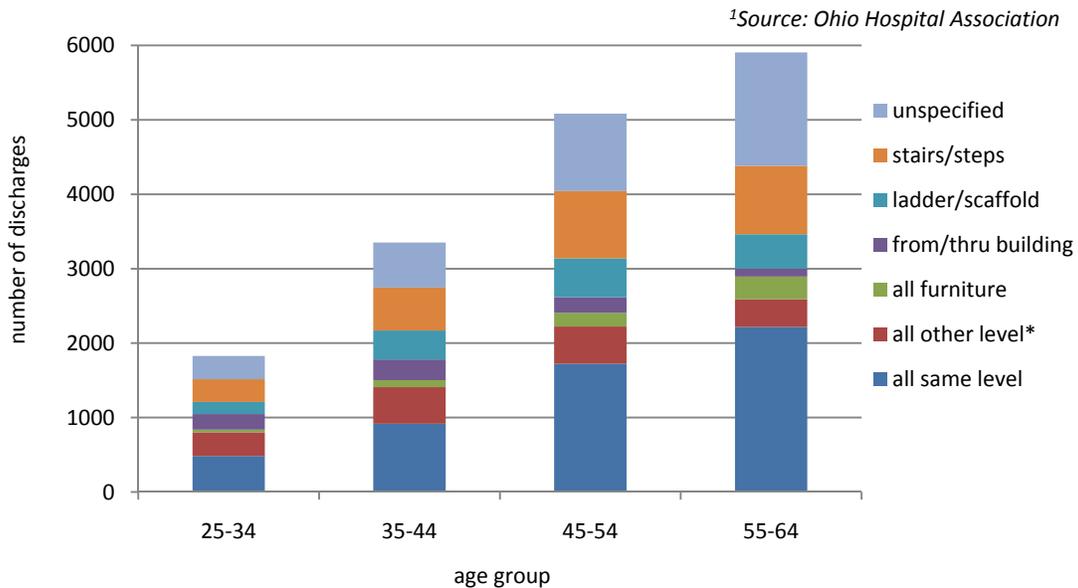


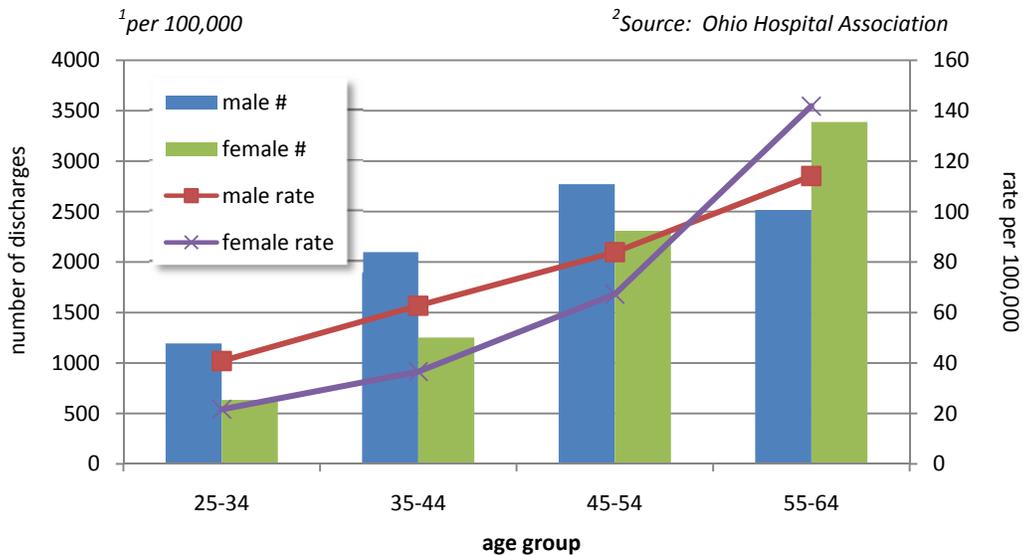
Figure 66 displays the number of fall-related HIDs by type of fall for adults. More than three times as many 55-64-year-olds were hospitalized as 25-34-year-olds. The proportion of falls that were *unspecified* or on the *all same level* increased with age, while falls *from/thru building* and to *other level* decreased with age.

Figure 66. Number of fall-related hospital discharges,¹ by type of fall, age group, ages 25-64, Ohio, 2002-05



The increasing number of hospitalized falls with advancing age, as seen in Figure 66, resulted in increased rates for both sexes, Figure 67. Until age 55, males were at higher risk than females. Fifty-five to 64-year-old females were hospitalized after a fall at an annual rate of 142 per 100,000, nearly 25 percent higher than males (114 per 100,000).

Figure 67. Number and rate¹ of HIDs² by age group, sex, ages 25-64, Ohio, 2002-05

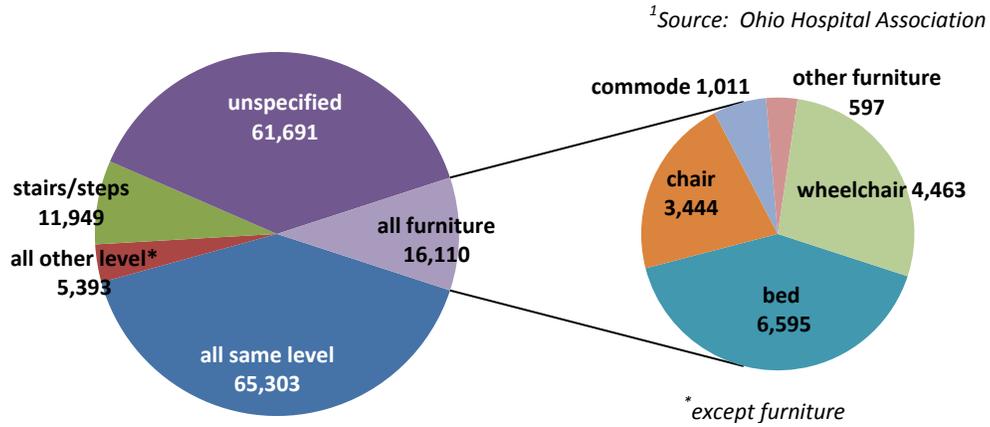


TYPES OF FALLS AMONG OLDER ADULTS, AGES 65 AND OLDER

Annually, one in three Americans over age 65 years experiences a fall, and many of these are associated with numerous morbidities, decreased quality of life and high health care costs.^{28,29} Many of these falls are recurrent and result in moderate to severe injuries that reduce mobility and independence.^{11,33, 34}

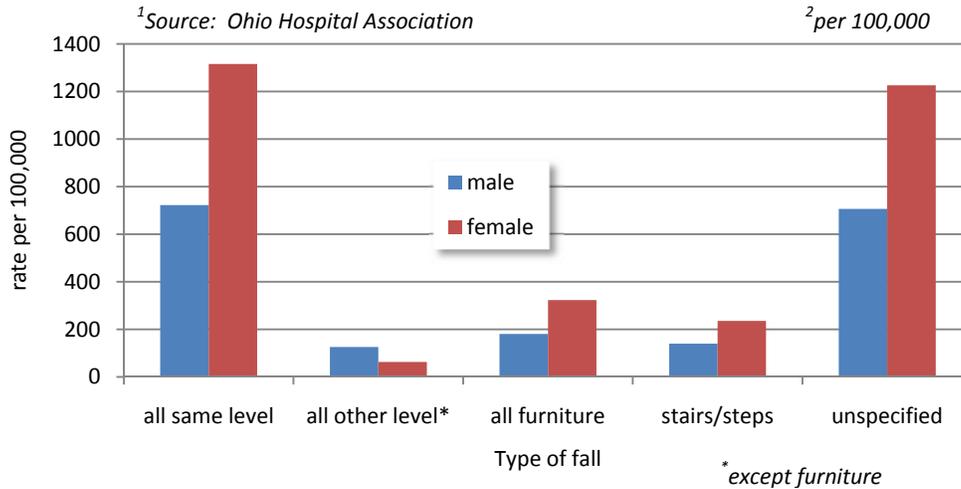
During the years 2002-05, although 13 percent of Ohioans were aged 65 or older, they were responsible for 20 percent of fall-related ER visits. Most (79 percent) of the 160,446 fall-related ER visits by older adults were classified as either *unspecified* or *all same level* falls, (Appendix A), Figure 68. Though a smaller proportion of injuries were attributable to *stairs/steps* and *furniture*, the absolute number of hospitalizations for these types of falls (11,949 and 16,110, respectively), clearly demonstrates the real dangers facing older persons in everyday life. There were relatively few *all other level* falls (3 percent) among older adults, beyond those involving *all furniture*.

Figure 68. Proportional distribution of fall-related ER visits¹ by type of fall, ages 65 and older, Ohio, 2002-05



Overall, among older adults, males visited ERs for treatment after a fall at an annual rate of 1,875 per 100,000, while females were at 1.7 times the risk (rate = 3,163 per 100,000). Females were at greater risk of being treated at an ER for every major type of fall except *all other level* falls, Figure 69.

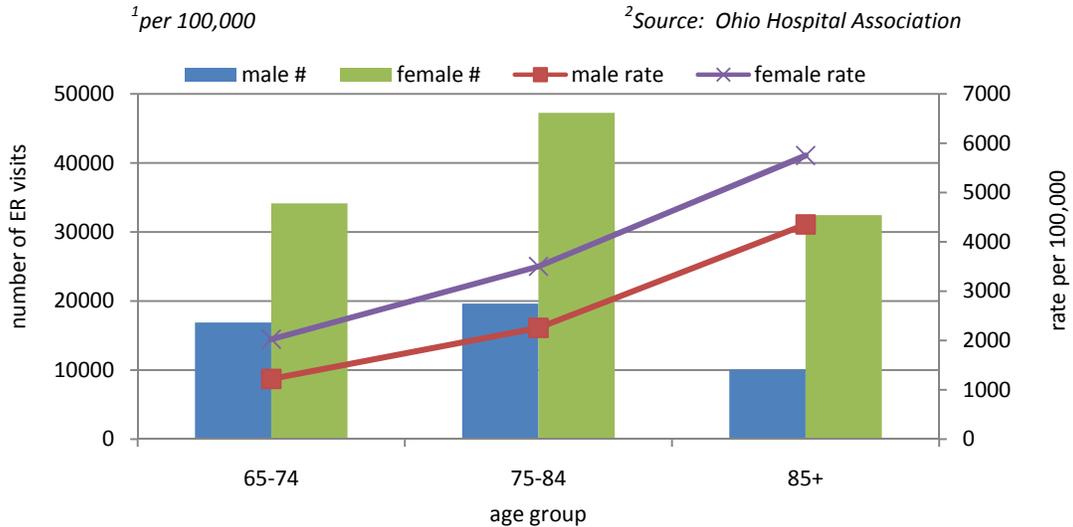
Figure 69. Fall-related ER visit¹ rates² by type of fall, sex, Ohio, 2002-05



The male fall-related ER visit rate was more than three times greater for those 85 or older (4,353 per 100,000) than for those 65-74 years old (1,221), Figure 70. During the study period, there were a little less than 58,000 living male Ohio residents aged 85 years or older (<http://www.census.gov> accessed July 28, 2008). Each year, about 2,500 visited an ER after a fall.

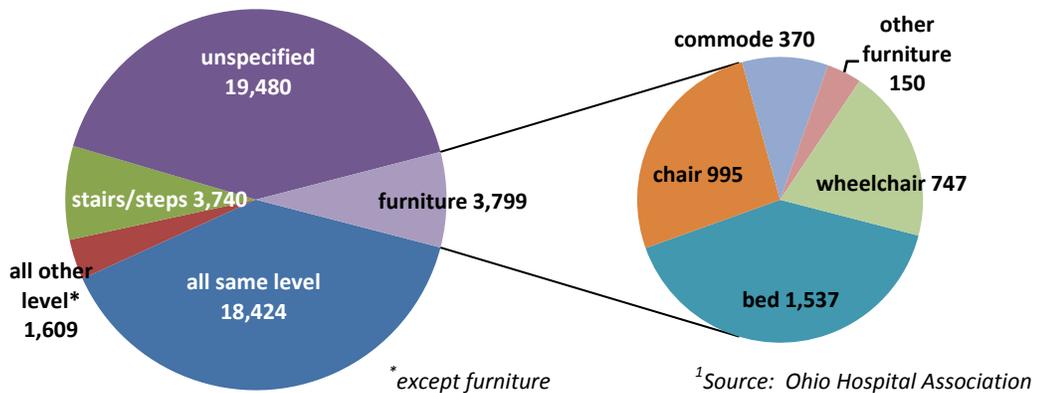
Although the age-related increase was not quite as great for females, they were at higher risk than males for each age group, with rates of 2,025 per 100,000 for 65-74-year-olds and 5,751 for those 85 and older. For each of these age groups, more than twice as many women as men sought treatment at an ER after a fall.

Figure 70. Number and rate¹ of fall-related ER visits² by age group, sex, ages 65 and older, Ohio, 2002-05



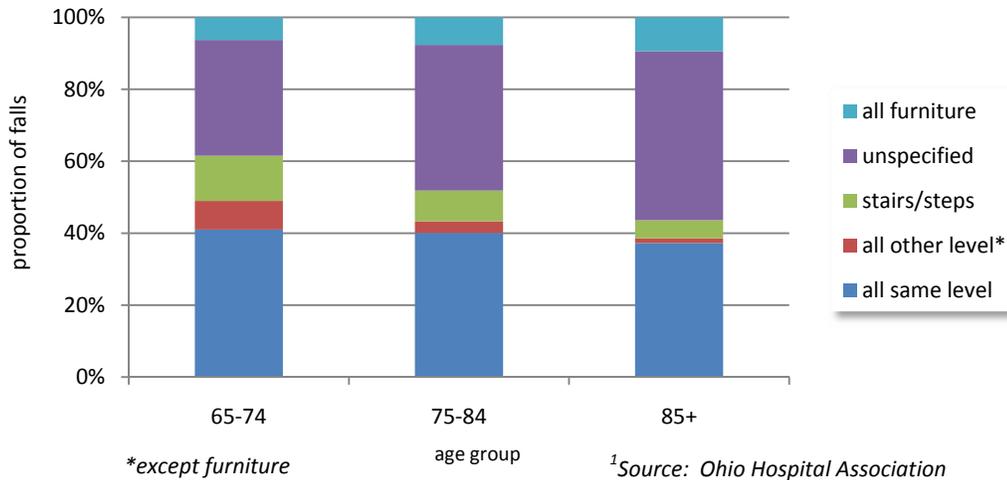
Consistent with national data and other studies, (references) the Ohio HID records revealed *all same level* was the most common among identified types of falls suffered by older adults, Figure 71. Falls from *all furniture* and *stairs/steps* each accounted for more than 3,700 injuries and 8 percent of total fall-related HIDs. For those aged 65 or older, type of fall was distributed similarly for ER visits and HIDs.

Figure 71. Proportional distribution of fall-related HIDs¹ by type of fall, ages 65 and older, Ohio, 2002-05



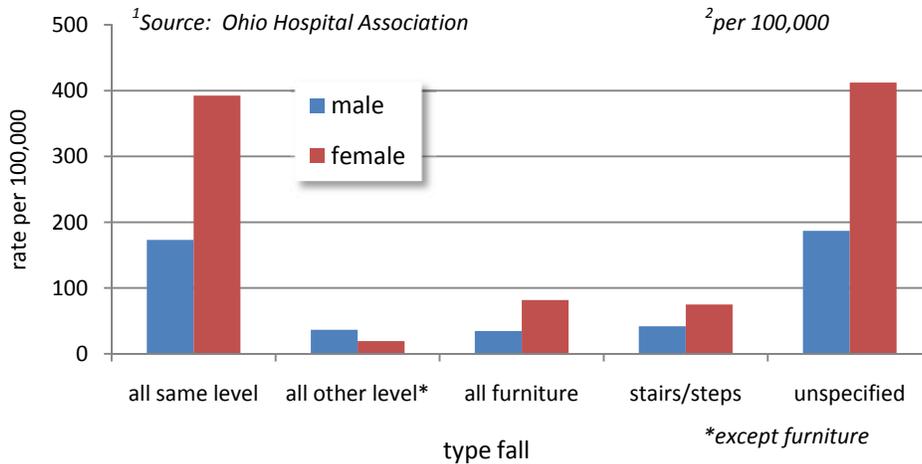
Forty-two percent of fall-related HIDs for this group were *unspecified* as to type of fall. Unfortunately, the proportion of unspecified falls increased with age group, (Figure 72), thereby limiting our ability to accurately characterize risk for the most vulnerable populations. With advancing age, falls on *stairs/steps* and from *other level* (excluding furniture) declined in impact on likelihood of hospitalization.

Figure 72. Proportional distribution of fall-related HIDs¹ by type of fall, age group, ages 65 and older, Ohio, 2002-05



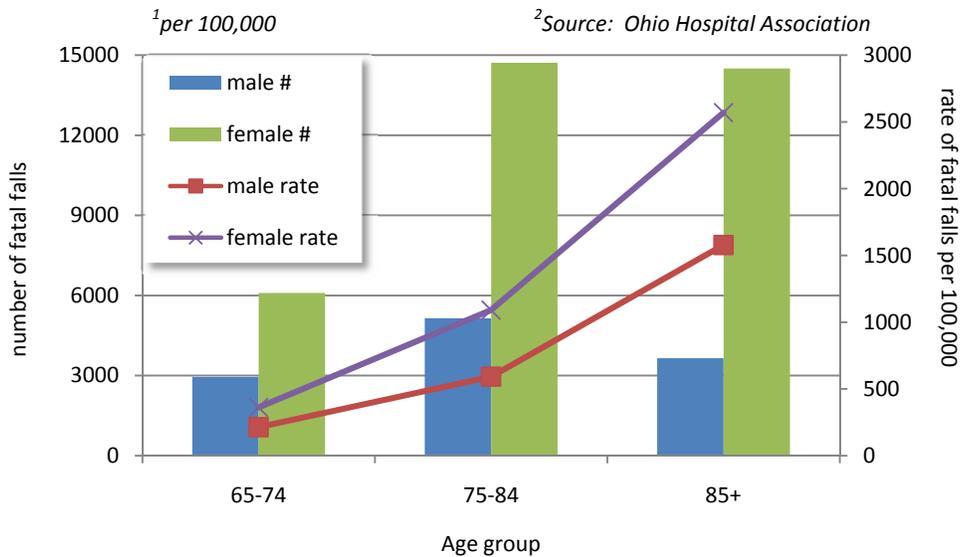
Among the 65 and older age group, the overall fall-related HID rate was 981 per 100,000 for females and 473 per 100,000 for males (data not shown). Females in this age group demonstrated higher rates of fall-related HID for every type of fall except from other level, Figure 73. *Furniture* and *stairs/steps* presented comparable risk for older Ohioans, though this risk varied by sex with females at greater risk.

Figure 73. Fall-related HID¹ rates² by type of fall, ages 65 and older, Ohio, 2002-05



As with fall-related ER visits among older adults 65 years and older, within each age subgroup, there were more than twice as many female as male discharges, Figure 74. For both sexes, HID rates were seven times higher for those aged 85 years or older than for those in the 65-74 age group. For this oldest age group, there were more than 25 fall-related HIDs for every 1,000 females each year.

Figure 74. Number and rate¹ of fall-related HIDs² by age group, sex, ages 65 and older, Ohio, 2002-05

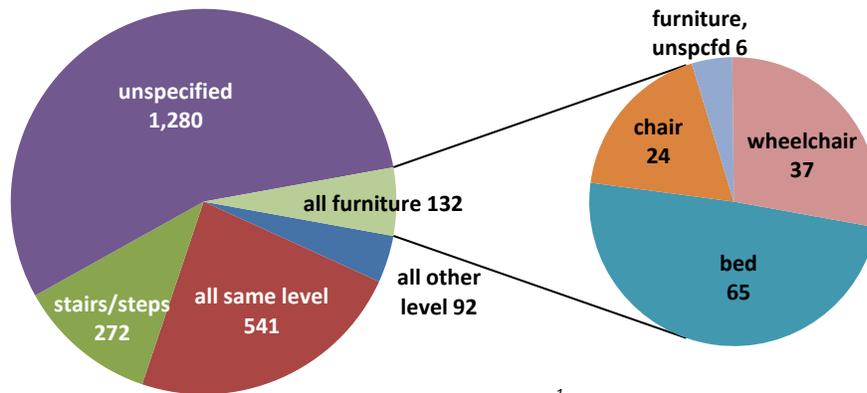


Fatal Falls Among Older Ohioans - 65 and Older

For the 2,317 most serious falls among older adults, i.e. those leading to death, the majority (55 percent) were classified as *unspecified*, (Appendix B) thereby providing little useful information, Figure 75. The specifics of the fall could be helpful for understanding how these falls occurred and how to decrease and/or prevent them. Efforts should be undertaken to improve the coding of both fatal and nonfatal injuries. Nearly one in four (23 percent) deaths resulted from *all same level* falls. *Stairs/steps* accounted for 12 percent and falls from *all furniture* characterized another 6 percent of fatal falls among Ohioans 65 and older.



