Injury Prevention: The Public Health Perspective of Fall Prevention

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Indiana State Department of Health
Trauma and Injury Prevention

Objectives

- Identify the scope of fall-related injuries in Indiana, Midwest, and U.S.
  - Hospital Admissions, ED visits, and Death
- Demonstrate accurate knowledge about fall-related injuries, including at-risk populations & risky behaviors
- Examine and define best practices in falls prevention in special populations

Public Health Approach

- Surveillance: What is the problem?
- Risk Identification: What is the cause?
- Intervention: What works?
- Implementation: How do you do it?
- Outcome Measurement: Did it work?

Injury, Not Accident!

- **Accident:** An unexpected occurrence, happening by chance

- **Injury**: A definable, correctable event, with specific risks for occurrence

- Injuries can be prevented

"Prevention is the vaccine for the disease of injury" – American College of Surgeons-Committee on Trauma

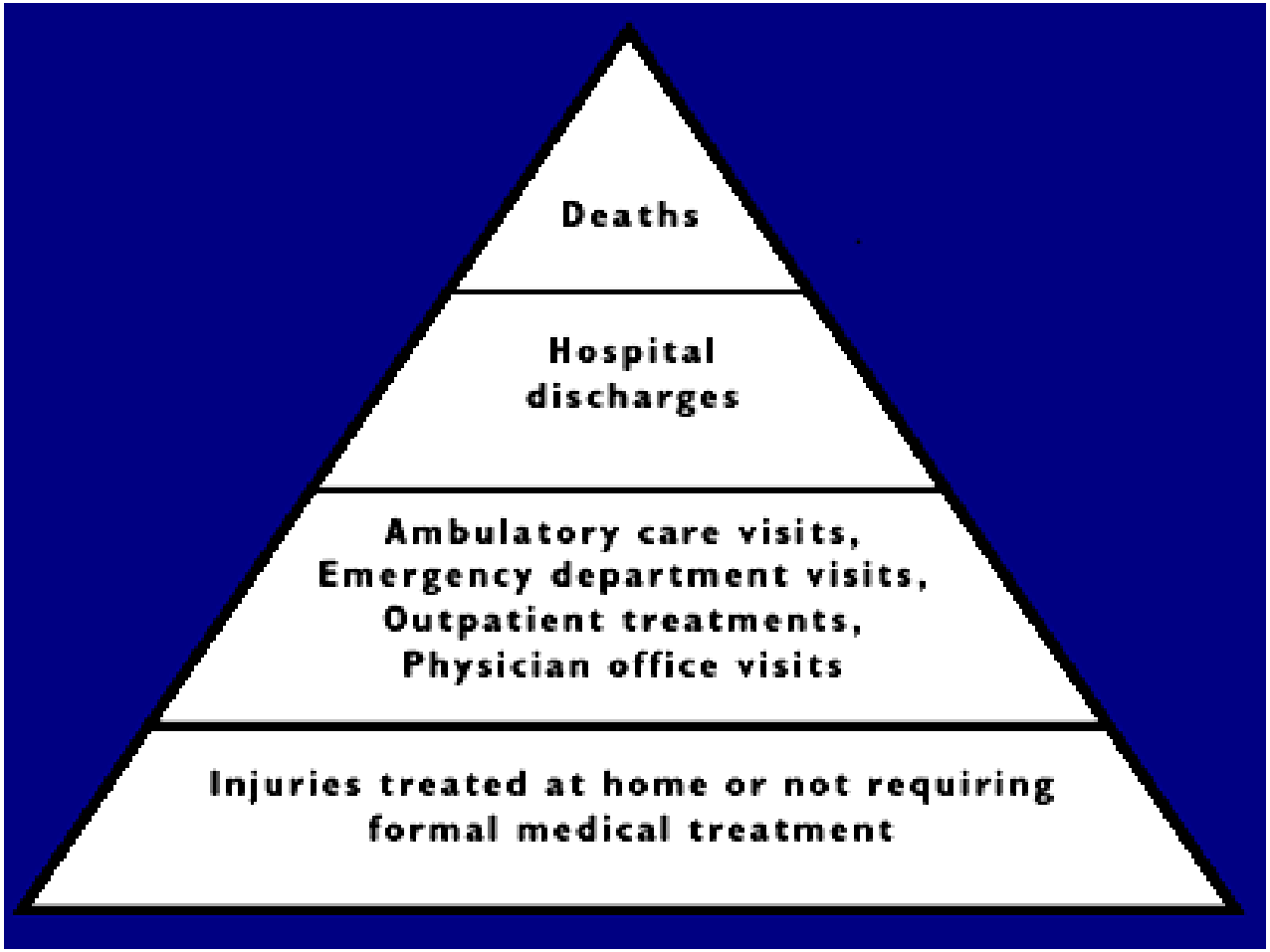
What is injury?

- Failure of tissue or a body part due to transfer of energy
  - Mechanical (majority)
  - Thermal
  - Electrical
  - Chemical
  - Ionizing radiation

- Injury results when an energy load is in excess of that tolerated under normal circumstances

- Affect all regardless of age, race, or SES

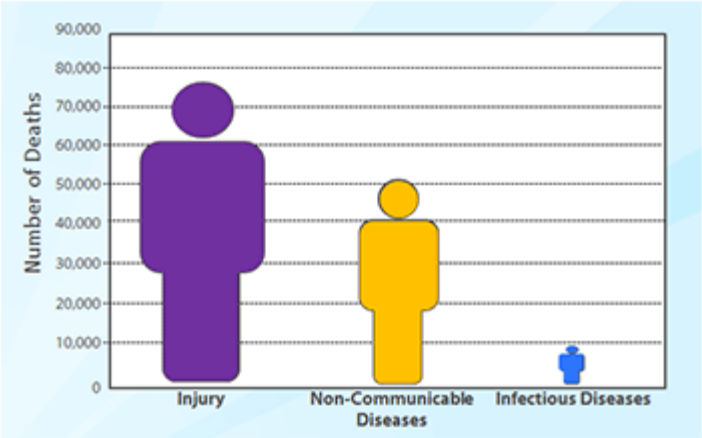
Injury Pyramid



1) Adapted from Safe States Alliance (formerly known as State and Territorial Injury Prevention Directors Association (STIPDA)): Safe States, 2003 Edition

Injuries in the United States

- More than 180,000 deaths per year[2]
  - 1 person every 3 minutes[2]
- 2.5 million people hospitalized each year[2]
- 31.6 million treated in ED each year[2]
- $406 billion in medical care and lost productivity each year[3]



2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2012). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.
3) Finkelstein EA, Corso PS, Miller TR, Associates. Incidence and Economic Burden of Injuries in the United States. New York, NY: Oxford University Press; 2006.

Fall-Related Injuries

- Fall-related injuries, at-risk populations & risky behaviors

Definition of Fall

- Injury due to mechanical energy transfer
  - Person descends abruptly due to the force of gravity strikes a surface at same or lower level
  - Rapid vertical deceleration

Injury Pattern

- Injury pattern results from three factors
  1) Distance of fall
     - Increase in incidence of trauma from falling from greater heights because velocity increases
     - Empire State Building vs. one step
     - Severe classification if fall greater than 3X height of the victim

4) LBFD EMS Education and Quality Management, http://www.lbfdtraining.com/emt.html.

Injury Pattern, continued

2) Type of landing surface

- Resilient surfaces will increase stopping distance
- Surface to absorb kinetic energy instead of body
- Trampoline vs. concrete

3) Body part that impacts first

- Head vs. wrist vs. feet

4) LBFD EMS Education and Quality Management, http://www.lbfdtraining.com/emt.html.

Falls Injury Severity

- Injury severity a function of:
  - Mechanical properties of tissue
  - Suddenness of impact
  - Localization of impact
  - Manner and amount of energy delivered

Fall Manner/ Intent

- Intents vary:
  - Unintentional (majority)
  - Self-inflicted/suicide
  - Assault / homicide
  - Undetermined
  - Other

Fall Injury Categories

Categories:	
Same level slipping, tripping, or stumbling	Steps or stairs
One level to another	Ladders and scaffolds
Hole or other opening in surface	Building or other structure
Other and unspecified	Same level from collision, pushing, or shoving
“Jumping from high places” for suicides	“Pushing from high places” for homicides

Outcomes

- Mild, moderate, and severe injuries occur
  - Increases risk of early death

- Children:
  - Head injuries common [4]
    - Heaviest part of body
    - Usually impacts first
  - Broken extremities

- Falls are the most common cause of traumatic brain injury[5]

4) LBFD EMS Education and Quality Management, http://www.lbfdtraining.com/emt.html.
5) Sterling DA, O'Connor JA, Bonadies J. [illegible] falls: injury severity is high and disproportionate to mechanism. Journal of Trauma-Injury, Infection and Critical Care 2001;50(1):116-9.

Outcomes in older adults

- Most fractures among older adults are caused by falls
  - Hip
  - Spine
  - Forearm
  - Leg
  - Ankle
  - Pelvis
  - Upper arm
  - Hand

6) Scheffer AC, Schuurmans MJ, Van Dijk [illegible] Der Hoof T. Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. Age and Ageing 2008;37

Outcomes in older adults, cont'd

- 20-30% of older adults who fall suffer moderate to severe injuries[5,7]
  - Lacerations, hip fractures, or head traumas
- Falls lead to:
  - Decreased mobility
  - Increased risk of early death
  - Loss of independence
- Fear of falling may increase risk of falls[8]
  - May limit their activities, leading to reduced mobility, loss of physical fitness and other risk factors[9]

5) Sterling DA, O'Connor JA, Bonadies J. Geriatric falls: injury severity is high and disproportionate to mechanism. Journal of Trauma-Injury, Infection and Critical Care 2001;50(1):116-9
7) Alexander BH, Rivara FP, Wolf ME. The cost and frequency of hospitalization for fall-related injuries in older adults. American Journal of Public Health 1992;82(7):1020-3.
8) Bell AJ, Talbot-Stern JK, Henne[illegible] A. Characteristics and outcomes of older patients presenting to the emergency department after a fall: a retrospective analysis. Medical Journal of Australia 20[illegible]2(4):176-7.
9) Vellas BJ, Wayne SJ, Romero LJ, Baumgartner [illegible] PJ. Fear of falling and restriction of mobility in elderly fallers. Age and Ageing 1997;26:189-193.