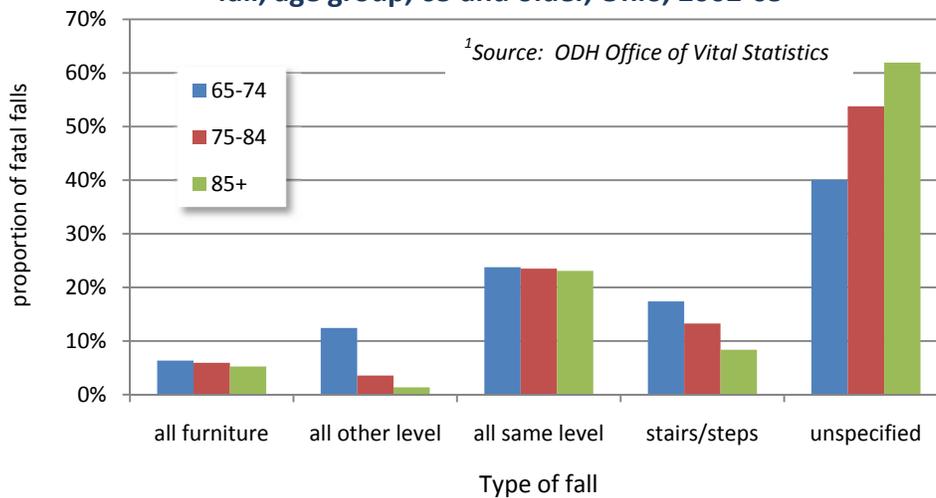
Figure 75. Proportional distribution and number of fatal falls¹ by type of fall, ages 65 and older, Ohio, 2002-05



¹Source: ODH Office of Vital Statistics

Figure 76 depicts how the likelihood of details of the fall being omitted increases with age: 40 percent of fatal falls among those aged 65-74 and 62 percent of those 85 or older were *unspecified*. Also apparent is the increasingly diminished role that *all other level* falls play in older populations.

Figure 76. Proportional distribution of fatal falls¹ by type of fall, age group, 65 and older, Ohio, 2002-05



¹Source: ODH Office of Vital Statistics

Of the 2,874 Ohioans who died as the result of a fall from 2002-05, 68 percent were 75 or older. Figure 77 demonstrates the steep rise in risk of fatally falling as older adults advance in age. Unlike with ER visits or HID, older males were at greater risk than females of dying from a fall.

Though males experienced higher fatal fall rates for each subgroup, the fatal fall rate for females increased the most (13 times greater) from 65-74-year-olds (8 per 100,000) to those 85 or older (115 per 100,000). The increase in the comparable male rates was ten-fold (16 to 164 per 100,000).

Figure 77. Number and rate¹ of fatal falls² by sex, age group, ages 65 and older, Ohio, 2002-05

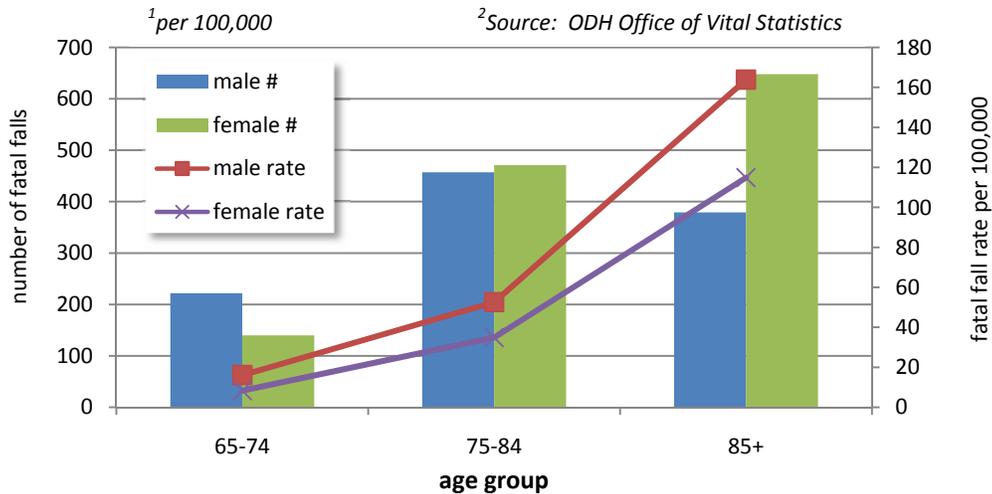
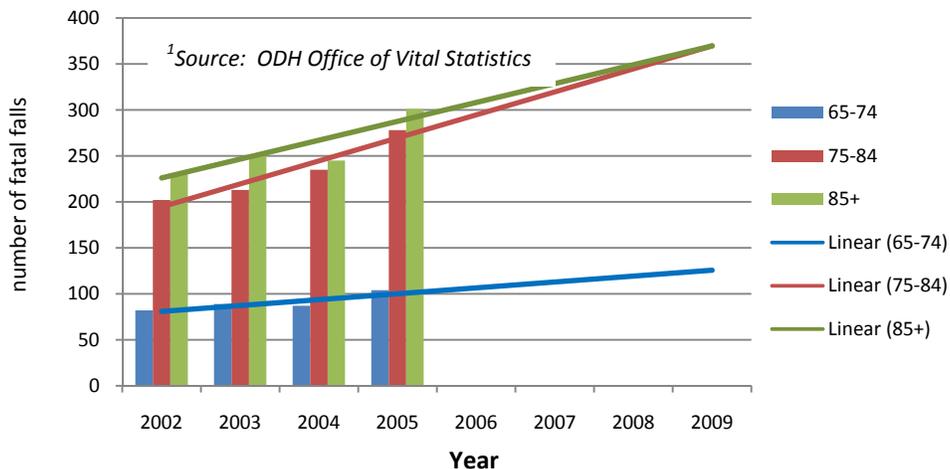


Figure 78 uses observed number of fall deaths to predict the numbers expected in the next few years for each of the age groups that make up older adults. As Ohioans grow older and if current trends continue, total number of fall fatalities will soon be equivalent between 75-84 and those 85 years and older. Total falls for all of the elderly will have increased from 515 in 2002 to nearly 900 in 2009.

Figure 78. Predicted number of fatal falls¹per year in 2006 thru 2009, based on current data, ages 65 and older, Ohio



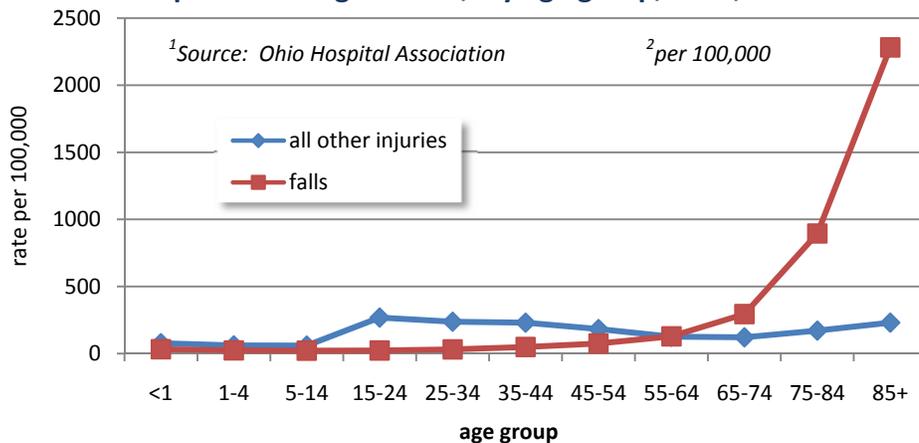
THE BURDEN OF FALLS AMONG OLDER OHIOANS – AGES 65 AND OLDER

Falls among older adults in Ohio have reached epidemic proportions. Fall death rates have increased 56 percent since 1999, and will continue to rise as the baby-boomers skew population dynamics in our state and nationwide. The proportion of Ohioans aged 65 and older is projected to increase by 50 percent from 2010 – 2030.³⁰



As was found in previous studies,³¹ fall-related HID rates for Ohioans aged 65 and older were five times higher (773 per 100,000) than discharge rates for all other injuries combined (154 per 100,000), thus commanding a major proportion of health care resources. Figure 78b depicts this disproportionate burden of falls among older adults in Ohio. Although poisoning, suicide and motor vehicle crash-related injuries among older adults continue to be significant issues, their importance is dwarfed by the burden of falls. From 2002-05, Ohioans aged 65 and older were hospitalized for fall-related injury 15 times more often than for motor vehicle-related injuries and 35 times more often than for unintentional poisonings, (data not shown). Examining only those 85 and older, the contrast is even more extreme. The 2,282 per 100,000 fall-related HID rate is by far the highest for any type of injury in any age group, (Figure 78b). This rate is 41 times greater than that associated with motor vehicle crashes, (Figure 5, pg. 19), the second-highest injury-related HID rate (55 per 100,000) for that age group.

Figure 78b. Average annual fall and all other injury combined hospital discharge¹ rates², by age group, Ohio, 2002-05

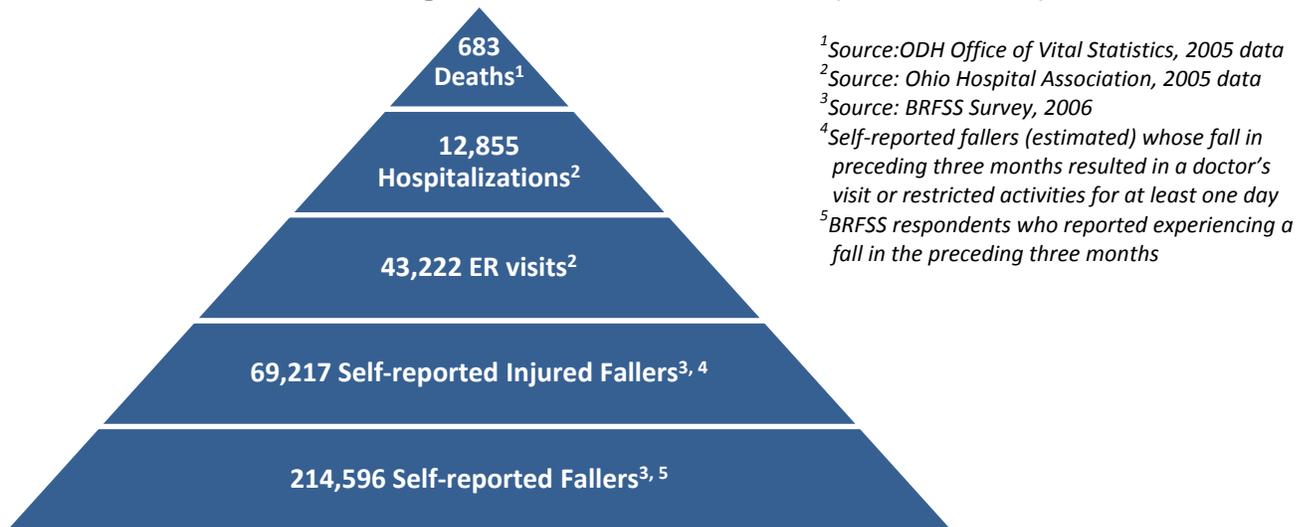


Non-Hospital-Treated Falls among Older Adults

As described in the data limitations section, this report focuses primarily on analysis of data for those who sought ER treatment, were admitted as an inpatient or died as a result of a fall-related injury. The Behavioral Risk Factor Surveillance System (BRFSS); however, which collects data on various health issues through a random-digit-dialing method survey, contained questions in 2006 about history of all falls (see pgs. 9 and 99 for more information) including those not resulting in injury.

The CDC analyzed responses to the BRFSS falls questions for persons 65 and older and published state-specific results.³² Among the additional insights this analysis provided was the ability to generate estimates of the number of older adults who experienced a fall and whether it resulted in an injury, Figure 78a. As reported in the 2006 BRFSS results, 14.3 percent of Ohio respondents aged 65 and older indicated that they fell during the previous three months, projecting to a total of approximately 215,000 persons who suffered at least one fall. Nearly one-third of those who fell (31.6 percent), or an estimated 69,000 Ohioans aged 65 and older, reported sustaining an injury that resulted in a doctor visit or restricted activity during the previous three months.

Figure 78a. Number of fall-related deaths,¹ HIDs² and ER visits,² and self-reported injured fallers^{3,4} and fallers,^{3,5} for ages 65 and older, Ohio, 2005^{1,2} (2006 BRFSS^{3,4,5})



Consequences of Falls among Older Adults

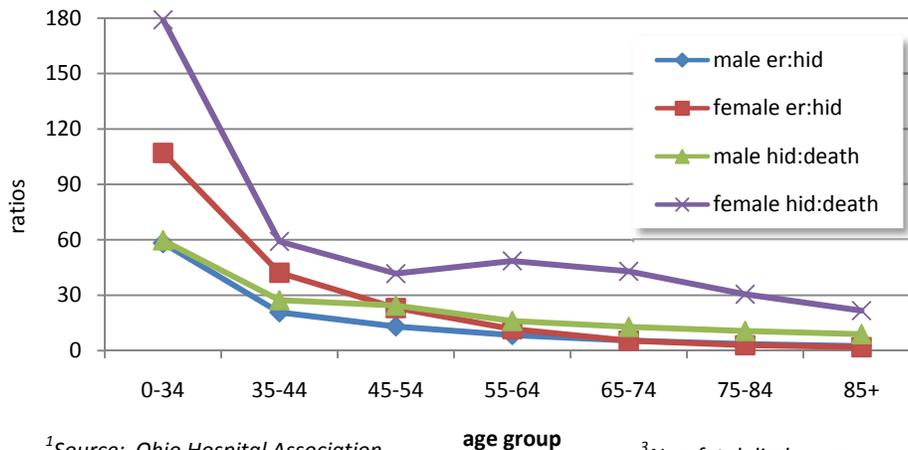
Research assessing falls among older adults further confirms their potentially debilitating consequences. Among older adults, falls increase disability and often, those injured do not return to their pre-fall level of functioning.³³ In a study of non-institutionalized older adults in the United States, nearly one-third who experienced a fall needed help with activities of daily living (i.e., eating, dressing and bathing) due to the injuries sustained from the fall.³ More than one-half of these persons are expected to need this help for at least six months.

The sequelae of falls are more extensive than these physical injuries. For those who have experienced a fall, there are frequently psychological consequences, including fear of additional falls.³⁴ These fears or the inability to regain the pre-fall level of functioning may lead to depressive symptoms and other detractors from quality of life such as reduction in overall physical activity level, self-imposed restriction of activities, social isolation, and lack of self-efficacy to function independently.^{33,34,35,36} In turn, these behaviors, unfortunately, may increase risk for future falls. These non-medical consequences of a fall, such as fear and decreased quality of life, albeit more difficult to quantify, add substantially to the overall burden of falls among older adults, especially when considering the estimated 215,000 (from BRFSS) older fallers in Ohio.

Severity of Falls in Older Adults

Figure 79 depicts the effects of age on the consequences of falling by making two comparisons: the likelihood of being hospitalized versus dying and the likelihood of being treated at an ER versus being admitted as an inpatient by sex. Except for a slight increase between ages 45-54 and 55-64 for the female HID to death ratio, the likelihood of experiencing the less severe outcome decreases with age. For females younger than 35 years, there were 179 fall-related HIDs for every fatal fall, but only 22 for those aged 85 or greater. For every age group, males were at greater risk of dying from their fall. Among males 85 or older, for every 11 falls serious enough to require inpatient treatment, one was fatal. For females 0-34, there were 137 ER visits for every fall that required hospital admittance, while there were less than two such visits for those aged 85 or older. The decline in males was not quite as drastic: 58 ER visits for every hospitalization in 0-34-year-olds, compared with 2.5 for the 85 and older group.

Figure 79. Ratios of fall-related HIDs^{1,3} to deaths² and ER visits^{1,4} to HIDs, by age group, sex, Ohio, 2002-05



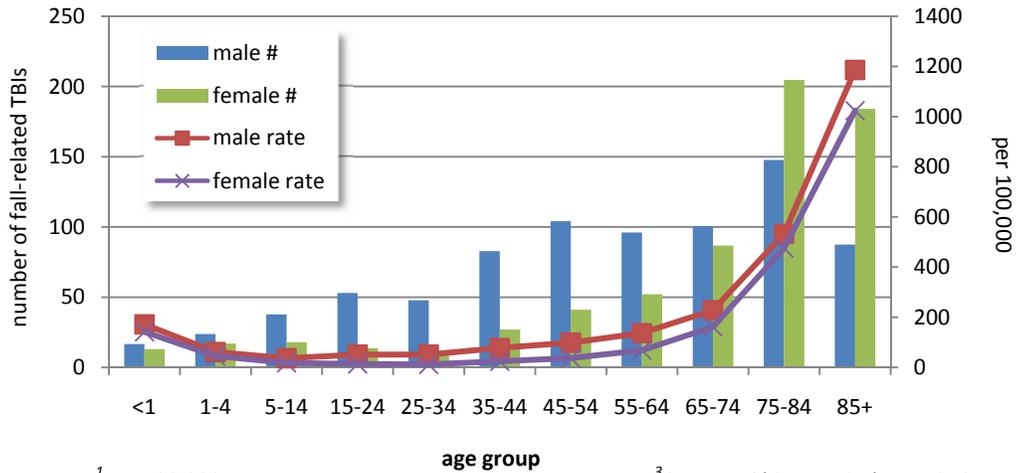
¹Source: Ohio Hospital Association
²Source: ODH Office of Vital Statistics

³Non-fatal discharges
⁴Non-hospitalized ER visit

For persons 65 or older who were hospitalized as a result of a fall, 16 percent (n=1,880) of males and 8 percent (n=2,663) of females also suffered traumatic brain injuries (TBI), which have been found to be on the rise among older adults. The rates for males were 13 per 100,000 for those 64 or younger and 76 per 100,000 for those 65 or older. Comparable rates among females were five and 74 per 100,000, respectively, Figure 80.

There were a greater number of fall-related TBI HIDs for males until age 74, Figure 80. Even among older adults, rates increased dramatically with increasing age: males 85 or older (212 per 100,000) suffered TBIs at five times the rate as 65-74-year-olds (41 per 100,000). The increase for females was six-fold: 183 per 100,000 from 29).

Figure 80. Number and rate¹ of fall- and TBI²-related HIDs³ by age group, sex, Ohio, 2002-05



¹per 100,000

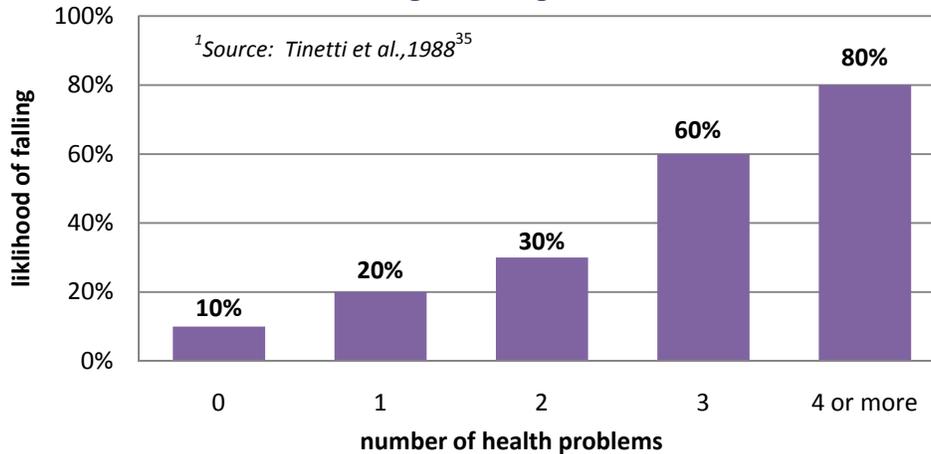
²traumatic brain injury

³Source: Ohio Hospital Association

Risk Factors for Falls Among Older Adults

Most studies agree that the risk of falling and incurring an injury from a fall is greater in elders with poor health status,³⁴ and the more health problems one has, the greater the likelihood of falling.³⁵ Tinetti *et al.* found the risk of falling increased linearly with the number of risk factors, from 8 percent with no risk factors to 78 percent with four or more risk factors, Figure 80a.³⁵

Figure 80a. Number of health problems and risk for falling among adults age 65 and older¹



¹Source: Tinetti *et al.*, 1988³⁵

Older adults with chronic conditions that lead to altered sensory or motor systems are particularly at risk for falls. A simple slip, trip or stumble is more likely to lead to an injury when the person is older. Nearly 75 percent of fall-related injuries among elders occur in or around the home.

A list of generally recognized risk factors for falls and fall-related injury among older adults follows.^{3,11,34,36}

- Co-morbidities such as lower limb arthritis, osteoporosis, stroke/heart disease, cancer, diabetes and other medical conditions.
- Impaired balance and coordination.
- Reduced visual cues.
- Gait instability, dizziness, slow walking speed.
- Physical inactivity.
- Prescription drug interactions (polypharmacy).
- Impaired cognitive function.
- Use of alcohol/drugs.
- History of previous falls.
- Hazardous environment.
- Living alone/social isolation.

CO-MORBIDITIES AND PHYSICAL ACTIVITY

As discussed previously (see pgs. 10 and 74-75), the 2006 BRFSS survey included questions about fall history in the three months preceding the survey. These questions were asked of respondents aged 45 and older in Ohio. As shown in Table 11 and Figure 80b, those with chronic diseases were at higher risk for falling than those without such co-morbidities. Survey respondents with a history of coronary heart disease (CHD, 27.7 versus 15.4 percent), stroke (28.6 versus 16.1 percent), age-related eye disease (ARD, 29.8 versus 16.5 percent) and diabetes (20.7 versus 16.2 percent) all had higher fall prevalence than respondents without a history of these conditions. Those with ARD had the highest overall prevalence of falling, followed by stroke.

When compared to normal- and underweight persons (17.9 percent), the obese* were more likely to report having fell (21.3 percent), while the overweight** were less likely (13.9 percent). Individuals older than 45 who reported adequate levels of physical activity had a lower prevalence of falls (15.7 percent) than did those without (19.6 percent). The reasons for these differences in risk are not clear; however, it is important to note that these data measure falls, not resultant injuries. BRFSS limitations are discussed on page 10, and additional BRFSS results are presented beginning on page 99.