Risk Factors

- Measurable characteristic associated with a higher probability of injury

- A group of people with this risk factor suffer more injury than those who do not have the factor
  - Environmental exposure
  - Personal attribute
  - Behaviors
  - Inherited characteristic
  - Lifestyle
  - Social circumstance

Fall Risk Factors

Biological	Behavioral	Home/ Environmental
• Age • Gender • Muscle Weakness • Poor balance and coordination • Chronic conditions • Osteoporosis • Poor vision • Loss of sensation in feet	• Inactivity • Poor nutrition • Inappropriate footwear • Risky behaviors • Multiple or psychoactive medications • Alcohol use	• Poor lighting • Obstacles and tripping hazards • Uneven or slippery surfaces • Lack of handrails or grab bars • Incorrect size or type assistive devices

10) National Center for Injury Prevention and Control. Preventing falls: How to develop community-based fall prevention programs for older adults. Atlanta, GA: Centers for Disease Control and Prevention, 2008

Children at risk

Children Fall Risk Factors:[11]

- Age
- Developmental status
- Activity level
- Curiosity
- Immature motor skills
- Lack of judgment
- Lack of supervision/ parental neglect
  - Falls most common cause of injuries suffered by children of teen parents[12]

11) Winn, D., Anderson, C. Understanding and Preventing Child Fall Injuries and Fatalities: The Status of Prevention Efforts in California. University of California, Center for Trauma and Injury Prevention Research. Retrieved from: http://www.ctipr.uci.edu/events/pubs/FallsWhitePaper.pdf

12) Roberson, B.D., Lang, C., Bachim, A. [illegible] children of at-risk parents: Assessing Common Injuries to Children of Teenage Parents. The Journal of Pediatrics. 2013. DOI 10.1016/j.jpeds.[illegible]09.024.

Falls Mechanism in Children

- Infants
  - Falling from furniture or stairs
  - Baby walker-related injuries caused by falling down stairs or tipping over
- Toddlers and preschool-age
  - Falling from windows
- Older children
  - Falling from playground equipment

11) Winn, D., Anderson, C. Und[illegible]tanding and Preventing Child Fall Injuries and Fatalities: The Status of Prevention Efforts in California. University of California, Center for Tra[illegible]nd Injury Prevention Research. Retrieved from: http://www.ctipr.uci.edu/events/pubs/Fallswi[illegible].pdf

Occupational Risk Factors

- Any walking or working surface a potential fall hazard
  - Uneven walking surfaces
  - Spills on walking surfaces such as liquids, oil, grease
  - Precipitation (ice, snow, rain)
  - Loose mats or rugs
  - Ladder/step stool work
  - Inadequate poor lighting
  - Item(s) in designated walking path (tools, equipment)
  - Lack of guard rails/ toe-boards
- Worker risk factors:
  - Age
  - Employee fatigue (fast work pace)
  - Poor vision
  - Inappropriate or poor-fitting footwear

13) Health and Safety Authority. Retrieved from www.hsa.ie/eng/Topics/Slips_Trips_Falls/

Scope of the problem

- Falls in the United States, Midwest & Indiana

Falls in the United States

- 8,974,762 non-fatal unintentional fall injuries in 2012
- 27,483 unintentional fall deaths in 2011

- Falls are the leading cause of both fatal and nonfatal injuries for older adults

- Leading cause of non-fatal injuries of all children
  - 2.8 million ED visits in 2010 among children
  - 275,000 TBI due to falls annually among children

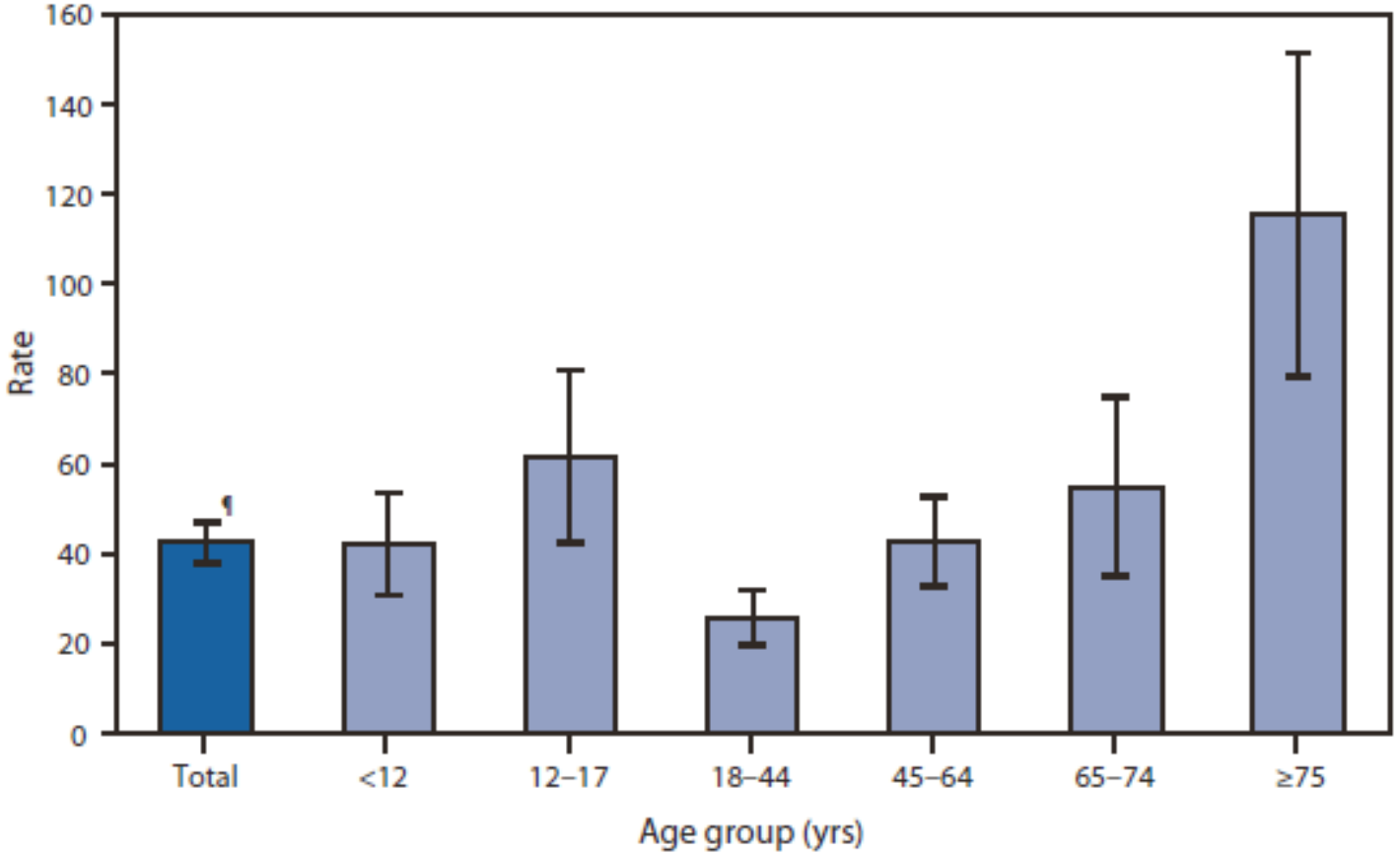
- Direct medical costs of falls ~$30 billion