Table 11. Estimated prevalence (%) of falls, range and mean number of falls in the past three months among those age 45 and older with selected co-morbidities/conditions, Ohio, 2006¹

Co-Morbidity/Condition	Prevalence of Falls	
	Those With	Those Without
Coronary Heart Disease (CHD)	27.7%	15.4%
Stroke	28.6%	16.1%
Age-related eye disease (ARD) ²	29.8%	16.5%
Physical Activity (with adequate)	15.7%	19.6%
Overweight**	13.9%	17.9% ⁺
Obese*	21.3%	17.9% ⁺
Diabetes	20.7%	16.2%

¹Source: 2006 Ohio Behavioral Risk Factor Surveillance System (BRFSS), ODH, Chronic Disease and Behavioral Epidemiology

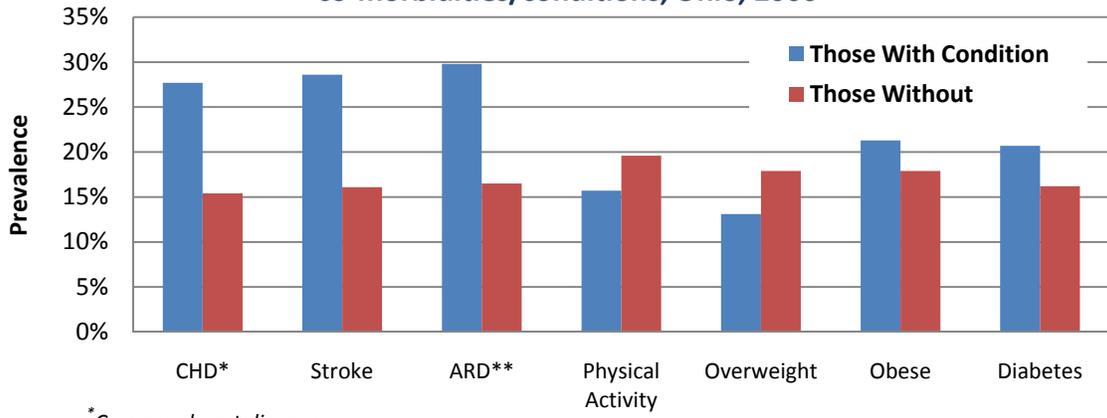
²ARD includes those with diabetic retinopathy, macular degeneration, cataracts, and/or glaucoma.

*obese defined as a Body Mass Index (BMI) of 30.0 – 99.8; calculated from self-reported weight and height

**overweight defined as a BMI 25.0 – 29.9; calculated from self-reported weight and height

⁺ normal and underweight

Figure 80b. Estimated prevalence (%) of falls in the last 3 months among residents age 45 and older with selected co-morbidities/conditions, Ohio, 2006¹



*Coronary heart disease
 **Age-related eye disease

Co-Morbidity/Condition

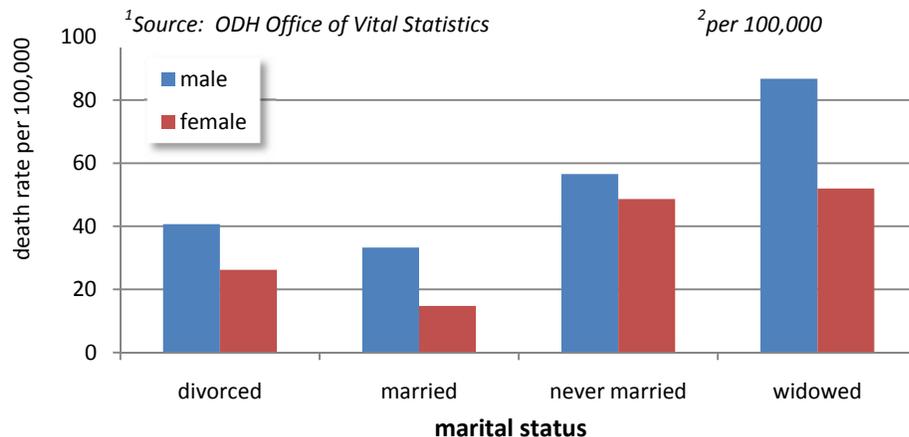
¹Source: 2006 Ohio BRFSS, ODH Chronic Disease and Behavioral Epidemiology

SOCIAL ISOLATION

Studies have found older adults who were married or co-habiting had lower rates of fall-related injuries than those who were divorced, separated, widowed or never married.³ The higher rate of fall injuries among older adults who are not married or not living with a partner may result from attempts to maintain their independence. The practical necessity of performing physically demanding activities that may challenge their abilities likely puts them at increased risk of falling.

The Ohio data confirmed these earlier findings. For persons 65 or older, the widowed were more than twice as likely (58.2 per 100,000 annually) to die from a fall than were married persons (24.9), while divorced (31.5 per 100,000) and never married persons (51.7 per 100,000) had intermediate fatal fall rates (data not shown). Males were at greater risk than females within each marital status category, (Figure 81). Male fatal fall rates ranged from 33.3 per 100,000 in the married to 86.7 for the widowed. The greatest gender disparity in risk was among the married, with males dying from falls at more than twice the rate as their spouses.

Figure 81. Fatal fall¹ rate² by sex, marital status, ages 65 and older, Ohio, 2002-05



¹Source: ODH Office of Vital Statistics

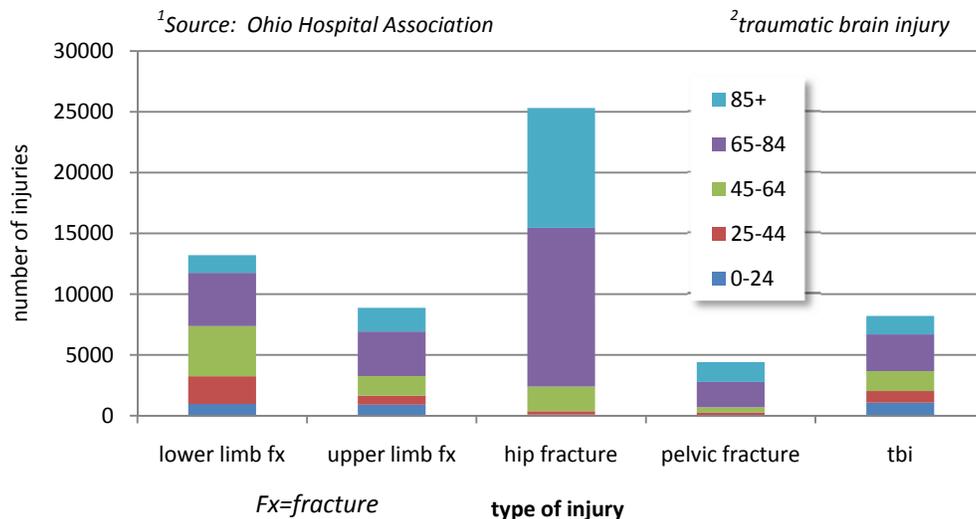
²per 100,000

INJURIES RESULTING FROM FALLS

Physical injuries frequently associated with falls include fractures, spinal cord injuries, traumatic brain injuries (TBIs), contusions, sprains, strains and lacerations. More than 83 percent of discharged fallers suffered a limb, hip or pelvic fracture or a TBI, with persons less than 1 year old accumulating the highest injury proportion (95 percent) and 15-24-year-olds the lowest (73 percent), (data not shown). Six percent of fallers sustained two or more of these injuries.

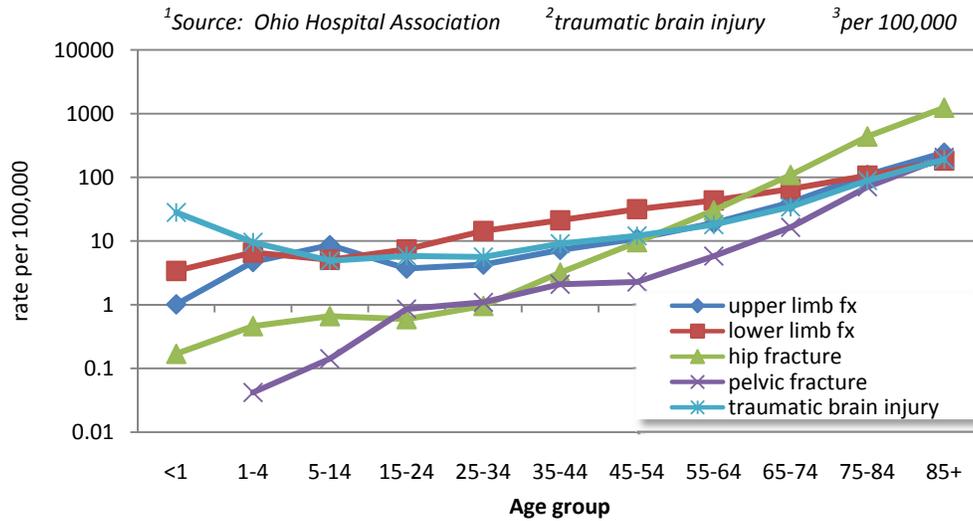
Figure 82 presents the number of TBIs and major fractures diagnosed among fall-related inpatients, by age group. Hip fractures, followed by lower limb fractures, were the most frequent fall-related injuries, while another 8,211 were treated for TBIs. More than 90 percent of the hip fractures occurred among those 65 or older.

Figure 82. Number of HID¹ fall-related fractures and TBIs² by type of injury, age group, Ohio, 2002-05



With the exception of TBIs in the very young, fall-related major injury rates were highly correlated with age, Figure 83. For example, Ohioans 85 and older were 10 times more likely to sustain hip fractures than people ages 65 to 74. The 85 and older age group displayed the highest rates for each of these injuries: upper limb fracture, 244 per 100,000; lower limb fracture, 184; hip fracture, 1,239; pelvic fracture, 206; and TBI, 191 per 100,000. Beginning with 45-54-year-olds, the proportion of fall-related HIDs with hip fractures becomes greater than those with TBI.

Figure 83. Hospital discharged¹ fall-related fracture and TBI² rates³ by age group, Ohio, 2002-05



Traumatic Brain Injuries:

TBI is one of the most serious and potentially disabling consequences of a fall. More than one-fourth (28 percent) of all TBIs in Ohio are caused by falls (data not shown). Whereas older Ohioans are at greatest risk of fall-related hip fractures (Figure 83), young children are more likely to be diagnosed with a TBI when they fall. For example, among Ohio fall-related injuries occurring from 2002 to 2005, 86 percent of infants and 40 percent of toddlers, compared to only 10 percent of those aged 85 years and older, were diagnosed with a TBI (Figure 84).

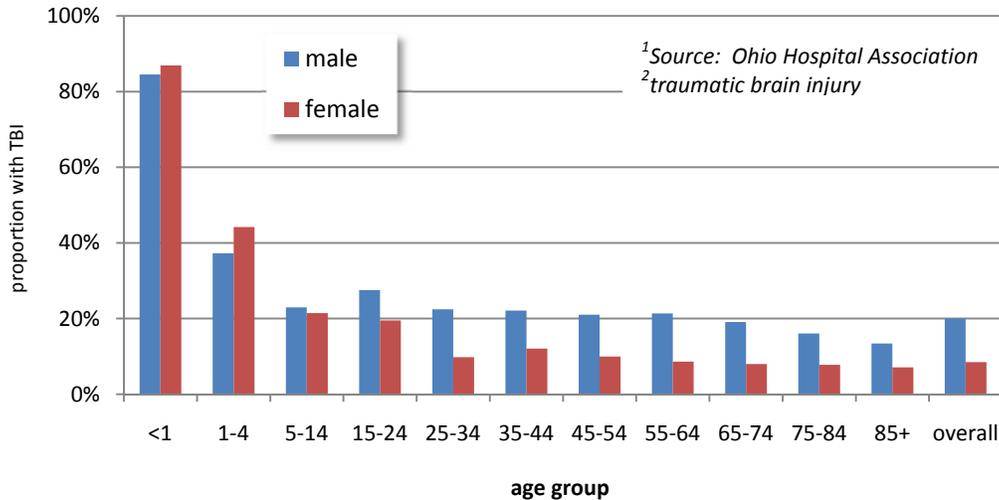
Physical characteristics, such as a proportionally larger head and high center of gravity, put young children at higher risk for TBIs when they fall. Babies and very young children are extremely flexible because their bones are still developing. Thus, the head in this age group is the part of the body most susceptible to injury from a fall. Of the 194 infants less than 1 year old who were discharged after a fall, only 28 did not have a TBI. The disproportionately high fraction of TBIs in this age group may be further explained by the serious nature of TBIs which may warrant hospital admittance more often than less serious injuries.

Recent studies have also shown that TBI may be under-diagnosed in the elderly, because changes in cognitive ability, concentration and memory related to aging can mask symptoms of TBI in this population.³⁷

Between ages 25 and 84 years, males were at least twice as likely as females to suffer a TBI resulting from a fall requiring hospitalization (Figure 84). This was also true overall: 20 percent of males versus 8.5 percent of females discharged from a hospital after treatment for a fall were diagnosed with a TBI.

Although the proportion of fall victims who suffer a TBI is much lower among older persons, the actual frequency is greater. From 2002-05, 4,543 Ohioans aged 65 and older were diagnosed with a fall-related TBI. This accounted for more than half of all the fall-related inpatient discharges with TBI. Hospitalization rates for fall-related TBI rose steadily after age 34 (Figure 80). Nationally, TBI accounted for nearly half (46 percent) of fatal falls among older adults in 2000.³⁸

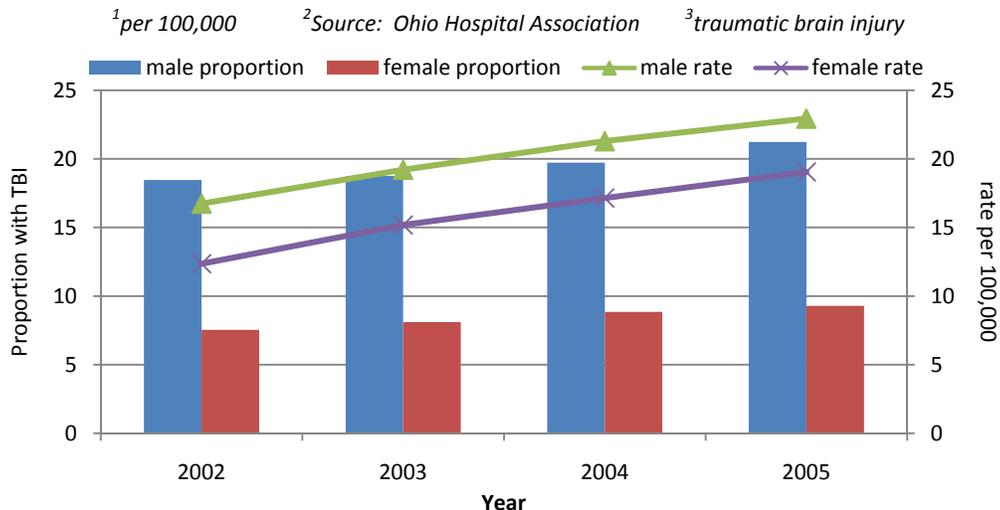
Figure 84. Proportion of discharged fallers¹ who suffered a TBI² by age group, sex, Ohio, 2002-05



¹Source: Ohio Hospital Association
²traumatic brain injury

For each year of the study period, the proportion of males discharged with a fall-related TBI was more than two-and-one-third times that of females, whereas the rate per 100,000 of hospitalized TBI in males was only 1.3 times higher, (Figure 85). Among each sex, the proportions of fall-related HIDs and rates with TBI increased slightly over time.

Figure 85. Proportion and rate¹ of discharged fallers² who suffered a TBI³ by sex, year, Ohio, 2002-05



¹per 100,000 ²Source: Ohio Hospital Association ³traumatic brain injury

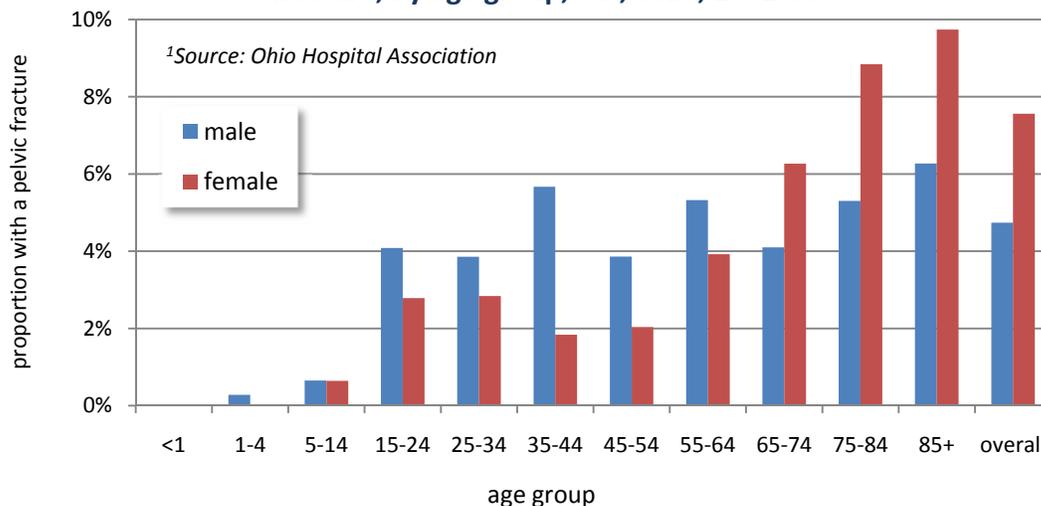
FRACTURES:

In a national study of fall-related injury costs, fractures were both the most common and most costly type of nonfatal injury.³⁹ Just over one-third of nonfatal injuries were fractures, but they made up 61 percent of costs, or \$12 billion. Hip, pelvic and lower limb fractures can be especially catastrophic for older adults, increasing disability and condemning some to never regain their pre-fall level of physical functioning or hampering the ability to perform simple acts of daily living.^{40,41} Among the hospitalizations for fall-related injury in Ohio from 2002-05, more than three-fourths (78 percent) involved an upper limb, lower limb, pelvic or hip fracture.

Pelvic Fractures:

From 2002-05, 84 percent of the pelvic fractures (n=4,329) occurred among Ohioans 65 years and older, Figure 86. Overall, 7.5 percent of females and 4.5 percent of male fallers suffered a fractured pelvis.

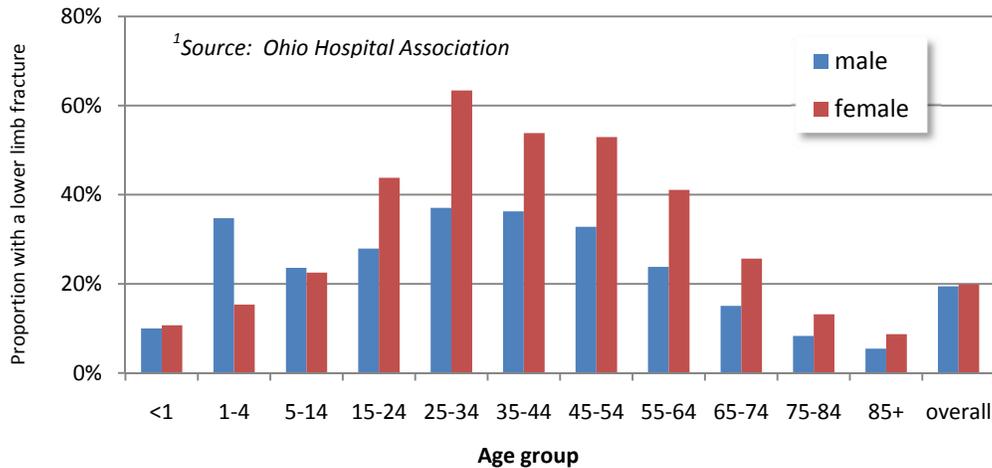
Figure 86. Proportion of discharged fallers¹ who suffered a pelvic fracture, by age group, sex, Ohio, 2002-05



Lower Limb Fractures:

Of the major fractures, only those involving a lower limb occurred more frequently among fallers 64 or younger (7,375) than among those 65 or older, (5,836), Figure 87. After age 14 and prior to age 84, a higher proportion of females than males suffered a lower limb fracture. Overall, however, the proportions were equivalent: 19 percent for each sex. This is explained by the large number (30,540) of female fallers 65 or older who did not fracture a lower limb, compared to only 10,676 comparable males.

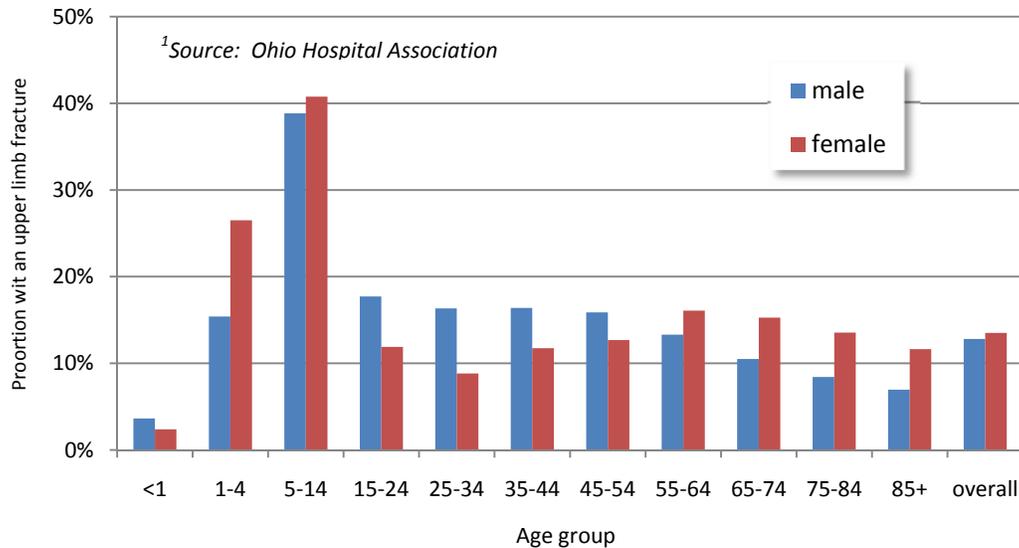
Figure 86. Proportion of discharged fallers¹ who suffered a lower limb fracture, by age group, sex, Ohio, 2002-05



Upper Limb Fractures:

Among females discharged after treatment for a fall from 2002-05, 5,949 (13.5 percent) also fractured an upper limb, while the male total was 2,919 (13 percent). Females aged 5-14 were the age group most likely to fracture an upper limb upon falling, more than 40 percent, Figure 88. Overall, males appeared to be more vulnerable during most of the working years, 15-54, while female fallers were more susceptible at older ages.

Figure 88. Proportion of discharged fallers¹ who suffered an upper limb fracture, by age group, sex, Ohio, 2002-05



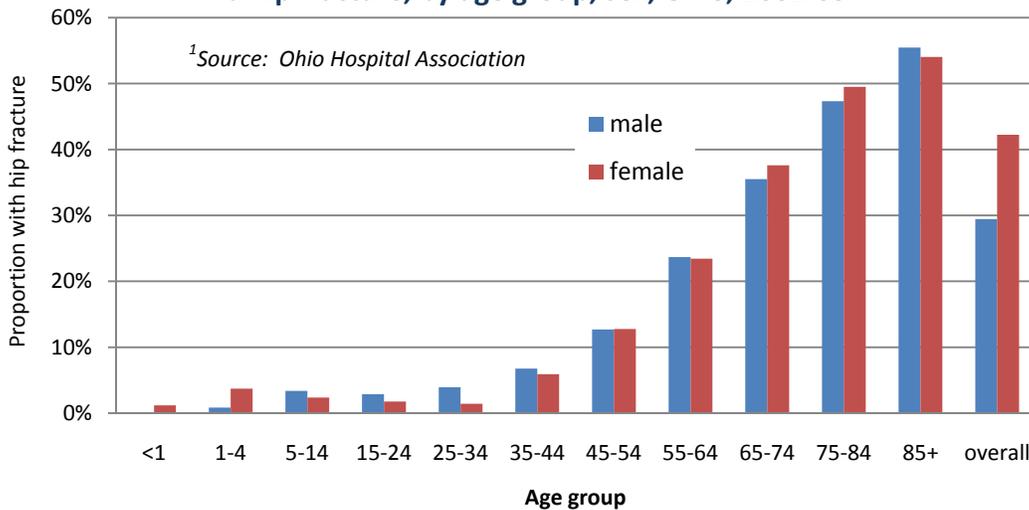
Hip Fractures:

The Burden of Hip Fractures:

- Hips were the bones most frequently fractured during a fall. In Ohio, more than 25,000 fall-related hip fractures occurred from 2002 to 2005.
- Overall, 63.5 percent of all hip fractures among those 65 and older were associated with a fall.
- Nearly half (48.7 percent) of fall-related discharges among those 65 and older had a hip fracture.
- Women are disproportionately susceptible to hip fractures: from 2002-2005, 75 percent of hip fracture hospitalizations were among women. Biological factors such as osteoporosis that increase the risk of injury after a fall may play a role.⁴²
- As many as 20 percent of hip fracture patients die within a year of their injury.⁴⁰
- Most patients with hip fractures are hospitalized for about one week.⁴³
- Up to 25 percent of adults who lived independently before their hip fracture have to stay in a nursing home for at least a year after their injury.⁴¹

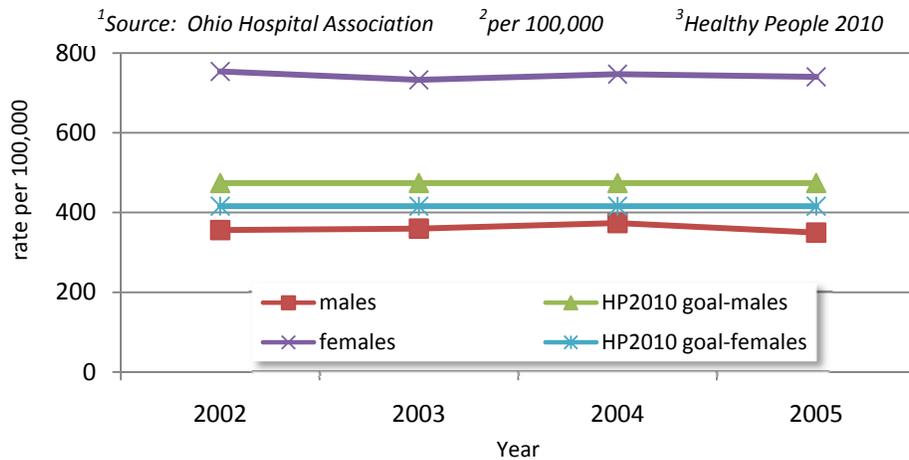
There were 6,711 (29 percent) male fallers discharged during 2002-05 who fractured their hip and nearly three times as many females: 18,605 (42 percent). Which sex was the most vulnerable varied over the life span, with a slightly higher proportion of males (55 percent) than females (54 percent) fracturing their hip in the highest risk age group, 85 and older.

Figure 89. Proportion of discharged fallers¹ who suffered a hip fracture, by age group, sex, Ohio, 2002-05



Healthy People 2010 (HP 2010) is a set of health objectives for the nation (see <http://www.healthypeople.gov/data/midcourse/comments>, accessed July 28, 2008). Ohio’s hip fracture rate for males 65 or older has met the HP 2010 objective (450.5 fractures per 100,000). However, the mostly recently measured female rate (740) falls short of the goal of only 416 hip fractures per 100,000 Ohioans, Figure 90. Almost all (more than 90 percent) hip fractures among women aged 65 and older are associated with falls.⁴⁰ In addition to the other consequences already mentioned, these injuries can lead to premature death.⁴³ The HP 2010 goal is to reduce hip fractures among older adults to 491.0 fractures per 100,000 females aged 65 years and older and to 450.5 fractures per 100,000 males aged 65 years and older.

Figure 90. Hip fracture discharge¹ rates² and HP 2010³ goals by year, sex, ages 65 and older, Ohio, 2002-05



PREVENTION OF FRACTURES IN OLDER ADULTS:

The frequency of each of these types of fractures can be greatly reduced, and hip fractures can even be largely eliminated by preventing falls. Fall prevention strategies include:

- Exercising regularly; programs like Tai Chi that increase strength and balance are especially effective.⁴⁴
- Review of medicines —both prescription and over-the-counter—to reduce side effects and interactions.
- Annual eye exams.
- Reducing fall hazards in the home. Visit the CDC’s website for a *Home Fall Prevention Checklist*: <http://www.cdc.gov/ncipc/duip/fallsmaterial.htm#BRochures>



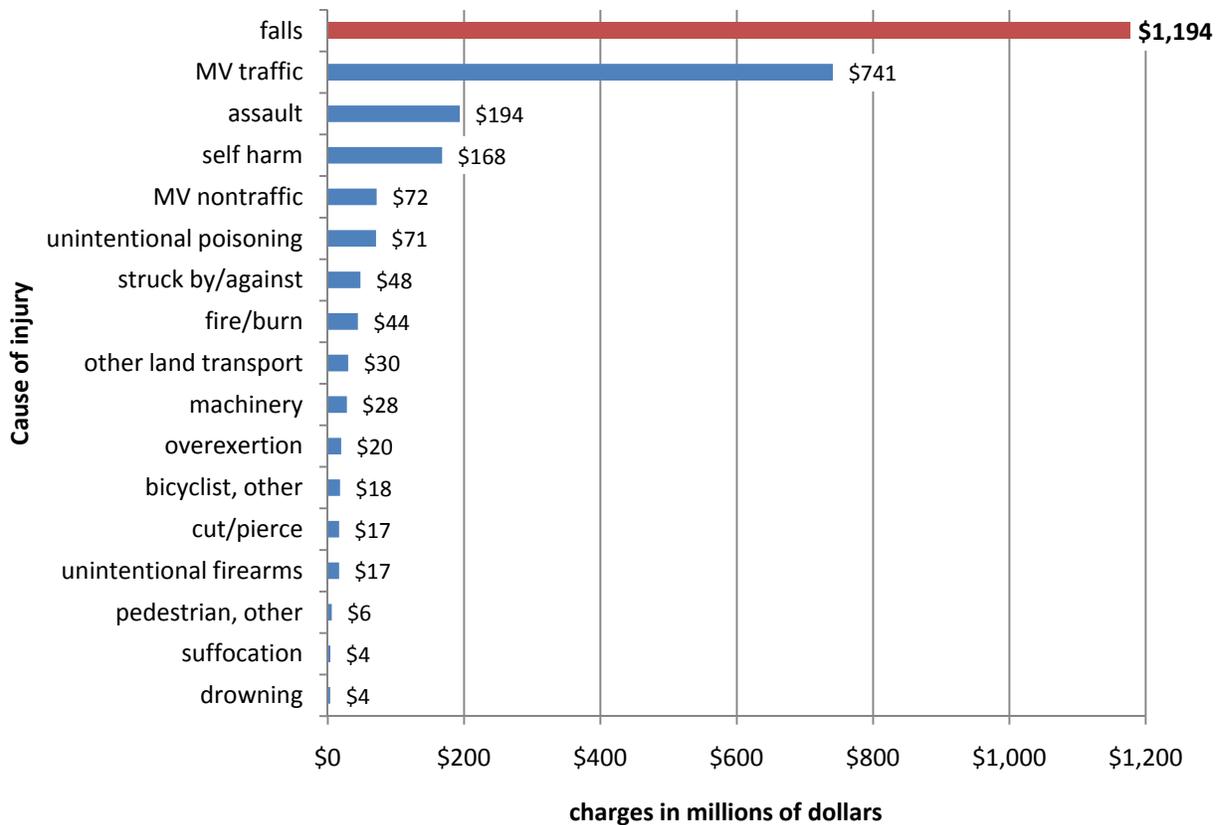
The most effective way to prevent fall-related injuries, is to combine these strategies.⁴⁵ Additional prevention materials^{46, 47} are available from the CDC at <http://www.cdc.gov/ncipc/duip/preventadultfalls.htm>.

THE COST OF FALLS: MEDICAL CHARGES AND LENGTH OF STAY (LOS) FOR FALL-RELATED INJURIES IN OHIO

Charges for inpatient treatment of falls were easily the greatest for any type of injury, nearly \$1.2 billion for the four-year study period (2002 through 2005), Figure 91. These charges represent 45 percent of the \$2.6 billion total for all leading causes of injury combined.

Figure 91. Total charges (in millions) for inpatient treatment¹ of leading causes of injury, by type of injury, Ohio, 2002-05

¹Source: Ohio Hospital Association



Medical Charges and Length of Stay by Sex and Age Group

Table 11 presents the mean charges for fall-related hospitalizations by age group and sex in Ohio from 2002-05. These medical charges are based on billing data and should not be considered as equivalent to reimbursements. Aside from a couple of exceptions among infants and 1-4-year-olds, males accumulated greater charges for every age group, for each year of the study period.

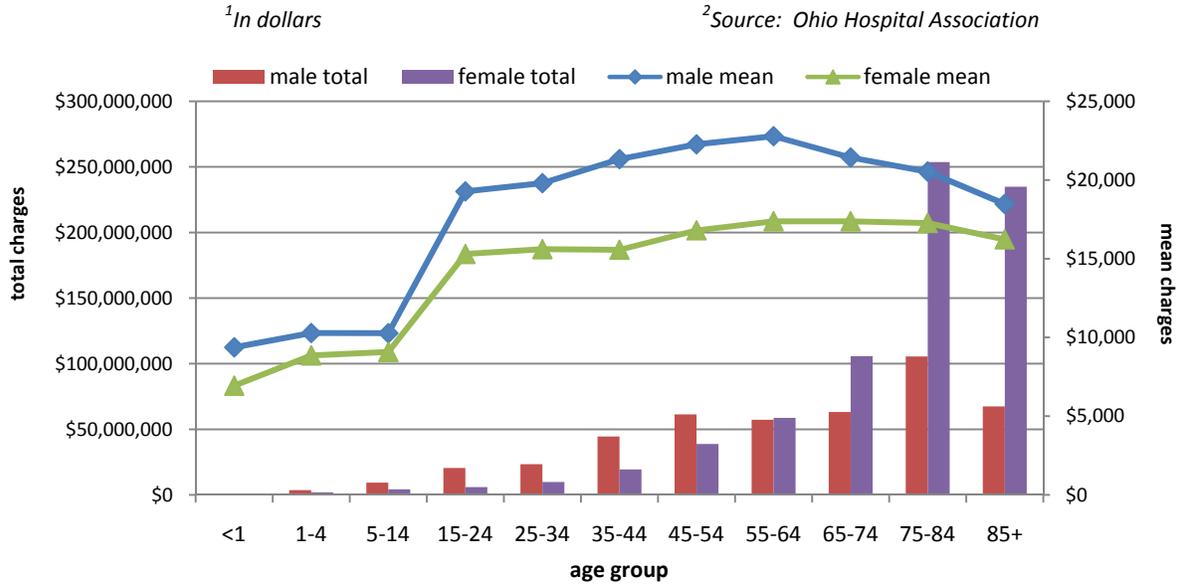
Table 12. Mean charges for fall-related inpatient treatment, by age group, sex, year, Ohio, 2002-05

Age	2002		2003		2004		2005	
	Male	Female	Male	Female	Male	Female	Male	Female
<1	\$11,367 (N=18)	\$6,675 (N=18)	\$13,148 (N=21)	\$6,316 (N=19)	\$7,476 (N=27)	\$8,939 (N=23)	\$7,911 (N=44)	\$5,720 (N=24)
1-4	\$6,796 (N=86)	\$10,514 (N=44)	\$10,144 (N=80)	\$7,302 (N=45)	\$14,543 (N=82)	\$8,256 (N=59)	\$9,900 (N=105)	\$9,362 (N=67)
5-14	\$9,032 (N=217)	\$8,265 (N=106)	\$8,984 (N=222)	\$8,933 (N=109)	\$11,115 (N=223)	\$9,190 (N=105)	\$11,748 (N=245)	\$9,714 (N=142)
15-24	\$15,005 (N=256)	\$14,481 (N=77)	\$18,526 (N=285)	\$12,247 (N=91)	\$20,648 (N=273)	\$17,411 (N=96)	\$22,986 (N=251)	\$16,446 (N=123)
25-34	\$16,712 (N=282)	\$13,637 (N=141)	\$18,437 (N=313)	\$15,243 (N=157)	\$19,906 (N=317)	\$15,952 (N=155)	\$24,457 (N=271)	\$17,212 (N=176)
35-44	\$18,427 (N=529)	\$12,868 (N=303)	\$19,802 (N=497)	\$14,883 (N=332)	\$21,836 (N=566)	\$16,254 (N=306)	\$25,371 (N=497)	\$18,334 (N=305)
45-54	\$20,986 (N=596)	\$14,775 (N=518)	\$19,853 (N=686)	\$15,290 (N=596)	\$22,749 (N=735)	\$16,860 (N=598)	\$25,056 (N=740)	\$20,054 (N=594)
55-64	\$21,951 (N=501)	\$15,423 (N=657)	\$22,056 (N=655)	\$15,840 (N=835)	\$21,555 (N=670)	\$18,380 (N=921)	\$25,295 (N=685)	\$19,094 (N=965)
65-74	\$18,456 (N=622)	\$15,495 (N=1,346)	\$18,956 (N=733)	\$16,350 (N=1,529)	\$23,111 (N=812)	\$18,027 (N=1,573)	\$24,394 (N=778)	\$19,279 (N=1,633)
75-84	\$17,778 (N=1,092)	\$14,930 (N=3,181)	\$18,981 (N=1,277)	\$16,507 (N=3,761)	\$21,430 (N=1,384)	\$17,645 (N=3,765)	\$23,249 (N=1,382)	\$19,518 (N=3,980)
85+	\$16,504 (N=798)	\$14,308 (N=3,167)	\$17,546 (N=900)	\$15,360 (N=3,476)	\$19,533 (N=920)	\$16,342 (N=3,785)	\$19,886 (N=1,029)	\$18,384 (N=4,043)

The mean total charge of a fall-related inpatient hospitalization in Ohio from 2002-05 was \$20,116 for males and \$16,694 for females, (data not shown). These charges include only treatment costs and not nursing home or home health care services.

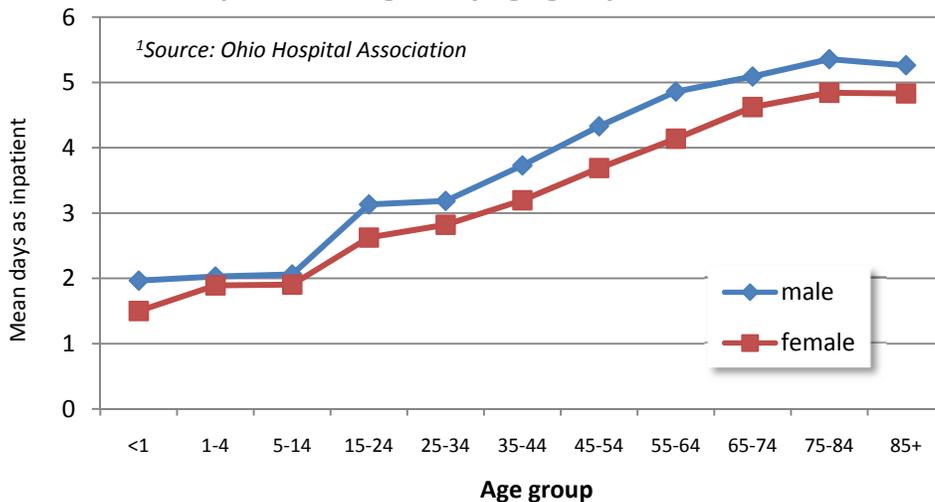
Seventy percent of total direct charges for fall-related hospital discharges were attributable to those aged 65 years and older. Examined by age and sex, males accounted for a greater percent of the total charges until age 65, at which point treating females became more costly, Figure 92.

Figure 92. Mean and total charges¹ of fall-related HIDs² by age group, sex, Ohio, 2002-05



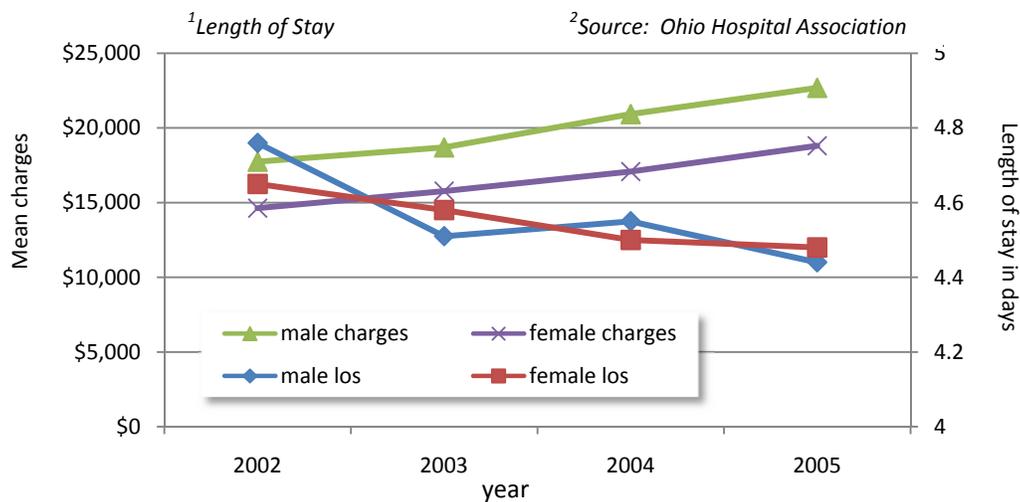
As Figure 93 illustrates, LOS increased steadily with advancing age through ages 75-84, at which point it dipped slightly for the oldest fallers. For every age group, males were hospitalized longer. However, the large number of older female fallers rendered the overall mean lengths of stay equivalent for each sex. Mean LOS ranged from a low of 1.5 days for female infants less than 1 year to a high of 5.3 days for males aged 75-84 years.

Figure 93. Mean length of stay for fall-related hospital discharges¹, by age group, sex, Ohio, 2002-05



Each year from 2002 to 2005, for both males and females, mean charges have been increasing, while mean LOS has been decreasing, though not quite as consistently, Figure 94. Each year, mean charges were higher for males than females and 21 percent higher over the four-year period. Average treatment charges for fall-related discharges increased 28 percent (\$15,697 to \$20,097), from 2002 to 2005, despite a 5 percent drop in length of stay (data not shown). As the U.S. population ages, prevention, and effective and efficient treatment of falls will be necessary to prevent them from consuming an ever larger proportion of health care resources.