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

10 Leading Causes of Nonfatal Injury Treated in ED, US, 2012

	Age Groups										
Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	Total
1	Unintentional Fall 145,406	Unintentional Fall 928,693	Unintentional Fall 682,972	Unintentional Struck By/Against 612,890	Unintentional Struck By/Against 1,015,214	Unintentional Fall 781,424	Unintentional Fall 723,904	Unintentional Fall 925,945	Unintentional Fall 881,178	Unintentional Fall 2,422,463	Unintentional Fall 8,974,762
2	Unintentional Struck By/Against 33,070	Unintentional Struck By/Against 385,146	Unintentional Struck By/Against 427,701	Unintentional Fall 600,403	Unintentional Fall 882,214	Unintentional Struck By/Against 648,632	Unintentional Overexertion 552,464	Unintentional Overexertion 480,093	Unintentional Struck By/Against 269,407	Unintentional Struck By/Against 280,326	Unintentional Struck By/Against 4,553,417
3	Unintentional Other Bite/Sting 14,293	Unintentional Other Bite/Sting 172,438	Unintentional Cut/Pierce 119,092	Unintentional Overexertion 318,459	Unintentional Overexertion 728,819	Unintentional Overexertion 643,571	Unintentional Struck By/Against 467,962	Unintentional Struck By/Against 412,908	Unintentional Overexertion 259,092	Unintentional Overexertion 213,553	Unintentional Overexertion 3,385,128
4	Unintentional Foreign Body 11,245	Unintentional Foreign Body 145,117	Unintentional Other Bite/Sting 111,305	Unintentional Cut/Pierce 126,902	Unintentional MV-Occupant 666,833	Unintentional MV-Occupant 539,425	Unintentional MV-Occupant 392,071	Unintentional MV-Occupant 358,304	Unintentional MV-Occupant 232,972	Unintentional MV-Occupant 197,951	Unintentional MV-Occupant 2,564,003
5	Unintentional Fire/Burn 10,837	Unintentional Cut/Pierce 90,907	Unintentional Overexertion 93,654	Unintentional Pedal Cyclist 98,448	Unintentional Cut/Pierce 444,644	Unintentional Cut/Pierce 415,539	Unintentional Cut/Pierce 310,662	Unintentional Other Specified 318,190	Unintentional Cut/Pierce 186,182	Unintentional Cut/Pierce 152,185	Unintentional Cut/Pierce 2,145,927
6	Unintentional Inhalation/ Suffocation 9,658	Unintentional Overexertion 89,007	Unintentional Pedal Cyclist 82,935	Unintentional Unknown/ Unspecified 88,748	Other Assault* Struck By/Against 423,804	Other Assault* Struck By/Against 346,347	Unintentional Other Specified 264,926	Unintentional Cut/Pierce 293,852	Unintentional Other Specified 175,130	Unintentional Poisoning 99,618	Unintentional Other Specified 1,580,574
7	Unintentional Other Specified 9,120	Unintentional Other Specified 68,237	Unintentional Foreign Body 64,755	Unintentional MV-Occupant 77,363	Unintentional Other Specified 320,844	Unintentional Other Specified 294,541	Other Assault* Struck By/Against 217,972	Unintentional Poisoning 216,942	Unintentional Poisoning 128,260	Unintentional Other Bite/Sting 90,300	Other Assault* Struck By/Against 1,361,096
8	Unintentional Overexertion 6,416	Unintentional Fire/Burn 56,711	Unintentional MV-Occupant 60,056	Other Assault* Struck By/Against 71,276	Unintentional Other Bite/Sting 191,062	Unintentional Other Bite/Sting 193,519	Unintentional Poisoning 162,002	Other Assault* Struck By/Against 174,556	Unintentional Other Bite/Sting 103,825	Unintentional Other Specified 79,395	Unintentional Other Bite/Sting 1,250,916
9	Unintentional Cut/Pierce 5,963	Unintentional Unknown/ Unspecified 45,276	Unintentional Dog Bite 46,565	Unintentional Other Bite/Sting 69,914	Unintentional Unknown/ Unspecified 154,866	Unintentional Poisoning 156,817	Unintentional Other Bite/Sting 148,512	Unintentional Other Bite/Sting 155,748	Other Assault* Struck By/Against 71,819	Unintentional Other Transport 68,187	Unintentional Poisoning 972,923
10	Unintentional Unknown/ Unspecified 5,020	Unintentional Dog Bite 38,556	Unintentional Unknown/ Unspecified 38,208	Unintentional Other Transport 49,358	Unintentional Poisoning 147,636	Unintentional Unknown/ Unspecified 113,467	Unintentional Unknown/ Unspecified 90,213	Unintentional Unknown/ Unspecified 85,383	Unintentional Other Transport 52,056	Unintentional Unknown/ Unspecified 62,327	Unintentional Unknown/ Unspecified 734,164