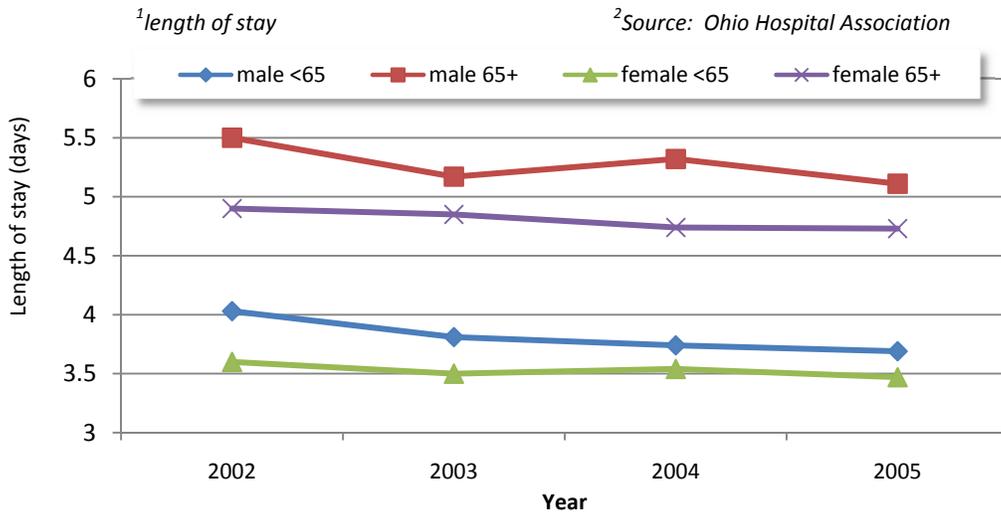
Figure 94. Mean treatment charges and LOS^{1,2} for fall-related HIDs by year, sex, Ohio, 2002-05



Changes Over Time in Costs (Charges & LOS) for Younger(<65) vs. Older Fallers (65+)

Persons younger than 65 and those 65 and older, for both sexes, had shorter average hospital stays in 2005 than in 2002, Figure 95. The greatest rate of decrease (7 percent) was found in males 65 years and older, who also had the highest mean LOS, ranging from 5.5 days in 2002 to 5.1 in 2005. Females 65 years and older had the second-highest mean LOS; 4.9 days in 2002 and 4.7 in 2005. The mean LOS for males younger than 65 ranged from 4.0 in 2002 to 3.7 in 2005. Females less than 65 years old had the lowest mean LOS, with the least amount of change over time, hovering around 3.5 from 2002 – 2005.

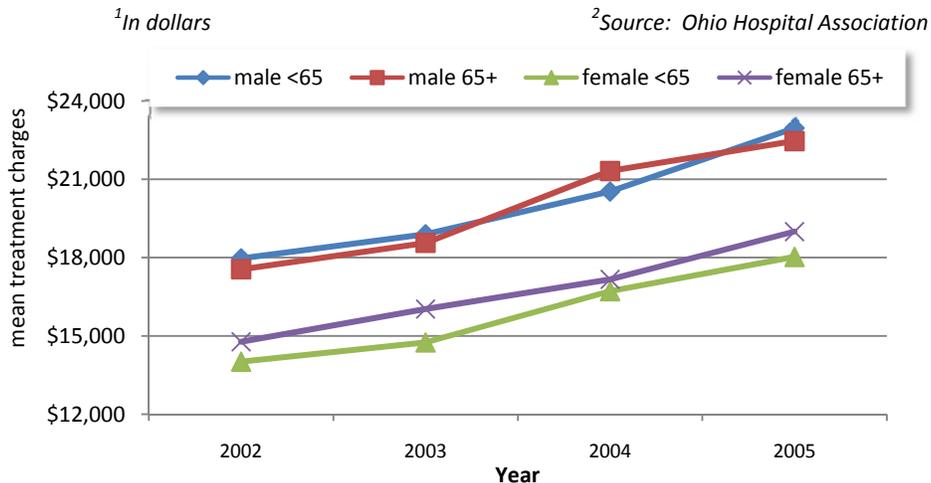
Figure 95. Mean LOS¹ for inpatient treatment of a fall,² by 64 or younger versus 65 or older, sex, year, Ohio, 2002-05



As observed earlier, LOS has been decreasing over time, while mean fall-related hospitalization charges have continued to rise. This remains true after categorizing fallers as younger than 65 or 65 and older, for both males and females, Figure 96. In contrast to LOS, for each age group, males had higher mean charges than females.

Mean fall-related inpatient hospitalization charges from 2002-05 were higher for males than for females in each age group, even though mean LOS was higher for those 65 or older than for those less than 65, regardless of sex. This would seem to imply that sex was more strongly associated with treatment charges, while LOS was more age dependent.

Figure 96. Mean charges¹ of inpatient treatment for a fall,² by 64 or younger versus 65 or older, sex, year, Ohio, 2002-05



Costs (Charges & LOS), by Type of Fall

Figure 97 present the mean total treatment charges for inpatient hospitalizations for selected types of falls, by sex. Highest mean charges for males resulted from *diving* (\$31,198), followed by falls *from/thru a building* (\$29,659) and falls on or from *stairs/steps* (\$23,127), (Appendix A). In contrast, treatment of females for injuries occurring while *diving* was one of the least expensive: \$13,959. For females, the highest mean charges resulted from falls *from/thru building* (\$26,174), from *ladders/scaffolding* (\$17,611) and on *stairs/steps* (\$17,345). As Figure 97 depicts, males cost more to treat - for every type of fall except for *conveyance, other furniture* and *recreation* falls.

Disregarding sex, the lowest mean treatment charges were for *playground* (\$8,381) and *recreation-related* (\$12,627) falls. These findings are logical in that falls in these venues occur more frequently among youth who have shorter mean lengths of stay, Figure 97.

Figure 97. Mean charges for inpatient treatment of a fall¹ by type of fall, sex, 2002-05

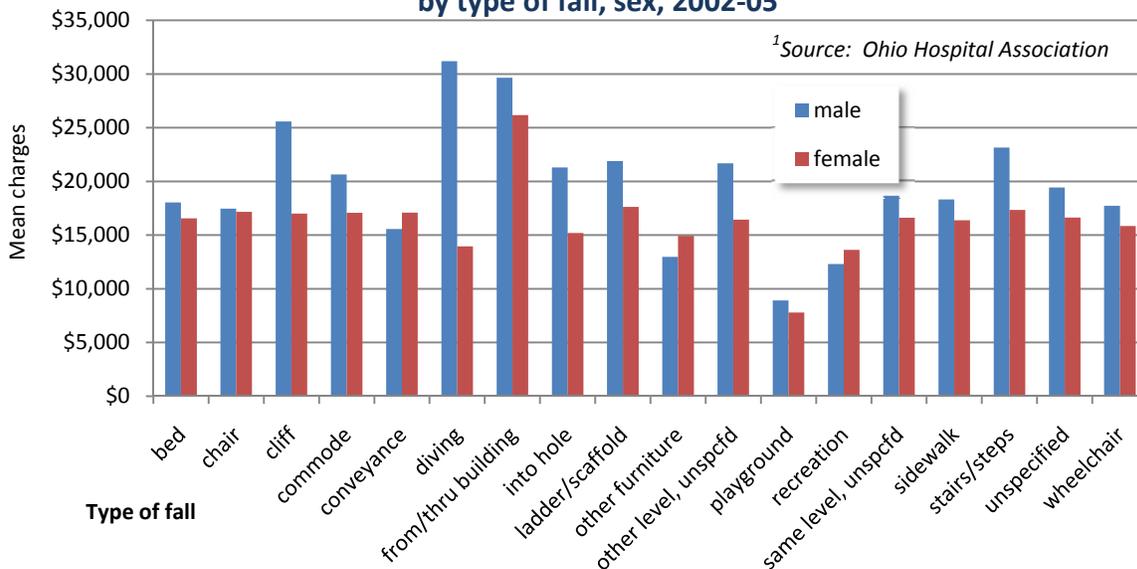
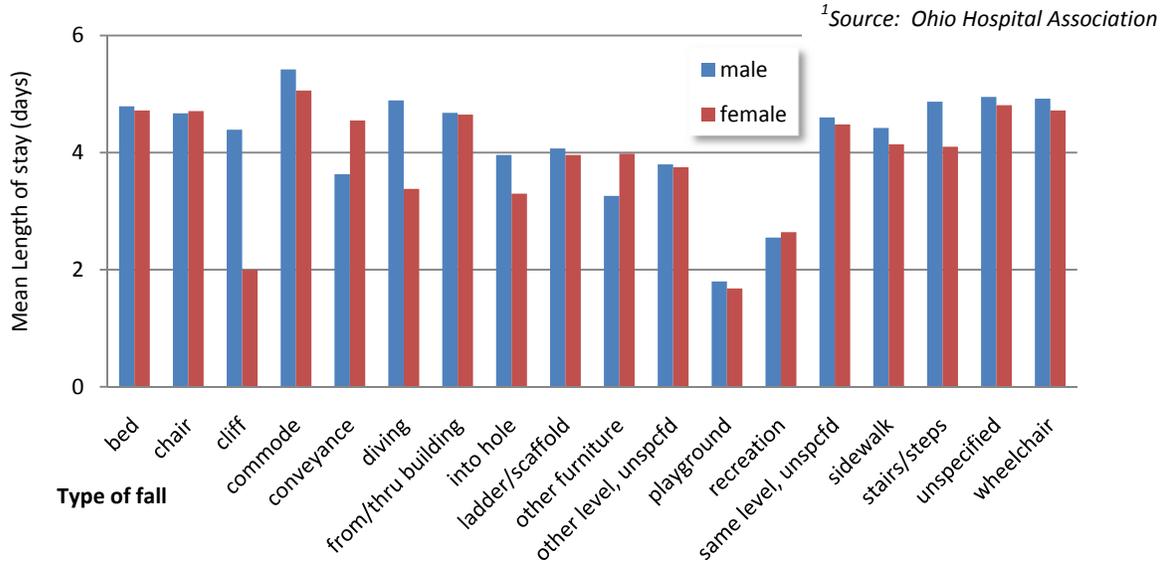


Figure 98 presents the mean LOS in days for inpatient treatment of Ohio residents by type of fall and sex. The overall mean for all inpatient discharges for 2002-05 was 4.6 days. Among males the types of falls that resulted in the longest hospital stays were: from commodes, unspecified and while diving, (5.4, 5.0 and 4.9 days, respectively). For females, falls from commodes (5.1 days), unspecified (4.8), and from wheelchairs and beds (4.7 each) required the longest treatments.

For young, able-bodied individuals, beds and toilets do not usually present a high risk for falls. Therefore, one might hypothesize that these individuals were more medically fragile and therefore at higher risk for more severe injury from a fall.

Figure 98. Mean LOS during inpatient treatment for a fall,¹ by type of fall, sex, Ohio, 2002-05



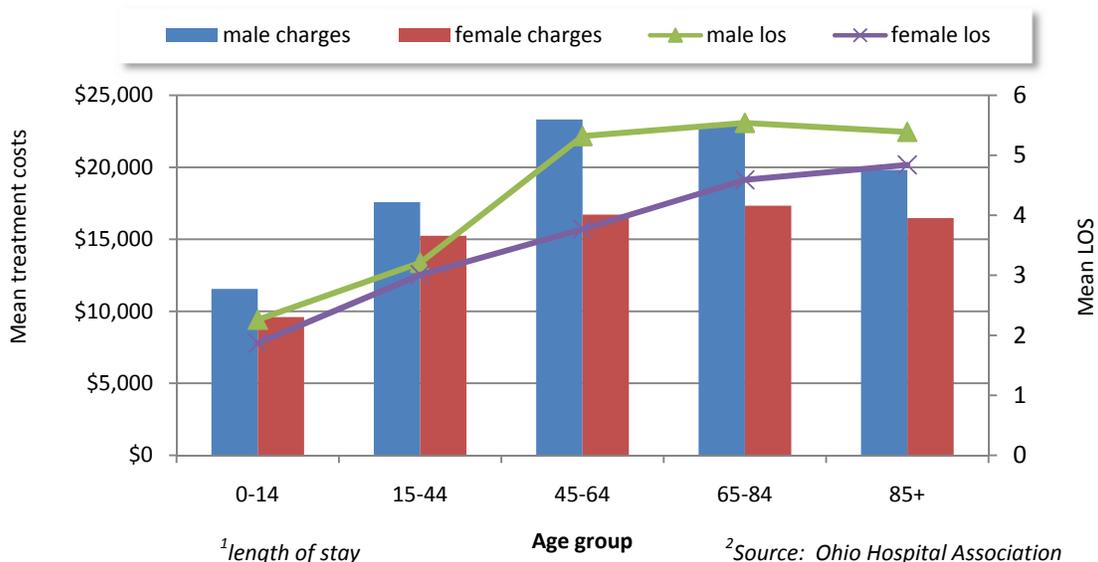
In-home Falls on Stairs

As we have seen, treatment charges for males are consistently higher than for females. This may be partially explained by males experiencing more serious falls due to more hazardous working conditions or greater risk taking during recreation. In an attempt to identify sex differences by standardizing the exposure hazards, falls on stairs that occurred only in the home were evaluated. Even in this isolated group, men stayed in the hospital longer and cost more to treat: treatment charges averaged \$21,437 for the 717 males and \$16,803 for the 1,640 females, while the mean LOS were 5.0 days and 4.3 days, respectively. These results suggest the higher costs for treating male falls is not entirely dependent on greater hazards faced, and may be due to reluctance on the part of males to seek medical treatment unless more seriously injured, quality of health insurance or disparities in the medical treatment provided to males and females. Additional study is needed to discern the underlying factors contributing to the higher charges associated with treating male fall-related injuries.



Figure 99 demonstrates that this greater costliness for males persists throughout the life span. Mean charges for males peaked at \$23,321 for 45-64-year-olds and length of stay at 5.54 days for 65-84-year-olds. Females displayed a slightly different pattern: charges were highest for 65-84-year-olds and length of stay longest for those 85 or older, \$17,329 and 4.84 days, respectively.

Figure 99. Mean charges and LOS¹ for inpatient treatment of falls on stairs in the home², by age group, sex, Ohio, 2002--05



OTHER COSTS OF NONFATAL, HOSPITAL-ADMITTED FALLS

The CSN EDARC, in collaboration with the West Virginia University Injury Control Research Center, calculated the costs of nonfatal, hospital-admitted injuries in Ohio using data from the Ohio State Inpatient Databases (SID), Healthcare Cost and Utilization Project (HCUP).⁴ The following information presents their results on the costs of nonfatal, hospital-admitted falls, in 2005 dollars.

As discussed previously for fatal falls, medical costs represented only a small proportion (7.9 percent) of the total estimated costs (\$6.2 billion) of nonfatal, hospital-admitted falls. The work-loss and quality-of-life-loss costs associated with fall-related injury were far more substantial, Table 13. Although the \$5.2 billion in quality-of-life costs were borne primarily by older adults, young persons injured by a fall accounted for a disproportionate share of the estimated \$526 million in work-loss costs in 2003, Figure 100.

Unintentional falls accounted for 40 percent of the \$15.6 billion total costs associated with all nonfatal, hospital-admitted injuries and more than any other single cause of injury, (data not shown).

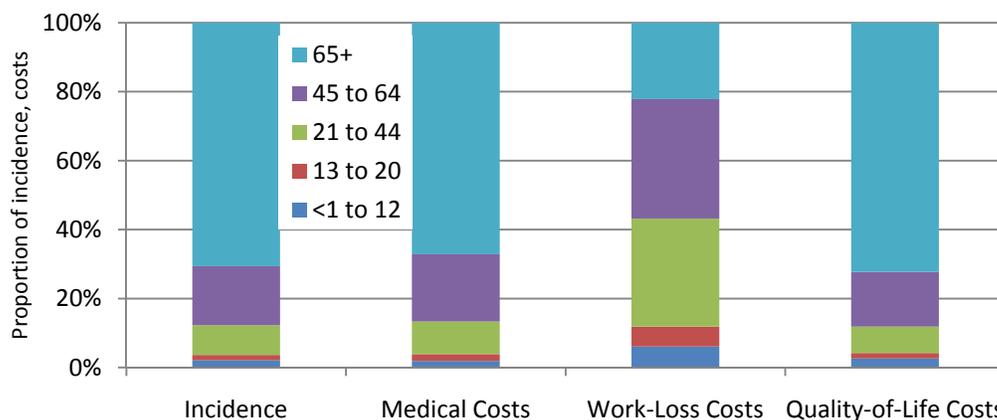
Table 13. Total and average medical, work-loss and quality-of-life annual costs¹ of nonfatal, hospital-admitted falls in Ohio², by age group, 2003

Age	Medical Costs		Work-Loss Costs		Quality-of-Life Costs		Total Costs	
	Total	Average	Total	Average	Total	Average	Total	Average
<1-12	\$9,271,400	\$16,294	\$32,123,300	\$56,456	\$136,626,200	\$240,116	\$178,020,900	\$312,866
13-20	\$9,710,300	\$22,902	\$30,207,200	\$71,243	\$79,355,800	\$187,160	\$119,273,300	\$281,305
21-44	\$46,015,000	\$19,690	\$164,732,300	\$70,489	\$395,290,800	\$169,145	\$606,038,100	\$259,323
45-64	\$95,245,500	\$20,531	\$182,327,100	\$39,303	\$819,966,600	\$176,755	\$1,097,539,200	\$236,590
65+	\$327,366,900	\$17,106	\$116,513,800	\$6,088	\$3,728,623,600	\$194,838	\$4,172,504,300	\$218,033
Total	\$487,609,100	\$17,989	\$525,903,700	\$19,402	\$5,159,863,000	\$190,359	\$6,173,375,800	\$227,749

¹In 2005 dollars

²Source: Children’s Safety Network Economics and Data Analysis Resource Center (CSN EDARC), Pacific Institute for Research and Evaluation (PIRE) in conjunction with the West Virginia University Injury Control Research Center (WVU ICRC), August 2006

Figure 100. Proportion of nonfatal, hospital-admitted fall-related injuries and costs¹, by age group, Ohio, 2003



*in 2005 Dollars

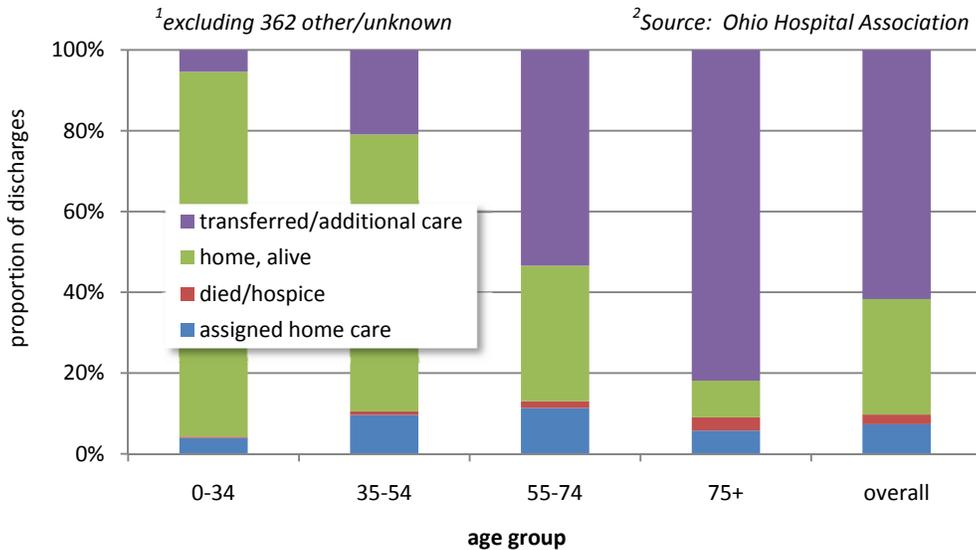
¹Source: CSN EDARC/WVU ICRC

DISCHARGE STATUS OF FALL-RELATED INPATIENTS

Forty-one thousand (61 percent) persons receiving inpatient treatment for a fall were *transferred/ [for] additional care*. Nineteen thousand eight were sent *home, alive*; 4,874 were *assigned home care*, 1,601 *died/ [or were assigned to] hospice* and 362 had *other/unknown* discharge status, (data not shown).

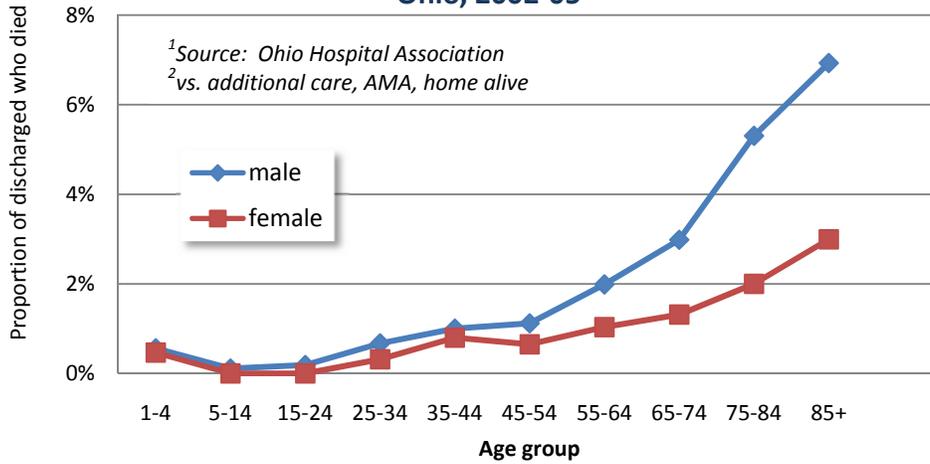
A person’s prospects for quick recovery from injuries incurred from a fall were highly correlated with youth, Figure 101. Overall, 29 percent of discharged fallers were sent home with no further treatment or additional care needed. Such was the case with more than 90 percent of the 0-34-year-olds, but only 9 percent of those 75 or older, with intermediate proportions for the intervening age groups. Upon discharge, 21 percent of 35-54-year-olds were transferred to receive additional treatment, rising to 53 percent of 55-74-year-olds and 82 percent of those 75 years and older, (the latter applicable to nearly 31,000 cases).

Figure 101. Proportional distribution of discharge status¹ for fall-related hospital discharges², by age group, Ohio, 2002-05



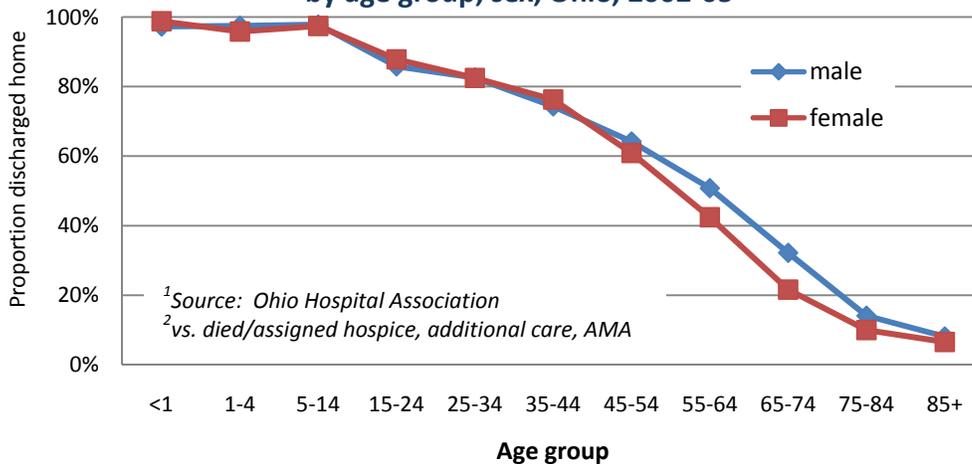
Overall, 3 percent of male and 2 percent of female fallers admitted for inpatient care *died/ [or were assigned] hospice care*. Proportional lethality started diverging between the sexes after age 54, Figure 102. Female deaths grew from 1 percent of 55-64-year-olds to 3 percent of those 85 years or older. For these same age groups, male fatality increased from 2 percent to 7 percent. From 2002 through 2005, each year, about 700 Ohioans died as the result of a fall, about 400 of whom were admitted to a hospital before expiring.

Figure 102. Proportion of fall-related inpatients¹ who died or were assigned hospice care², by age group, sex, Ohio, 2002-05



After inpatient treatment for a fall, the likelihood of being discharged home without further treatment declined steadily with advancing age: more than 97 percent of persons 14 or younger, while only 7 percent of those 85 or older (data not shown). Although older male fallers were more likely to die than were comparable females, they were also more likely to be discharged home without further treatment, Figure 103.

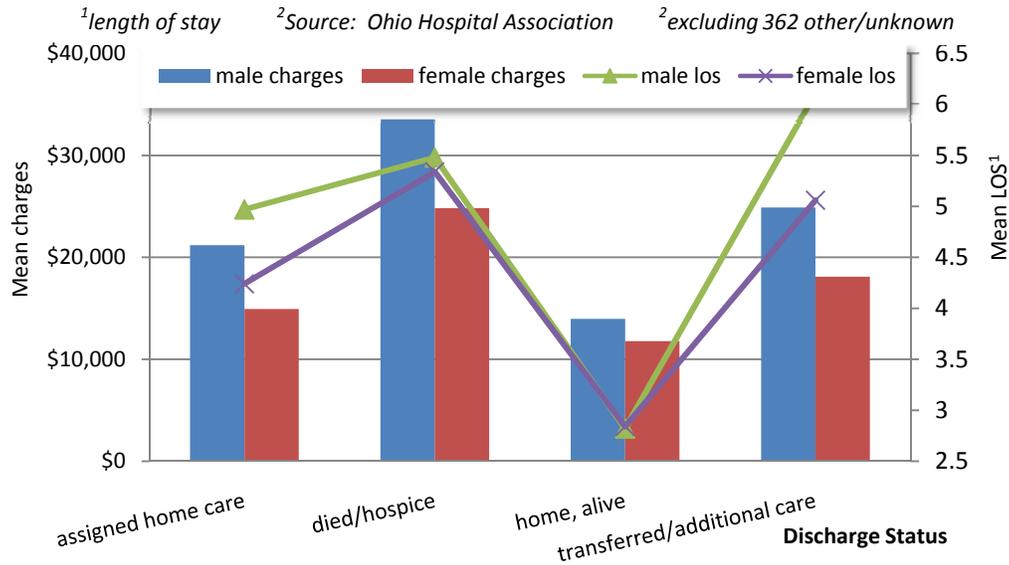
Figure 103. Proportion of fall-related inpatients¹ who were discharged home without further treatment², by age group, sex, Ohio, 2002-05



DISCHARGE STATUS BY LENGTH OF STAY (LOS) AND TYPE OF FALL

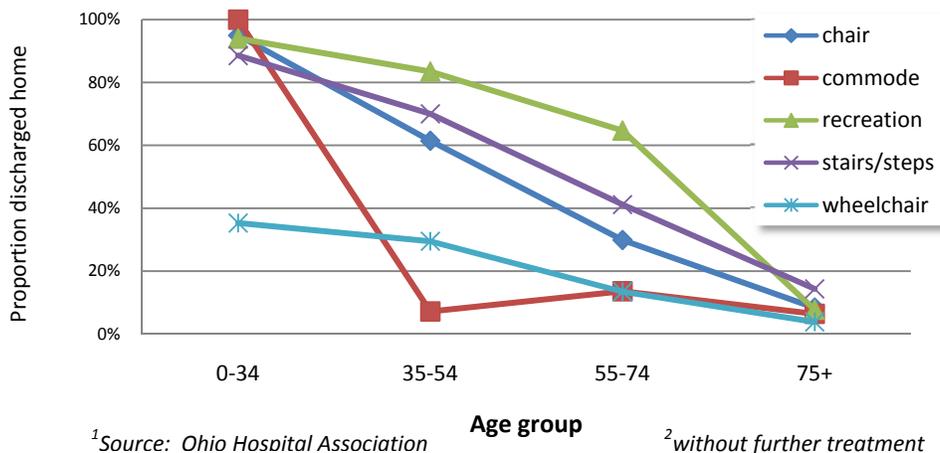
Figure 104 reveals that among persons receiving inpatient treatment for falls, those whose discharge outcomes were *home, alive* had the shortest mean stays and lowest mean charges. Fallers who died had the greatest mean charges; males, \$33,456 and females, \$24,829. Males whose discharge status was *transferred/additional care* had the greatest length of stay, 6.1 days. Males had longer stays and greater charges than females for every discharge status except *home, alive*, where mean length of stay was equivalent.

Figure 104. Mean charges and LOS¹ for inpatient treatment of falls² by discharge status³, sex, Ohio, 2002-05



For most types of falls, the likelihood of being discharged *home, alive*, without further treatment declined steadily with age (data not shown). Figure 105 presents this likelihood for selected types of falls that displayed somewhat atypical patterns. Overall, of the 919 persons hospitalized after falling from a wheelchair, less than 9 percent were sent home; 35 percent of 0-34-year-olds, and less than 3 percent of those 75 years of age or older. Of the 410 total persons who fell from *commodes*, only 7 percent of those aged 35-54 went home upon discharge, while 55-74 year olds were twice as likely (14 percent) to avoid additional care. Up until age 74, at least 65 percent of those admitted after a *recreation* fall were sent home without further treatment. However, only one of the 13 (8 percent) recreation-related fallers 75 or older achieved this same outcome. Persons who fell on *stairs/steps* or from a *chair* followed more typical age-related patterns of likelihood of being discharged home: 89-95 percent of 0-34-year-olds; 61-70 percent of 35-44-year-olds; 30-41 percent of 55-74-year-olds; and 8-14 percent of those 75 or older.

Figure 105. Likelihood of fall-related inpatients¹ being discharged home² by type of fall, age group, Ohio, 2002-05



BEHAVIOR RISK FACTOR SURVEILLANCE DATA

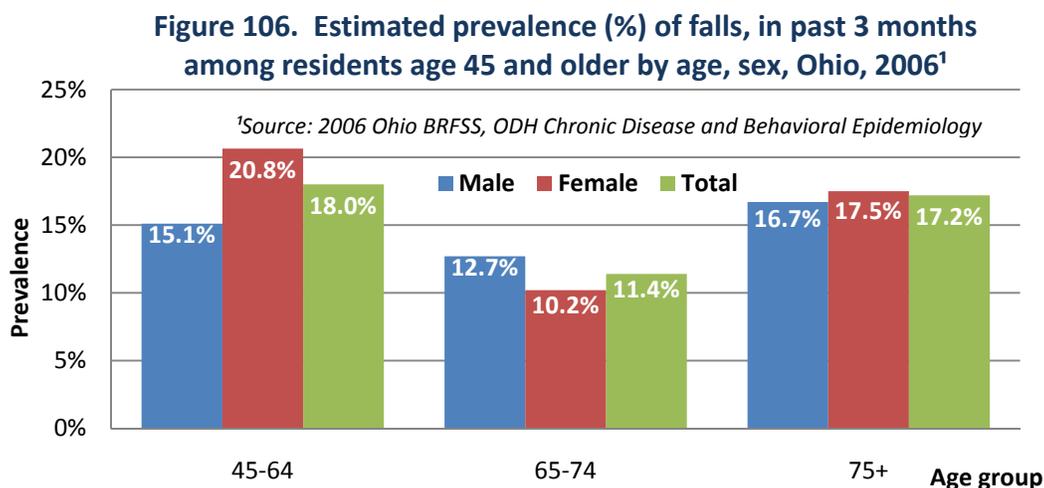
As described in the data limitations section (pg. 10), this report focuses primarily on analysis of data for those who sought ER treatment, were admitted as an inpatient or died as a result of a fall-related injury. The Behavioral Risk Factor Surveillance System (BRFSS); however, collects data on self-reported falls and fall-related injuries through a random-digit-dialing method survey. Two questions about falls were included in the 2006 survey and asked of Ohio respondents 45 years and older:

- **Question #1:** In the past three months, how many times have you fallen (i.e., unintentionally come to rest on the ground or another lower level)?
- **Question #2:** For those who fell, a follow-up question was asked: How many of these falls caused an injury (i.e., resulted in a doctor visit or restricted activity for at least one day)?

The CDC analyzed responses to this survey for persons 65 and older and published state-specific results.³² Among the additional insights this analysis provided was the ability to generate estimates of rates of non-treated falls among this older population, Figure 78a. As reported in the 2006 BRFSS results, 14.3 percent of Ohio respondents aged 65 and older indicated that they fell at least once during the previous three months, projecting to a total of approximately 215,000 fallers.

Question Number 1

Figure 106 presents the estimated prevalence of falls in the past three months by age group. Females aged 45-64 had the highest overall prevalence of falling; however, as revealed by the HID data, the severity of fall-related injury and the consequences of a fall increase with age (see Figures 78-80). Thus, more people may fall in this age range; however, these falls did not translate into higher HID and ER rates than for ages 65 and older. For both males and females, the estimated prevalence of falling for ages 65-74 was lower than for ages 75 and older (11.4 versus 17.2 percent overall). For ages 45-64 and 75 and older, females were more likely to report having fell (20.8 and 17.5 versus 15.1 and 16.7 percent, respectively), while more males aged 65-74 reported falling (12.7 versus 10.2 percent).



In addition to being useful in describing general fall patterns by age group, gender and race, these figures can also be used to estimate the number of persons who fell. For example, a fall prevalence of 18 percent for Ohio respondents aged 45-64 translates into an estimated 539,675 fallers in this age group in 2006. Other estimates are presented in Table 14. An estimated 87,390 65-74-year-olds fell and an estimated 131,652 Ohioans 75 years and older fell.

Table 14. Estimated prevalence (%) of history of falls, estimated number of fallers in the past 3 months among residents age 45 and older by age and sex, Ohio, 2006¹

Age Group (Years)	Male	Female	Total
Ages 45-64			
*Prevalence	15.1%	20.8%	18.0%
*Estimated no. of fallers ²	220,275	320,199	539,675
Ages 65-74			
*Prevalence	12.7%	10.2%	11.4%
*Estimated no. of fallers ²	44,072	42,794	87,390
Ages 75+			
*Prevalence	16.7%	17.5%	17.2%
*Estimated no. of fallers ²	47,230	84,456	131,652

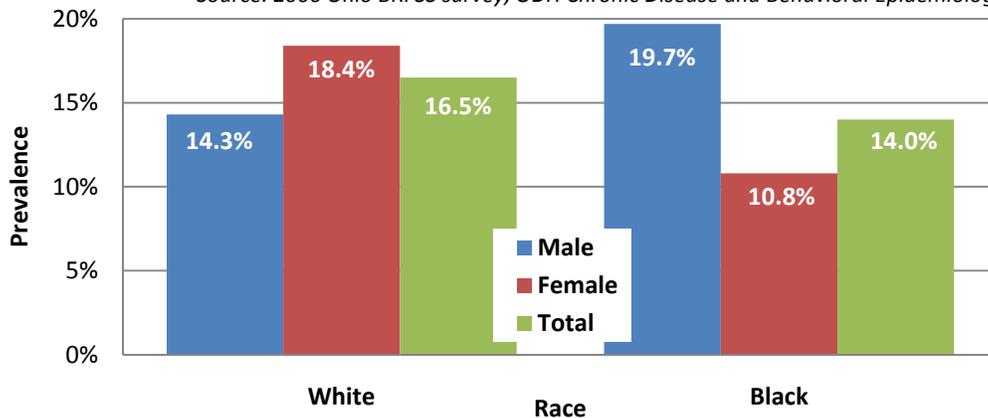
¹Source: 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey, ODH, Chronic Disease and Behavioral Epidemiology

²Based on U.S. Census Bureau 2006 Ohio population estimates, <http://www.census.gov>

By race and gender for residents 45 years and older, white respondents were more likely overall to report having fallen (16.5 percent) than black respondents (14.0 percent). Black males had the highest estimated prevalence (19.7 percent) of falls, followed by white females (18.4 percent), Figure 107.

Figure 107. Estimated prevalence (%) of falls in past 3 months among residents age 45 and older by race, sex, Ohio, 2006¹

¹Source: 2006 Ohio BRFSS survey, ODH Chronic Disease and Behavioral Epidemiology

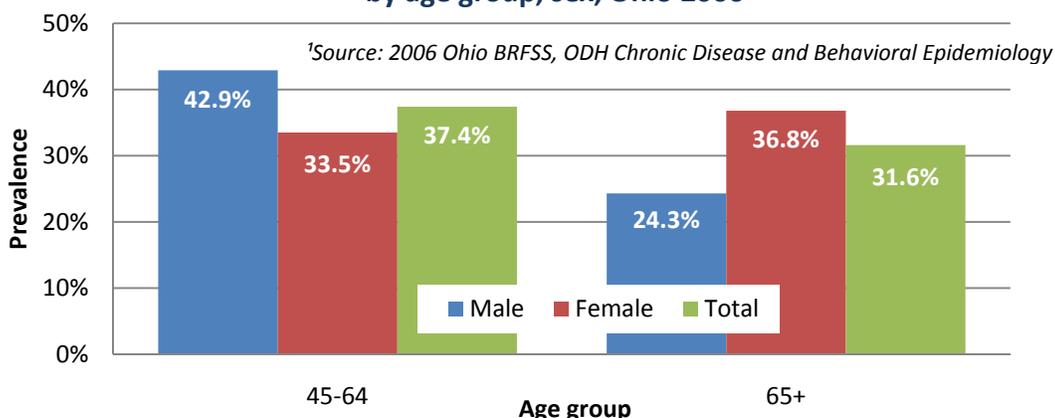


Question Number 2

Analysis of responses for those who sustained an injury due to their fall yielded the following results. For those aged 65 and older, nearly one-third who fell (31.6 percent), or an estimated 69,217 Ohioans, reported sustaining at least one injury that resulted in a doctor visit or restricted activity during the previous three months, Figure 108 and Table 15. For those aged 45-64, more than one-third (37.4 percent) or an estimated 201,838 Ohioans suffered a fall-related injury during the past three months. Males aged 45-64 were at greater risk than females (42.9 versus 33.5 percent) for sustaining an injury, while females aged 65 and older had a higher risk than males (36.8 percent versus 24.3 percent). Males aged 45-64 had a higher prevalence of fall-related injury than older males (42.9 versus 24.3 percent), while the pattern was reversed for females (36.8 versus 33.5 percent).

The BRFSS data on fall-related injury differs from the ER and HID data, where injury rates increase consistently with age after 24-years-old. As discussed among the limitations of the BRFSS data, the definition of a fall-related injury does not specify severity; an injury could be as minor as a small bruise or as severe as a broken hip. This broad definition could have obscured age-related differences if, for example, persons aged 45-64 years sustained less severe injuries and persons aged 65 years and older experienced more severe injuries. Other limitations of the BRFSS data that may impact results are discussed on page 10. As discussed previously, there may also be gender differences in seeking medical treatment for injury that may help explain some of these differences.

Figure 108. Estimated Prevalence (%) of injury after falls in the past 3 months among residents age 45 and older by age group, sex, Ohio 2006¹



An estimated two times as many females as males aged 65 and older were injured after a fall, Table 15. This pattern is consistent with hospital-admitted injuries, see page 38. For ages 45-64, although males had a higher prevalence of injury, in total numbers, more females than males were estimated to have sustained an injury. In total, an estimated 271,055 Ohioans aged 45 and older sustained a fall-related injury in the past three months.

Table 15. Estimated Prevalence (%) of injury and number of injured after falls in the past 3 months among residents age 45 years and older by age group and sex, Ohio 2006¹

Age Group (Years)	Male	Female	Total
Ages 45-64			
*Prevalence	42.9%	33.5%	37.4%
*Estimated no. of injured ² fallers ³	94,498	107,267	201,838
Ages 65 and older⁴			
*Prevalence	24.3%	36.8%	31.6%
*Estimated no. of injured ² fallers ³	22,186	46,828	69,217

¹Source: 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey, ODH, Chronic Disease and Behavioral Epidemiology

²Injured is defined as resulting in a doctor visit or restricted activity for at least one day

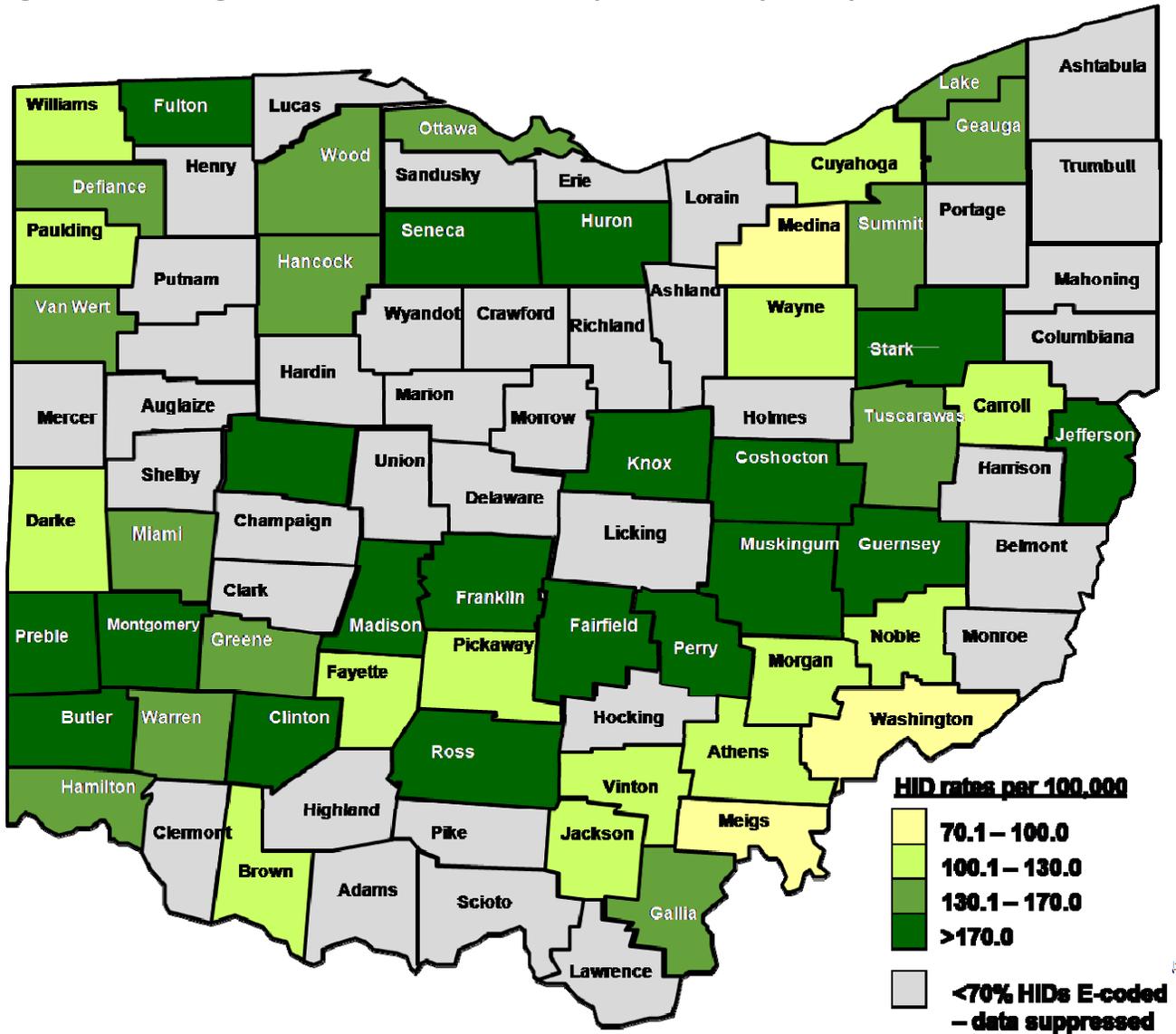
³Based on U.S. Census Bureau 2006 Ohio population estimates, <http://www.census.gov>, un-weighted

⁴Age groups 65-74 and 75+ were collapsed for question #2 due to sample size.