Rate of Nonfatal, Medically Consulted Fall Injury, US, 2010



* Per 1,000 population.

95% confidence interval

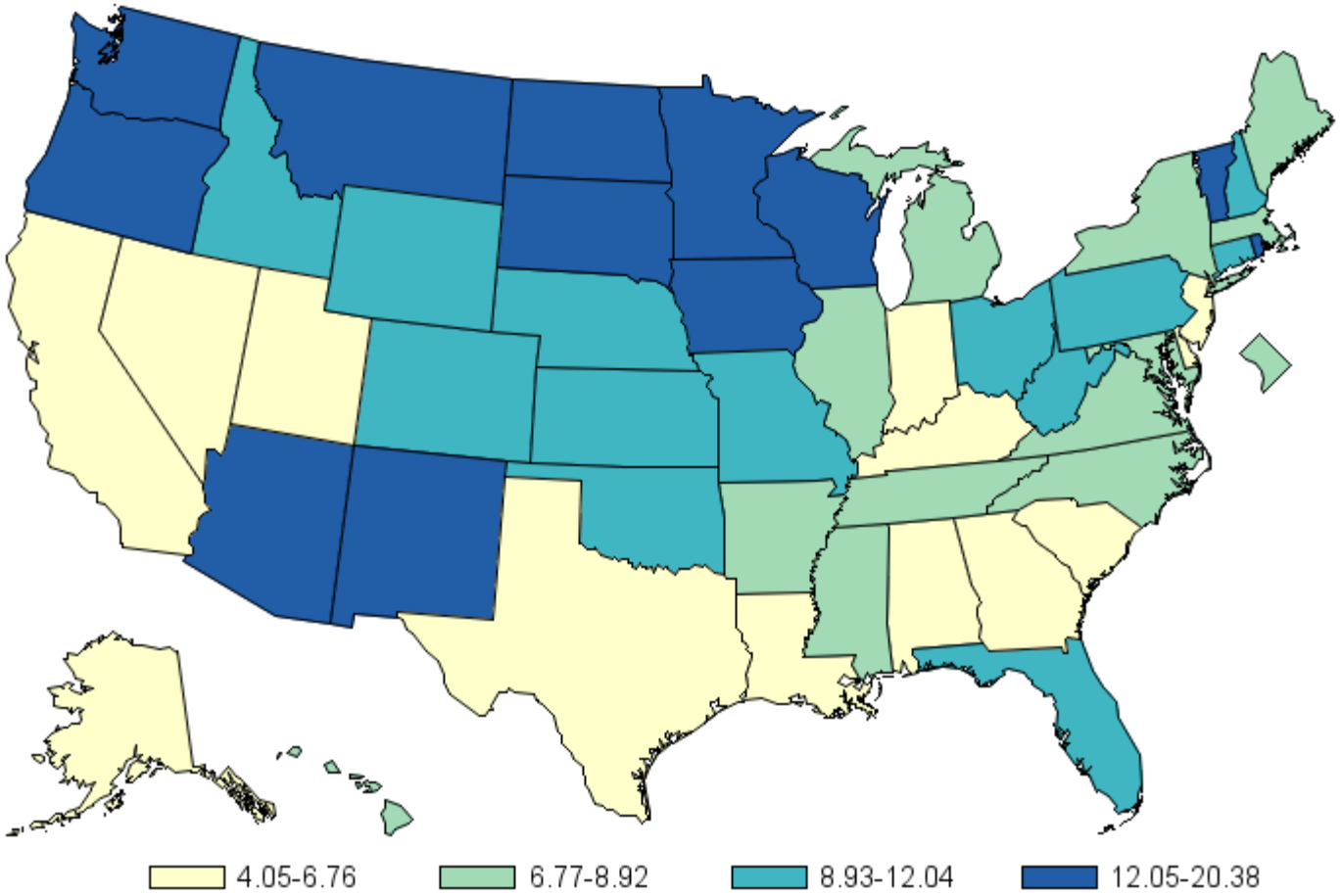
14) Adams PF, Martinez ME, Vickerie JL, [illegible]er WK. Summary health statistics for the U.S. population: National Health Interview Survey, 2010. Vital Health Stat 2011;10(251).