COUNTY-LEVEL FALL-RELATED ER VISIT AND INPATIENT DISCHARGE DATA

Figure 109 provides a visual presentation of the variation in fall-related inpatient discharge rates by county. Table 12 presents the total number and average annual rates of fall-related inpatient discharges and ER visits, as well as mean charges and mean in patient LOS for 2002-05, by county and sex. Caution should be used when making county-to-county comparisons. The rates are determined by the patient’s county of residence and not where the fall occurred or where the hospital is located. Discharges for Ohio residents treated in out-of-state hospitals are included sporadically in these data; therefore rates for border counties are likely to be somewhat under-reported.

Figure 109. Average annual fall-related HID rates per 100,000 by county, Ohio, 2002-05



In addition, E-coding varies greatly by county (4 percent to 93 percent), with rural areas more likely to omit E-coding of injuries. For those counties that had 70 percent or greater E-coding for injury-related hospital discharges, all data were included in Table 12. For counties that had 50 percent or greater, but less than 70 percent of all HIDs E-coded, only rates were excluded. When less than 50 percent of injury discharges were E-coded, all data were suppressed, (see Appendix C for E-coding proportions by county). These same criteria were applied to those sections of Table 12 that addressed ER visits, see Appendix D.

With these limitations in mind, the following observations can be made for the years 2002-05:

- Average fall-related charges ranged from a low of \$10,384 (n=659) in Tuscarawas County to a high of \$23,419 (n=2,371) for Lucas County, with the state average falling at \$17,864.
- Mean LOS for Ohio was 4.5 days, ranging from 3.6 days for Paulding County to 5.4 days for Carroll (n=153) and Scioto (n=479) counties.
- The frequency of fall-related inpatient discharges ranged from a low of 47 in Holmes to a high of 8,004 for Cuyahoga County residents.
- Annual fall-related, age-adjusted discharge rates were lowest for Washington County, at 74.4 per 100,000, and highest for Fairfield County, at 215.9 per 100,000
- Fall-related ER visit rates fell between 939.2 per 100,000 for Cuyahoga County residents and 4,505 per 100,000 for Jefferson County, with Ohio's overall rate being 1,755.1.

Table 16. Number of fall-related HIDs and ER visits,¹ average charges, LOS and crude and adjusted rates,* by county of residence, sex, 2002-05.²

¹ totals include persons of unknown sex

* per 100,000

		Hospital Inpatient Discharges					ER visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate** [®]
OHIO	male	22,796	\$20,132	4.6	102.3	111.5	363,595	1,604.3
	female	44,049	\$16,693	4.5	187.6	147.1	453,479	1,898.0
	total ¹	66,845	\$17,864	4.5	146.1	135.4	817,088	1,755.1
ADAMS	male	35	\$30,042	4.8	<70% coded	<70% coded [®]	1,437	<70% coded [®]
	female	46	\$15,062	4.1	<70% coded	<70% coded	1,918	<70% coded
	total	81	\$21,535	4.4	<70% coded	<70% coded	3,355	<70% coded
ALLEN	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
ASHLAND	male	94	\$18,493	3.8	<70% coded [®]	<70% coded [®]	2,010	1,885.5
	female	161	\$14,076	4.0	<70% coded	<70% coded	2,612	2,365.0
	total	255	\$15,704	4.0	<70% coded	<70% coded	4,622	2,130.1
ASHTABULA	male	141	\$14,976	4.0	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	250	\$13,104	4.4	<70% coded	<70% coded		<50% coded
	total	391	\$13,779	4.3	<70% coded	<70% coded		<50% coded
ATHENS	male	68	\$13,639	4.2	55.0	81.6	2,571	2,078.4
	female	177	\$15,027	5.0	137.0	151.9	2,898	2,242.4
	total	245	\$14,642	4.8	96.9	125.6	5,469	2,162.2
AUGLAIZE	male	89	\$17,070	4.5	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	248	\$14,189	4.5	<70% coded	<70% coded		<50% coded
	total	337	\$14,944	4.5	<70% coded	<70% coded		<50% coded
BELMONT	male	76	\$15,171	3.5	<70% coded [®]	<70% coded [®]	2,097	<70% coded [®]
	female	221	\$16,462	4.3	<70% coded	<70% coded	2,851	<70% coded
	total	297	\$16,132	4.1	<70% coded	<70% coded	4,948	<70% coded
BROWN	male	78	\$17,951	3.7	89.4	104.1		<50% coded [®]
	female	100	\$14,634	3.9	111.4	101.5		<50% coded
	total	178	\$16,087	3.8	100.6	105.1		<50% coded
BUTLER	male	719	\$20,979	4.8	106.0	136.5	13,882	2,009.5
	female	1,472	\$16,086	4.6	207.9	204.2	17,211	2,381.2
	total	2,191	\$17,691	4.7	158.1	178.9	31,093	2,199.4

[®]50-69% E-coded, mean charges, LOS, number of discharges and ER visits presented; less than 50% E-coded, all data suppressed; Appendices C & D

²Source: Ohio Hospital Association

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

		Hospital Inpatient Discharges					ER Visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate* [@]
CARROLL	male	57	\$13,278	5.5	97.4	96.1	652	1,110.6
	female	96	\$11,356	5.3	160.6	122.0	706	1,159.3
	total	153	\$12,072	5.4	129.3	114.0	1,358	1,135.2
CHAMPAIGN	male	33	\$20,152	3.9	<70% coded [@]	<70% coded [@]		<50% coded [@]
	female	55	\$15,785	4.6	<70% coded	<70% coded		<50% coded
	total	88	\$17,422	4.4	<70% coded	<70% coded		<50% coded
CLARK	male	228	\$19,295	4.4	<70% coded [@]	<70% coded [@]		<50% coded [@]
	female	383	\$16,329	4.6	<70% coded	<70% coded		<50% coded
	total	611	\$17,435	4.5	<70% coded	<70% coded		<50% coded
CLERMONT	male	344	\$20,080	4.2	92.6	118.1	6,907	1,674.0
	female	620	\$17,334	4.3	161.9	171.6	8,802	2,051.4
	total	964	\$18,315	4.2	127.8	152.5	15,710	1,865.9
CLINTON	male	94	\$16,613	4.0	112.9	132.0	2,859	3,372.2
	female	235	\$10,980	4.0	273.6	230.6	3,514	4,045.2
	total	329	\$12,577	4.0	194.5	191.1	6,374	3,715.1
COLUMBIANA	male	260	\$16,071	5.0	<70% coded [@]	<70% coded [@]	5,271	<70% coded [@]
	female	463	\$12,040	5.1	<70% coded	<70% coded	6,639	<70% coded
	total	723	\$13,488	5.1	<70% coded	<70% coded	11,910	<70% coded
COSHOCTON	male	109	\$15,617	4.1	149.9	152.3	1,770	2,425.3
	female	247	\$14,064	4.4	327.5	247.6	2,305	3,052.1
	total	356	\$14,539	4.3	240.3	209.9	4,075	2,744.4
CRAWFORD	male	54	\$17,211	4.4	<70% coded [@]	<70% coded [@]	2,971	3,343.6
	female	134	\$13,160	4.2	<70% coded	<70% coded	3,860	4,055.7
	total	188	\$14,324	4.3	<70% coded	<70% coded	6,831	3,711.8
CUYAHOGA	male	2,897	\$19,198	4.6	113.3	111.0	23,976	909.6
	female	5,107	\$17,238	4.6	179.4	122.1	28,137	965.7
	total	8,004	\$17,947	4.6	148.1	120.8	52,113	939.2
DARKE	male	122	\$25,388	5.4	116.5	113.3	1,797	1,663.4
	female	178	\$16,114	4.3	164.3	106.7	2,274	2,054.3
	total	300	\$19,842	4.8	140.8	112.1	4,071	1,862.1
DEFIANCE	male	81	\$12,664	4.0	105.2	111.4	1,338	<70% coded [@]
	female	182	\$14,145	4.5	230.0	165.3	1,631	<70% coded
	total	263	\$13,704	4.3	168.4	147.1	2,969	<70% coded
DELAWARE	male	211	\$22,663	4.4	<70% coded [@]	<70% coded [@]	4,263	1,504.0
	female	362	\$19,336	4.1	<70% coded	<70% coded	5,057	1,751.0
	total	573	\$20,561	4.2	<70% coded	<70% coded	9,320	1,628.6

[@]50-69% E-coded, mean charges, LOS, number of discharges and ER visits presented; less than 50% E-coded, all data suppressed; Appendices C & D totals include persons of unknown sex
 *rates per 100,000

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

		Hospital Inpatient Discharges					ER Visit	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate**@
ERIE	male				<50% coded®	<50% coded®		<50% coded®
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
FAIRFIELD	male	298	\$18,582	4.9	110.0	136.0	6,021	2,214.3
	female	788	\$15,259	4.9	288.4	268.7	7,553	2,749.2
	total	1,086	\$16,171	4.9	199.5	215.9	13,575	2,483.2
FAYETTE	male	51	\$24,601	5.1	92.0	95.6	2,074	3,733.5
	female	91	\$19,137	4.5	159.4	118.7	2,506	4,387.7
	total	142	\$21,099	4.7	126.2	111.5	4,580	4,065.4
FRANKLIN	male	2,302	\$23,712	4.6	108.1	143.6	28,828	<70% coded®
	female	4,340	\$20,384	4.6	195.0	195.6	37,347	<70% coded
	total	6,642	\$21,537	4.6	152.5	179.3	66,175	<70% coded
FULTON	male	113	\$18,738	4.2	134.4	150.3	1,694	2,013.3
	female	208	\$13,523	3.9	237.5	188.6	2,063	2,354.3
	total	321	\$15,354	4.0	187.0	176.5	3,757	2,187.3
GALLIA	male	49	\$14,202	3.3	80.0	83.2	1,244	2,026.1
	female	130	\$15,331	4.0	203.9	163.8	1,606	2,516.8
	total	179	\$15,022	3.8	143.2	133.4	2,850	2,276.4
GEAUGA	male	194	\$15,126	3.6	103.8	110.2		<50% coded®
	female	358	\$15,490	4.2	186.9	154.4		<50% coded
	total	552	\$15,362	4.0	145.9	138.2		<50% coded
GREENE	male	267	\$20,299	4.3	89.8	107.4	4,849	1,626.3
	female	623	\$19,283	4.8	199.9	183.2	6,123	1,957.4
	total	890	\$19,587	4.7	146.2	155.3	10,972	1,795.8
GUERNSEY	male	101	\$13,999	4.1	125.9	130.5	2,503	3,111.1
	female	237	\$12,121	4.2	278.8	205.0	2,892	3,389.8
	total	338	\$12,682	4.2	204.6	176.1	5,395	3,254.5
HAMILTON	male	1,843	\$21,772	4.5	118.3	127.7	22,448	<70% coded®
	female	3,868	\$17,272	4.5	227.5	170.1	32,678	<70% coded
	total	5,711	\$18,722	4.5	175.3	157.1	55,128	<70% coded
HANCOCK	male	156	\$13,451	4.1	108.8	115.1	2,261	1,569.8
	female	383	\$11,708	4.0	253.5	190.7	2,869	1,885.1
	total	539	\$12,214	4.0	183.1	160.8	5,130	1,731.6
HARDIN	male	41	\$15,891	4.1	<70% coded®	<70% coded®		<50% coded®
	female	112	\$15,348	4.4	<70% coded	<70% coded		<50% coded
	total	153	\$15,493	4.3	<70% coded	<70% coded		<50% coded

totals include persons of unknown sex

*rates per 100,000

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THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

		Hospital Inpatient Discharges					ER Visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate* [®]
HARRISON	male	23	\$13,466	4.9	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	48	\$13,250	5.2	<70% coded	<70% coded		<50% coded
	total	71	\$13,322	5.1	<70% coded	<70% coded		<50% coded
HENRY	male	40	\$19,986	4.2	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	79	\$13,375	4.0	<70% coded	<70% coded		<50% coded
	total	119	\$15,597	4.1	<70% coded	<70% coded		<50% coded
HIGHLAND	male	42	\$18,976	3.7	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	64	\$16,789	4.4	<70% coded	<70% coded		<50% coded
	total	106	\$17,656	4.1	<70% coded	<70% coded		<50% coded
HOCKING	male	22	\$20,226	4.5	<70% coded [®]	<70% coded [®]	1,765	3,065.2
	female	54	\$14,717	4.7	<70% coded	<70% coded	2,040	3,523.8
	total	76	\$16,312	4.6	<70% coded	<70% coded	3,805	3,295.1
HOLMES	male	17	\$15,968	4.2	<70% coded [®]	<70% coded [®]	1,426	1,675.8
	female	30	\$10,024	4.2	<70% coded	<70% coded	1,455	1,723.6
	total	47	\$12,174	4.2	<70% coded	<70% coded	2,881	1,699.7
HURON	male	176	\$17,025	4.6	148.2	161.5	4,055	3,407.0
	female	344	\$14,665	4.5	280.1	232.6	4,921	4,001.4
	total	520	\$15,463	4.5	215.2	208.2	8,976	3,709.2
JACKSON	male	48	\$20,300	4.2	74.2	82.0	1,263	1,952.9
	female	137	\$15,283	4.0	198.6	149.1	1,645	2,382.1
	total	185	\$16,585	4.0	138.4	125.8	2,908	2,174.4
JEFFERSON	male	250	\$13,326	4.7	183.3	154.4	5,795	4,212.9
	female	568	\$12,665	4.4	380.4	222.6	7,194	4,772.6
	total	818	\$12,867	4.5	286.3	196.5	12,989	4,505.4
KNOX	male	143	\$12,561	3.8	127.0	149.9	2,697	2,379.4
	female	336	\$12,029	4.4	283.4	217.2	3,362	2,807.3
	total	479	\$12,188	4.2	207.2	191.3	6,059	2,598.9
LAKE	male	507	\$17,807	4.6	111.9	116.3	9,164	1,993.8
	female	1,024	\$14,851	4.6	215.5	158.4	10,841	2,253.0
	total	1,531	\$15,830	4.6	164.9	143.2	20,005	2,126.5
LAWRENCE	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
LICKING	male	202	\$20,280	4.3	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	351	\$15,611	4.1	<70% coded	<70% coded		<50% coded
	total	553	\$17,314	4.1	<70% coded	<70% coded		<50% coded

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totals include persons of unknown sex

*rates per 100,000

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

		Hospital Inpatient Discharges					ER Visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate* [®]
LOGAN	male	109	\$14,967	4.3	118.5	128.5	1,760	1,902.9
	female	321	\$12,576	4.9	339.9	257.6	2,211	2,319.8
	total	430	\$13,180	4.7	230.6	207.2	3,971	2,114.1
LORAIN	male	446	\$19,162	4.5	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	618	\$13,063	4.2	<70% coded	<70% coded		<50% coded
	total	1,064	\$15,616	4.3	<70% coded	<70% coded		<50% coded
LUCAS	male	881	\$27,432	4.7	<70% coded [®]	<70% coded [®]	17,006	1,949.6
	female	1,490	\$21,065	4.6	<70% coded	<70% coded	20,713	2,221.8
	total	2,371	\$23,419	4.6	<70% coded	<70% coded	37,719	2,090.2
MADISON	male	88	\$25,352	4.9	98.9	117.7	1,927	2,160.4
	female	188	\$19,850	4.8	249.1	204.0	2,157	2,844.2
	total	276	\$21,605	4.8	167.8	172.7	4,084	2,474.3
MAHONING	male	515	\$21,148	4.6	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	1,000	\$18,322	4.7	<70% coded	<70% coded		<50% coded
	total	1,515	\$19,283	4.6	<70% coded	<70% coded		<50% coded
MARION	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
MEDINA	male	215	\$18,602	4.0	65.9	73.1	6,855	2,072.7
	female	326	\$14,580	3.8	97.7	95.2	7,981	2,368.0
	total	541	\$16,177	3.9	81.9	89.0	14,836	2,222.0
MEIGS	male	28	\$17,312	3.5	61.7	60.9	479	1,056.3
	female	75	\$13,831	3.9	156.9	112.3	547	1,144.5
	total	103	\$14,777	3.8	110.6	93.3	1,027	1,103.7
MERCER	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
MIAMI	male	199	\$24,123	5.5	100.4	108.6	5,441	2,733.1
	female	410	\$16,272	4.7	200.0	157.5	6,690	3,244.0
	total	609	\$18,854	5.0	151.1	138.6	12,131	2,992.9
MONROE	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
MONTGOMERY	male	1,640	\$25,462	5.1	155.0	162.2	23,515	2,220.8
	female	3,143	\$21,126	4.8	275.2	207.7	30,332	2,653.8
	total	4,783	\$22,613	4.9	217.4	193.4	53,849	2,445.8

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THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

totals include persons of unknown sex

*rates per 100,000

		Hospital Inpatient Discharges					ER Visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate* [®]
MORGAN	male	23	\$12,168	3.2	78.2	76.3	514	1,707.0
	female	61	\$16,171	4.4	201.0	147.7	544	1,759.1
	total	84	\$15,074	4.1	140.6	118.5	1,058	1,733.5
MORROW	male	36	\$15,990	4.4	<70% coded [®]	<70% coded [®]	1,627	2,379.0
	female	88	\$11,407	3.5	<70% coded	<70% coded	1,963	2,859.9
	total	124	\$12,737	3.8	<70% coded	<70% coded	3,590	2,619.9
MUSKINGUM	male	225	\$18,309	4.5	137.0	140.6	4,639	2,713.0
	female	486	\$15,360	4.7	272.4	196.5	5,491	3,013.0
	total	711	\$16,283	4.6	207.5	178.1	10,130	2,869.2
NOBLE	male	14	\$10,644	3.0	43.9	53.9	358	1,118.3
	female	57	\$12,682	4.3	235.9	164.6	437	1,800.5
	total	71	\$12,280	4.0	126.6	121.0	795	1,412.2
OTTAWA	male	93	\$21,231	4.6	113.2	105.1	1,932	<70% coded [®]
	female	226	\$18,067	4.5	270.7	177.4	2,423	<70% coded
	total	319	\$18,982	4.5	192.6	149.1	4,355	<70% coded
PAULDING	male	26	\$9,638	3.2	67.8	73.2	791	2,057.0
	female	72	\$10,709	3.8	181.9	138.9	1,062	2,682.6
	total	98	\$10,413	3.6	125.7	112.1	1,853	2,374.8
PERRY	male	92	\$17,309	4.4	132.1	150.3	1,650	2,315.7
	female	149	\$16,286	4.8	211.3	179.7	1,818	2,544.5
	total	241	\$16,676	4.7	172.0	172.2	3,468	2,430.8
PICKAWAY	male	81	\$20,433	4.3	69.0	88.8	2,705	2,293.0
	female	166	\$18,289	4.4	170.7	151.9	3,593	3,670.9
	total	247	\$18,992	4.4	115.1	128.6	6,298	2,917.2
PIKE	male	40	\$15,498	3.8	<70% coded [®]	<70% coded [®]		<50% coded [®]
	female	97	\$14,218	3.9	<70% coded	<70% coded		<50% coded
	total	137	\$14,592	3.9	<70% coded	<70% coded		<50% coded
PORTAGE	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
PREBLE	male	101	\$21,595	4.6	119.5	124.5	1,135	1,330.4
	female	217	\$16,570	4.4	253.1	197.3	1,347	1,564.3
	total	318	\$18,160	4.4	186.8	170.1	2,482	1,448.2
PUTNAM	male				<50% coded [®]	<50% coded [®]		<50% coded [®]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded

[®]50-69% E-coded, mean charges, LOS, number of discharges and ER visits presented; less than 50% E-coded, all data suppressed; Appendices C & D
 totals include persons of unknown sex *rates per 100,000

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

		Hospital Inpatient Discharges					ER Visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate** [@]
RICHLAND	male				<50% coded			<50% coded
	female				<50% coded			<50% coded
	total				<50% coded			<50% coded
ROSS	male	178	\$13,983	3.6	115.2	136.3	2,927	1,867.0
	female	357	\$13,609	3.9	249.2	203.3	3,620	2,480.5
	total	535	\$13,733	3.8	179.6	179.9	6,547	2,162.1
SANDUSKY	male				<50% coded			<50% coded
	female				<50% coded			<50% coded
	total				<50% coded			<50% coded
SCIOTO	male	126	\$23,216	5.7	<70% coded			<50% coded
	female	353	\$20,289	5.3	<70% coded			<50% coded
	total	479	\$21,054	5.4	<70% coded			<50% coded
SENECA	male	135	\$19,006	3.9	118.1	125.5	3,375	2,947.0
	female	350	\$16,338	4.3	299.5	213.9	4,137	3,524.4
	total	485	\$17,082	4.2	209.8	181.9	7,513	3,239.8
SHELBY	male				<50% coded [@]	<50% coded [@]		<50% coded [@]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
STARK	male	1,209	\$12,085	5.1	164.7	164.9	18,846	2,550.5
	female	2,376	\$10,560	5.0	300.4	208.8	24,111	3,020.6
	total	3,585	\$11,074	5.1	235.1	194.3	42,958	2,794.5
SUMMIT	male	1,335	\$21,216	4.3	126.3	129.9	27,997	2,643.0
	female	2,423	\$17,940	4.3	214.0	162.1	33,172	2,921.9
	total	3,758	\$19,104	4.3	171.7	152.1	61,170	2,787.3
TRUMBULL	male				<50% coded [@]	<50% coded [@]		<50% coded [@]
	female				<50% coded	<50% coded		<50% coded
	total				<50% coded	<50% coded		<50% coded
TUSCARAWAS	male	212	\$12,939	4.5	117.7	119.5	4,715	2,610.3
	female	447	\$9,170	4.6	236.9	160.7	6,071	3,208.1
	total	659	\$10,384	4.6	178.7	146.9	10,786	2,916.1
UNION	male				<50% coded			<50% coded
	female				<50% coded			<50% coded
	total				<50% coded			<50% coded

[@]50-69% E-coded, mean charges & LOS, and number of discharges/ER visits depicted; less than 50% E-coded, all data suppressed; Appendices C & D

totals include persons of unknown sex

*rates per 100,000

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

		Hospital Inpatient Discharges					ER Visits	
		No.	Mean Charges	Mean Length of Stay (days)	Average Annual Rate*	Average Age-Adjusted Annual Rate*	No.	Avg. Annual Rate* [@]
VAN WERT	male	61	\$12,534	3.6	106.9	106.1	1,182	2,061.6
	female	131	\$9,579	3.7	218.3	148.8	1,563	2,586.2
	total	192	\$10,444	3.7	164.0	133.7	2,745	2,330.4
VINTON	male	21	\$14,710	4.1	79.4	93.0	540	2,037.7
	female	34	\$14,407	3.9	126.1	110.7		2,355.7
	total	55	\$14,522	3.9	103.0	105.2	1,176	2,198.2
WARREN	male	321	\$19,957	4.3	83.7	122.1	5,075	1,181.3
	female	582	\$18,617	4.6	155.8	176.9	6,485	1,529.6
	total	903	\$19,093	4.5	119.3	156.4	11,561	1,353.5
WASHINGTON	male	71	\$14,211	4.1	58.3	59.3	1,992	1,631.3
	female	147	\$11,714	4.0	114.3	84.9	2,570	1,990.5
	total	218	\$12,531	4.0	87.1	74.4	4,562	1,815.8
WAYNE	male	220	\$14,159	3.9	97.7	109.7	4,420	<70% coded
	female	354	\$13,399	4.9	154.5	127.5	5,447	<70% coded
	total	574	\$13,689	4.5	126.4	122.5	9,867	<70% coded
WILLIAMS	male	79	\$16,335	4.4	102.0	101.7	140	180.8
	female	145	\$11,421	4.3	185.4	137.2	136	173.9
	total	224	\$13,090	4.3	143.9	123.4	276	177.3
WOOD	male	242	\$14,809	4.0	101.0	124.0	4,774	1,991.2
	female	550	\$13,373	4.1	217.0	195.8	5,873	2,315.5
	total	792	\$13,812	4.1	160.6	169.1	10,647	2,157.9
WYANDOT	male				<50% coded			<50% coded
	female				<50% coded			<50% coded
	total				<50% coded			<50% coded

[@]50-69% E-coded, mean charges, LOS, number of discharges and ER visits presented; less than 50% E-coded, all data suppressed; Appendices C & D

totals include persons of unknown sex

*rates per 100,000

OVERALL SUMMARY

Falls are a serious threat to public health and safety in Ohio.

- Falls are the leading cause of injury-related ER visits and hospitalizations for Ohioans and therefore contribute substantially to the burden our health care system faces.
- Forty-five percent of all injury-related hospitalizations and 27 percent of injury-related ER visits are due to falls. From 2002-2005, 66,845 fall-related HIDs resulted in 303,895 days of hospital stay. In addition, 817,074 ER visits were caused by fall-related injuries.
- Fall-related injury rates are on the rise. From 2002-05, the overall number and rate of fall-related HIDs and deaths increased each year.
- Falls can result in severe injuries. Hip fractures were the most frequent fall-related injuries. Seventy-nine percent of females who fell fractured their lower or upper limb, pelvis and/or hip. A significant number (more than 8,200) of treated fallers also required treatment for TBI. More than one in four TBIs in Ohio were associated with falls, and fall-related HID rates with TBI increased each year from 2002-05.
- Falls are the second-leading cause of fatal occupational injury after transportation-related injury, accounting for 11 percent of all fatal occupational-related injuries.

Falls are extremely costly and costs continue to grow.

- Fall-related HIDs resulted in \$1.2 billion in medical charges in Ohio from 2002-05. Annual charges for fall-related HIDs increased 58.4 percent from 2002 (\$230 million) to 2005 (\$364 million).
- Medical costs represent only a small proportion of total costs. Indirect costs such as work-loss and diminished quality-of-life are far more substantial. Fatal falls cost a total of \$646 million and non-fatal, hospital-admitted falls cost \$6.2 billion annually in Ohio.

Significant gender differences in fall-related injury were found:

- Females accounted for approximately two out of three fall-related hospitalizations.
- Both mean charges and length of stay were greater for males than females in every age group.
- Among younger persons (through age 54) treated for a fall, males were overrepresented, while older fallers were increasingly more likely to be female. For males, type of fall was largely determined by their activities, while for females, health issues associated with aging may have played a greater role.
- Nearly three-fourths of treated, fall-related hip fractures occurred among women.
- Males are at greater overall risk for traumatic brain injuries.

The circumstances of a fall (i.e., type and location of fall) can be useful in designing prevention efforts; however, they are frequently missing in injury data.

- The proportion of fall-related injuries in which the type of fall is unspecified increases with age, with the greatest proportion found in Ohioans aged 65 and older. A more thorough accounting of the circumstances surrounding these falls would greatly enhance future prevention efforts.
- When location was known, most falls occurred in the home.
- Children and youth are at higher risk for specific types of falls at different age groups. For example, infants and toddlers fall more from furniture and down stairs while older children fall more during sports- and recreation-related activities.

SUMMARY OF FALLS AMONG OLDER OHIOANS- AGES 65 AND OLDER

Falls are particularly harmful to older adults; the likelihood of falling and consequences of a fall increase dramatically with age.

- Falls among older adults have reached epidemic proportions and rates continue to rise each year in Ohio: the 515 deaths among those 65 or older in 2002 are expected to increase to nearly 900 in 2009.
- Older adults account for a disproportionate share of fall-related injury. In 2005, persons 65 and older accounted for 20 percent of all fall-related ER visits, 71 percent of fall-related inpatient discharges and *81 percent of deaths*, while they represented only 13 percent of the overall Ohio population.
- The severity of fall-related injuries increases with age, and therefore the risk for hospitalization and death. Younger Ohioans are more likely to be treated in an ER for fall-related injuries and not to require an overnight stay in the hospital. Mean length of stay in days increases with age.
- Fall-related ER visit and HID rates for Ohioans aged 65 years and older are higher than rates for all other injuries combined.
- The likelihood that a fall occurred on the same level from a slip, trip, or stumble as opposed to falling from one level another (e.g., down stairs, off a cliff, etc.) increases with age, particularly for females.
- Older adults with poor health status and who are isolated are at greater risk for falling.
- Fatal and medically-treated falls represent only a proportion of all falls. Fear, loss of independence, depressive symptoms and decreased quality of life often result from even minor falls not requiring medical care.

Due to the large and growing burden of fall-related injury in Ohio, especially among older Ohioans over 65 years, additional resources are needed at both the state and local level for evidence-based prevention initiatives.

PREVENTION RESOURCES FOR FALLS AMONG OLDER ADULTS

Falls are not a normal part of aging. There are simple steps that older adults can take to reduce their risk for a fall.

- Exercising regularly; programs like Tai Chi that increase strength and balance are especially effective.
- Reviewing medicines —both prescription and over-the counter—to reduce side effects and interactions.
- Having yearly eye exams.
- Reducing fall hazards in the home. Visit the CDC's website for a *Home Fall Prevention Checklist*: <http://www.cdc.gov/ncipc/duip/fallsmaterial.htm#BRochures>

The most effective way to prevent fall-related injury is to combine these strategies. Information, such as the following publications, on specific fall prevention programs is available from the CDC at:

<http://www.cdc.gov/ncipc/duip/preventadultfalls.htm>. The following documents are available online:

Preventing Falls: What Works – A CDC Compendium of Effective Community-based Fall Prevention Interventions from Around the World: This document described 14 evidence-based fall prevention strategies.

Preventing Falls: How To Do It – A User Guide for Developing Effective Community-based Fall Prevention Programs: This companion document offers guidelines to help organizations develop fall prevention programs.

APPENDIX A

Categorization of types of falls, based on ICD-9 CM E-codes

collapsed categories	merged types of falls	specific types of fall	ICD-9 CM	
all same level		same level, unspecified	E885, E8859	
		recreation	nonmotor scooter	E8850
	skateboard		E8852	
	skis		E8853	
	snowboard		E8854	
	roller skates		E8851	
			sidewalk	E8801
			sports	E8860
			conveyance	E8869
			accidentally pushed	E886
all other level	all furniture	from bed	E8844	
		from a chair	E8842	
		from commode	E8846	
		other furniture	E8845	
		wheelchair	E8843	
	ladder/scaffolding		other level, unspecified	E884, E8849
			ladder	E881, E8810
			scaffold	E8811
			playground	E8840
			from/thru building	E882
			into hole	E883, E8839
			off a cliff	E8841
			into well	E8831
			manhole	E8832
			diving	E8830
stairs/steps	stairs/steps	stairs/steps	E880, E8809	
		escalator	E8800	
unspecified		unspecified	E888, E8880, E8881, E8888, E8889	

APPENDIX B

Categorization of types of fatal falls, based on ICD-10 codes

collapsed categories	merged types of falls	specific types of fall	ICD-10
all same level		on ice/snow	W00
		same level slip/trip	W01
		skates,skis	W02
		accidently pushed	W03
		same level, unspecified	W18
all furniture		wheelchair	W05
		from bed	W06
		from a chair	W07
		other furniture	W08
all other level		dropped by other	W04
		playground	W09
	ladder/scaffolding	ladder	W11
		scaffold	W12
		from/thru building	W13
		from a tree	W14
		off a cliff	W15
		diving	W16
		other level, unspecified	W17
	stairs/steps		stairs/steps/escalator
unspecified		unspecified	W19

Injury-related hospital discharges¹, E-code status, total injuries, proportion E-coded, by county, 2002-05

¹Source: Ohio Hospital Association

70% or greater E-coding, all data included

50%_69% E-coding, only mean charges & los, incidence reported

less than 50% E-coding, all data suppressed

	Not E-coded	E-coded	Total injury discharges	Percent (%) E-coded
ADAMS	186	273	459	59.48
ALLEN	1,307	835	2,142	38.98
ASHLAND	243	503	746	67.43
ASHTABULA	750	1,039	1,789	58.08
ATHENS	167	466	633	73.62
AUGLAIZE	488	619	1,107	55.92
BELMONT	431	587	1,018	57.66
BROWN	146	475	621	76.49
BUTLER	814	4,872	5,686	85.68
CARROLL	45	345	390	88.46
CHAMPAIGN	189	280	469	59.70
CLARK	1,096	1,710	2,806	60.94
CLERMONT	609	2,329	2,938	79.27
CLINTON	166	660	826	79.90
COLUMBIANA	871	1,617	2,488	64.99
COSHOCTON	156	664	820	80.98
CRAWFORD	206	325	531	61.21
CUYAHOGA	7,640	19,924	27,564	72.28
DARKE	123	663	786	84.35
DEFIANCE	171	449	620	72.42
DELAWARE	473	1,103	1,576	69.99
ERIE	901	748	1,649	45.36
FAIRFIELD	525	1,956	2,481	78.84
FAYETTE	92	312	404	77.23
FRANKLIN	4,158	14,838	18,996	78.11
FULTON	195	660	855	77.19
GALLIA	126	308	434	70.97
GEAUGA	341	1,000	1,341	74.57
GREENE	195	1,898	2,093	90.68

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

	Not E-coded	E-coded	Total injury discharges	Percent (%) E-coded
GUERNSEY	208	770	978	78.73
HAMILTON	2,932	12,840	15,772	81.41
HANCOCK	195	868	1063	81.66
HARDIN	165	292	457	63.89
HARRISON	99	137	236	58.05
HENRY	209	264	473	55.81
HIGHLAND	206	353	559	63.15
HOCKING	197	236	433	54.50
HOLMES	70	152	222	68.47
HURON	264	992	1,256	78.98
JACKSON	116	343	459	74.73
JEFFERSON	550	1,372	1,922	71.38
KNOX	161	817	978	83.54
LAKE	689	2,596	3,285	79.03
LAWRENCE	789	29	818	3.55
LICKING	763	1281	2044	62.67
LOGAN	232	693	925	74.92
LORAIN	1,764	2,538	4,302	59.00
LUCAS	4,522	5,974	10,496	56.92
MADISON	180	510	690	73.91
MAHONING	2,398	3,206	5,604	57.21
MARION	758	205	963	21.29
MEDINA	476	1,254	1,730	72.49
MEIGS	66	179	245	73.06
MERCER	418	264	682	38.71
MIAMI	357	1,408	1,765	79.77
MONROE	88	38	126	30.16
MONTGOMERY	854	10,861	11,715	92.71
MORGAN	33	185	218	84.86
MORROW	122	237	359	66.02
MUSKINGUM	244	1,448	1,692	85.58
NOBLE	41	136	177	76.84
OTTAWA	164	591	755	78.28
PAULDING	78	186	264	70.45
PERRY	153	525	678	77.43
PICKAWAY	232	611	843	72.48
PIKE	224	264	488	54.10
PORTAGE	1,478	946	2,424	39.03
PREBLE	112	713	825	86.42
PUTNAM	418	169	587	28.79

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

	Not E-coded	E-coded	Total injury discharges	Percent (%) E-coded
RICHLAND	1,591	619	2,210	28.01
ROSS	290	1,157	1,447	79.96
SANDUSKY	553	448	1,001	44.76
SCIOTO	404	803	1,207	66.53
SENECA	293	824	1,117	73.77
SHELBY	373	287	660	43.48
STARK	1,006	7,064	8,070	87.53
SUMMIT	1,903	8,239	10,142	81.24
TRUMBULL	2,935	2,015	4,950	40.71
TUSCARAWAS	249	1,295	1,544	83.87
UNION	339	138	477	28.93
VAN WERT	83	291	374	77.81
VINTON	52	114	166	68.67
WARREN	206	1,985	2,191	90.60
WASHINGTON	125	410	535	76.64
WAYNE	252	1,268	1,520	83.42
WILLIAMS	76	455	531	85.69
WOOD	501	1,480	1,981	74.71
WYANDOT	195	142	337	42.14
OHIO OVERALL	57,261	146,975	204,236	71.96

Injury-related ER visits¹, E-code status, total injuries, proportion E-coded, by county, 2002-05

¹Source: Ohio Hospital Association

70% or greater E-coding, all data included

50%_69% E-coding, only mean charges & los, incidence reported

less than 50% E-coding, all data suppressed

	Not E-coded	E-coded	Total injury-related ER visits	Percent (%) E-coded
ADAMS	8,212	12,078	20,290	59.53
ALLEN	47,458	20,916	68,374	30.59
ASHLAND	8,569	17,135	25,704	66.66
ASHTABULA	32,408	28,975	61,383	47.20
ATHENS	2,185	22,930	25,115	91.30
AUGLAIZE	21,311	7,897	29,208	27.04
BELMONT	7,889	16,605	24,494	67.79
BROWN	15,927	7,620	23,547	32.36
BUTLER	35,616	105,644	141,260	74.79
CARROLL	855	5,740	6,595	87.04
CHAMPAIGN	19,120	2,832	21,952	12.90
CLARK	38,517	29,114	67,631	43.05
CLERMONT	25,209	60,218	85,427	70.49
CLINTON	5,063	24,215	29,278	82.71
COLUMBIANA	27,571	43,620	71,191	61.27
COSHOCTON	3,934	13,792	17,726	77.81
CRAWFORD	9,613	22,621	32,234	70.18
CUYAHOGA	70,815	201,482	272,297	73.99
DARKE	3,772	13,086	16,858	77.62
DEFIANCE	6,735	11,041	17,776	62.11
DELAWARE	12,027	34,997	47,024	74.42
ERIE	40,436	9,187	49,623	18.51
FAIRFIELD	14,475	49,576	64,051	77.40
FAYETTE	3,817	13,681	17,498	78.19
FRANKLIN	203,123	253,235	456,358	55.49
FULTON	4,271	14,631	18,902	77.40
GALLIA	1,881	10,952	12,833	85.34
GEAUGA	13,225	8,086	21,311	37.94
GREENE	3,398	38,277	41,675	91.85

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

	Not E-coded	E-coded	Total injury-related ER visits	Percent (%) E-coded
GUERNSEY	2,222	19,369	21,591	89.71
HAMILTON	122,524	210,577	333,101	63.22
HANCOCK	4,071	19,138	23,209	82.46
HARDIN	11,606	8,523	20,129	42.34
HARRISON	1,147	7,489	8,636	86.72
HENRY	9,589	4,457	14,046	31.73
HIGHLAND	20,275	8,134	28,409	28.63
HOCKING	3,973	15,744	19,717	79.85
HOLMES	3,137	7,800	10,937	71.32
HURON	10,097	33,384	43,481	76.78
JACKSON	2,680	9,944	12,624	78.77
JEFFERSON	8,951	42,239	51,190	82.51
KNOX	2,529	27,213	29,742	91.50
LAKE	6,756	67,734	74,490	90.93
LAWRENCE	13,971	531	14,502	3.66
LICKING	27,460	24,526	51,986	47.18
LOGAN	6,120	15,100	21,220	71.16
LORAIN	116,210	28,427	144,637	19.65
LUCAS	100,979	146,952	247,931	59.27
MADISON	6,304	15,888	22,192	71.59
MAHONING	74,646	54,282	128,928	42.10
MARION	5,007	4,930	9,937	49.61
MEDINA	8,768	56,547	65,315	86.58
MEIGS	587	4,136	4,723	87.57
MERCER	13,750	2,596	16,346	15.88
MIAMI	10,551	39,971	50,522	79.12
MONROE	2,272	835	3,107	26.87
MONTGOMERY	20,810	183,906	204,716	89.83
MORGAN	544	3,753	4,297	87.34
MORROW	1,857	14,782	16,639	88.84
MUSKINGUM	7,089	35,953	43,042	83.53
NOBLE	399	3,056	3,455	88.45
OTTAWA	8,799	14,827	23,626	62.76
PAULDING	2,400	7,322	9,722	75.31
PERRY	3,326	13,631	16,957	80.39
PICKAWAY	8,424	22,650	31,074	72.89
PIKE	6,434	3,387	9,821	34.49
PORTAGE	32,369	16,073	48,442	33.18
PREBLE	1,432	9,012	10,444	86.29
PUTNAM	13,940	3,185	17,125	18.60

THE BURDEN OF INJURY FROM UNINTENTIONAL FALLS IN OHIO, 2002-2005

	Not E-coded	E-coded	Total injury-related ER visits	Percent (%) E-coded
RICHLAND	52,580	11,863	64,443	18.41
ROSS	7,816	25,843	33,659	76.78
SANDUSKY	21,548	6,936	28,484	24.35
SCIOTO	56,718	8,152	64,870	12.57
SENECA	7,336	26,851	34,187	78.54
SHELBY	22,869	2,594	25,463	10.19
STARK	30,703	151,421	182,124	83.14
SUMMIT	16,365	212,349	228,714	92.84
TRUMBULL	57,573	47,388	104,961	45.15
TUSCARAWAS	2,298	42,165	44,463	94.83
UNION	8,925	1,787	10,712	16.68
VAN WERT	1,957	10,199	12,156	83.90
VINTON	999	4,561	5,560	82.03
WARREN	6,470	41,897	48,367	86.62
WASHINGTON	2,990	16,892	19,882	84.96
WAYNE	17,985	36,948	54,933	67.26
WILLIAMS	1,096	1,290	2,386	54.07
WOOD	11,001	39,144	50,145	78.06
WYANDOT	9,068	2,737	11,805	23.19
OHIO OVERALL	1,727,734	2,999,203	4,726,937	63.45

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ABBREVIATIONS REFERENCE LIST

Following is a list of abbreviations used throughout the report:

BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CFOI	Census of Fatal Occupational Injuries
CSN	Children’s Safety Network
E-code	External cause of injury code
ER	Emergency room
HID	Hospital inpatient discharge
HP 2010	Healthy People 2010 Objectives
ICD	International Classification of Diseases
LOS	Length of stay (in days)
NCIPC	National Center for Injury Prevention and Control
ODH	Ohio Department of Health
OHA	Ohio Hospital Association
OIPP	Ohio Injury Prevention Partnership
OSHA	Occupational Safety and Health Administration
STIPDA	State and Territorial Injury Prevention Directors’ Association
TBI	Traumatic brain injury
VIPP	Violence and Injury Prevention Program
WISQARS™	Web-based Injury Statistics Query and Reporting System
YPLL	Years of Potential Life Lost

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Prevention Resources

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