10 Leading Causes of Injury Deaths, US, 2011

Cause of Death	Number of Deaths	Percentage of All Deaths in Age Group
All Injury Deaths	190,048	100.0%
Unintentional Poisoning	36,280	19.1%
Unintentional MV Traffic	33,783	17.8%
Unintentional Fall	27,483	14.5%
Suicide Firearm	19,990	10.5%
Homicide Firearm	11,068	5.8%
Suicide Suffocation	9,913	5.2%
Suicide Poisoning	6,564	3.5%
Unintentional Suffocation	6,242	3.3%
Unintentional Unspecified	5,871	3.1%
Unintentional Drowning	3,556	1.9%
All Others	29,298	15.4%

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

Fall Death Rates per 100,000 Population, US, 2008–2010



*crude rates

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

Falls in older adults

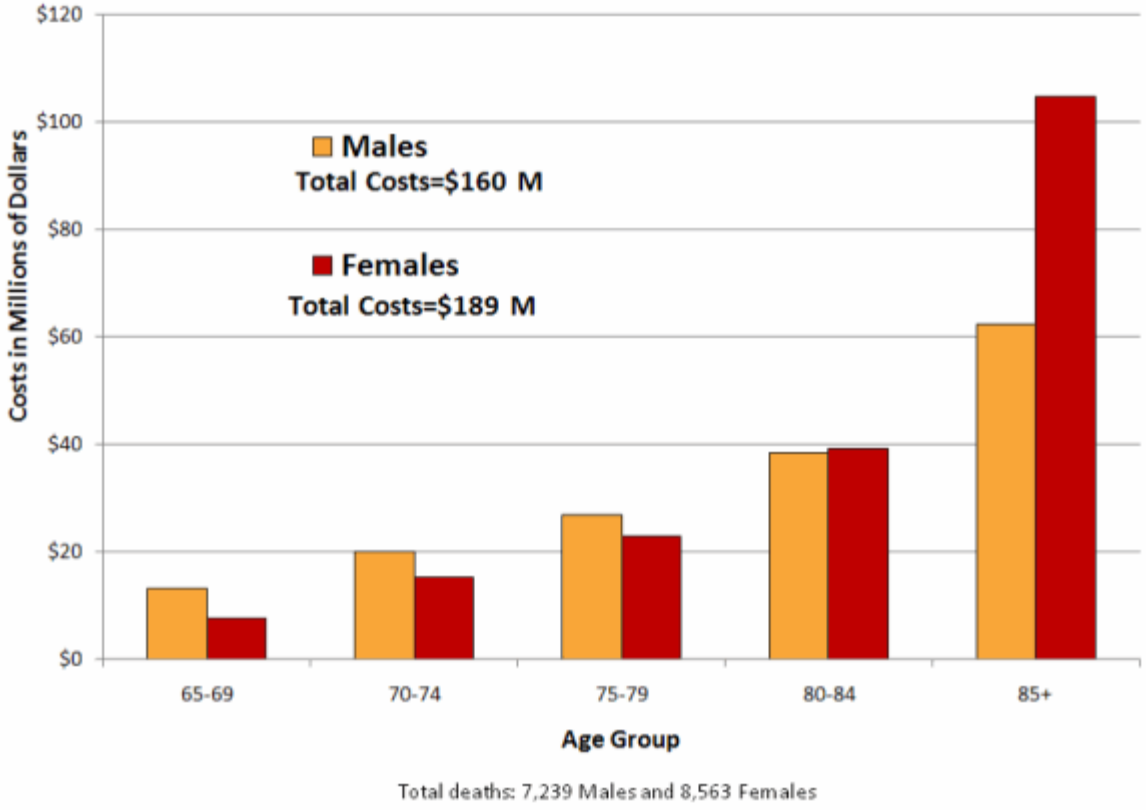
- More than one out of every three adults 65+ fall each year[15]
  - Less than half of older adults discuss falls risk with healthcare providers[16]

- Every 17 seconds an older adult goes to ED because of a fall[2]
- Every 30 minutes an older adult dies from fall[2]

- Falls are not a normal part of aging
  - Falls are preventable

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.
15) Tromp AM, Pluijm SMF, Smit JH, et al. Fall-risk screening test: a prospective study on predictors for falls in community-dwelling elderly. J Clin Epidemiol 2001;54(8):837-844.
16) Stevens JA, Ballesteros MF, Mack KA, [illegible] RA, DeCaro E, Adler G. Gender differences in seeking care for falls in the aged Medicare Population. American Journal of Preventive Medicine 2012;43[illegible]

Total Lifetime Medical Costs of Unintentional Fatal Fall-Related Injuries in Older Adults, US, 2005



2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.[illegible]/injury/wisqars/index.html.

10 Leading Causes of Injury Deaths age 65+, US, 2011

Cause of Death	Number of Deaths	Percentage of All Deaths in Age Group
All Injury Deaths	52,494	100.0%
Unintentional Fall	22,901	43.6%
Unintentional MV Traffic	6,225	11.9%
Unintentional Unspecified	4,630	8.8%
Suicide Firearm	4,526	8.6%
Unintentional Suffocation	3,402	6.5%
Adverse Effects	1,628	3.1%
Unintentional Poisoning	1,581	3.0%
Unintentional Fire/burn	1,073	2.0%
Unintentional Natural/ Environment	825	1.6%
Suicide Poisoning	751	1.4%
All Others	4,952	9.4%

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

Falls in the US- Older adults

- Increase in ED visits
  - Non-fatal injuries, disposition= Treated & Released
  - 2001: 1,257,602
  - 2012: 1,668,285
- Increase in hospitalizations
  - Non-fatal injuries, disposition = Hospitalized
  - 2001: 340,212
  - 2012: 655,923
- Increase in deaths
  - 2001: 11,623
  - 2011: 22,901

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

Falls in Midwest

- 7,032 unintentional fall deaths in 2011
- Leading cause of injury death among 65+
  - 5,966 unintentional fall deaths in 2011
- Increase in older adult deaths
  - 2001:3,411
  - 2011:5,966

***Midwest: IA IL IN KS MI MN MO ND NE OH SD WI

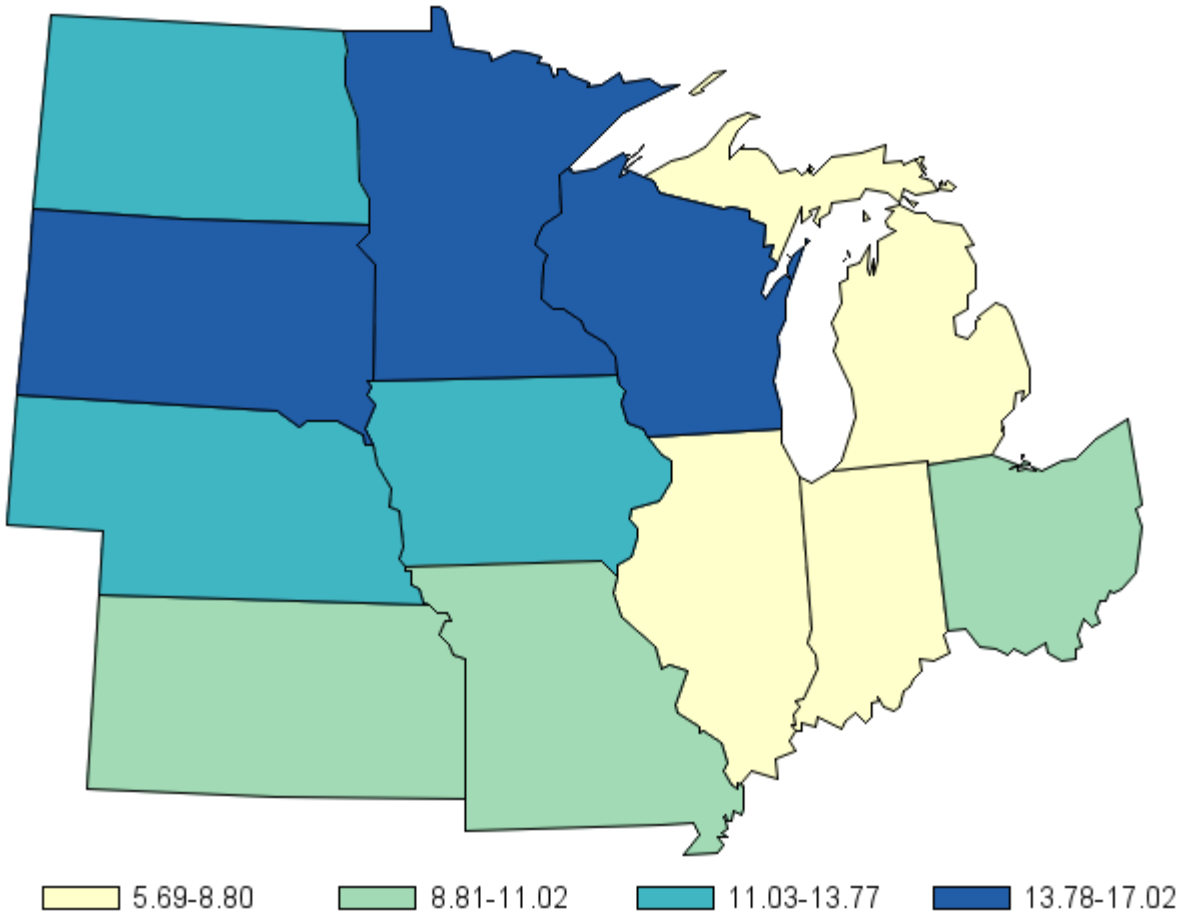
2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.[illegible]/injury/wisqars/index.html.

10 Leading Causes of Injury Deaths, Midwest, 2011

Cause of Death	Number of Deaths	Percentage of All Deaths in Age Group
All Injury Deaths	41,887	100.0%
Unintentional Poisoning	7,631	18.2%
Unintentional Fall	7,032	16.8%
Unintentional MV Traffic	6,802	16.2%
Suicide Firearm	4,043	9.7%
Homicide Firearm	2,391	5.7%
Suicide Suffocation	2,362	5.6%
Unintentional Suffocation	1,634	3.9%
Unintentional Unspecified	1,441	3.4%
Suicide Poisoning	1,415	3.4%
Undetermined Poisoning	733	1.7%
All Others	6,403	15.3%

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

Fall Death Rates per 100,000 Population, Midwest, 2008–2010



*crude rates

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

10 Leading Causes of Injury Deaths age 65+, Midwest, 2011

Cause of Death	Number of Deaths	Percentage of All Deaths in Age Group
All Injury Deaths	12,570	100.0%
Unintentional Fall	5,966	47.5%
Unintentional MV Traffic	1,365	10.9%
Unintentional Unspecified	1,180	9.4%
Suicide Firearm	855	6.8%
Unintentional Suffocation	807	6.4%
Adverse Effects	400	3.2%
Unintentional Poisoning	310	2.5%
Unintentional Fire/burn	257	2.0%
Unintentional Natural/ Environment	227	1.8%
Unintentional Other Spec., NEC[N]	158	1.3%
All Others	1,045	8.3%

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.[illegible]/injury/wisqars/index.html.

Costs due to falls: 2005

- 2005 cost of falls deaths: $1.48 Billion
  - 5,289 deaths
- 2005 cost of falls-related hospitalizations: $39.9 Billion
  - 719,020 hospitalizations
- 2005 cost of falls-related ED visits: $29.1Billion
  - 7,174,537 treated & released ED visits

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

Falls in Indiana

- 146,812 ED visits in 2013
  - 146,692 were unintentional falls
- 10,523 hospital admissions in 2013
  - 10,467 were unintentional falls
- 418 fall deaths in 2012
- 5,620 hip fracture hospitalizations among older adults

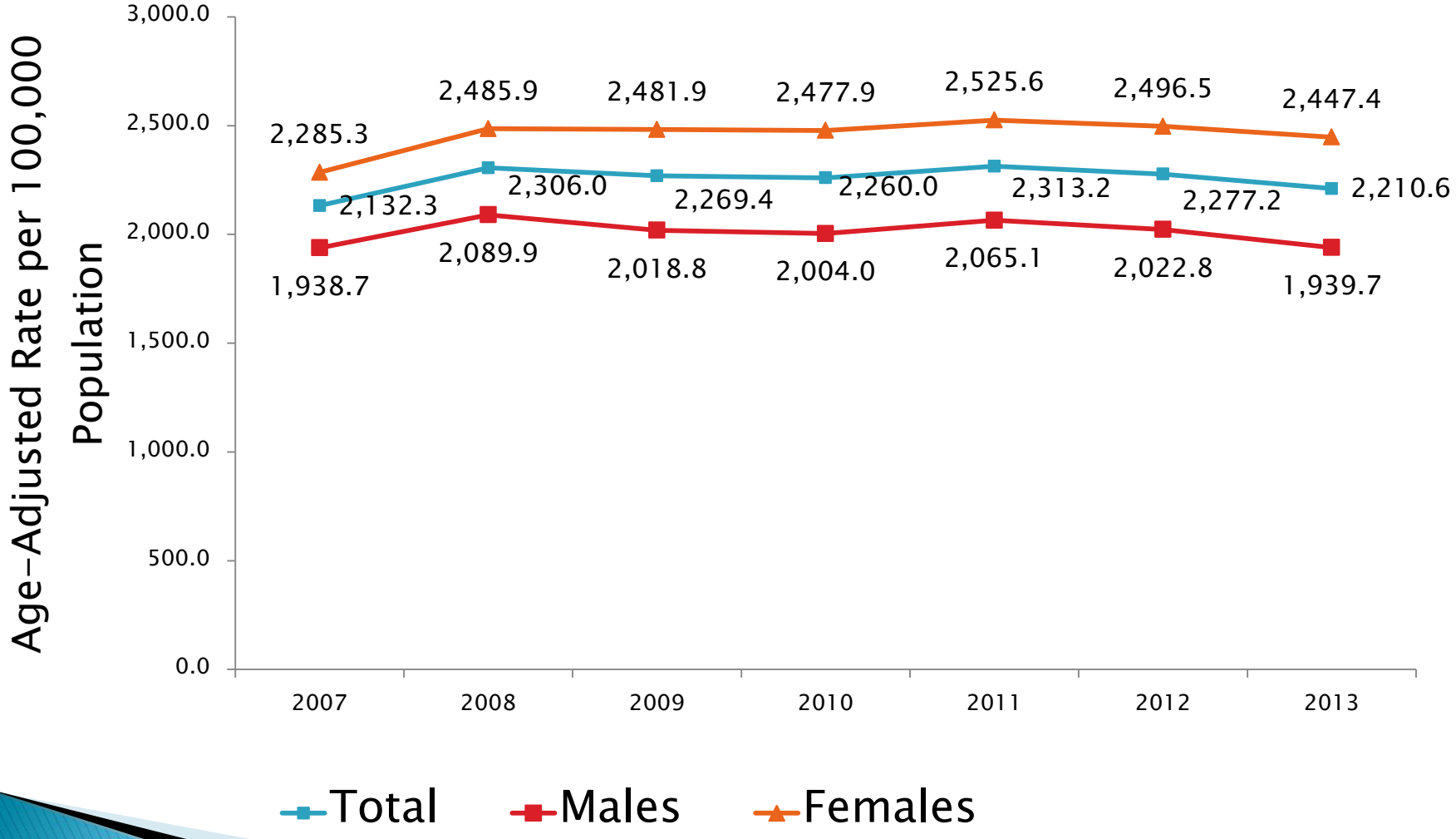
17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.

Falls in the Indiana

- Increase in unintentional fall deaths
  - 1999: 245 deaths at rate of 4.17 per 100,000
  - 2012: 414 deaths at rate of 5.68 per 100,000
- Expected to increase as Indiana's population ages

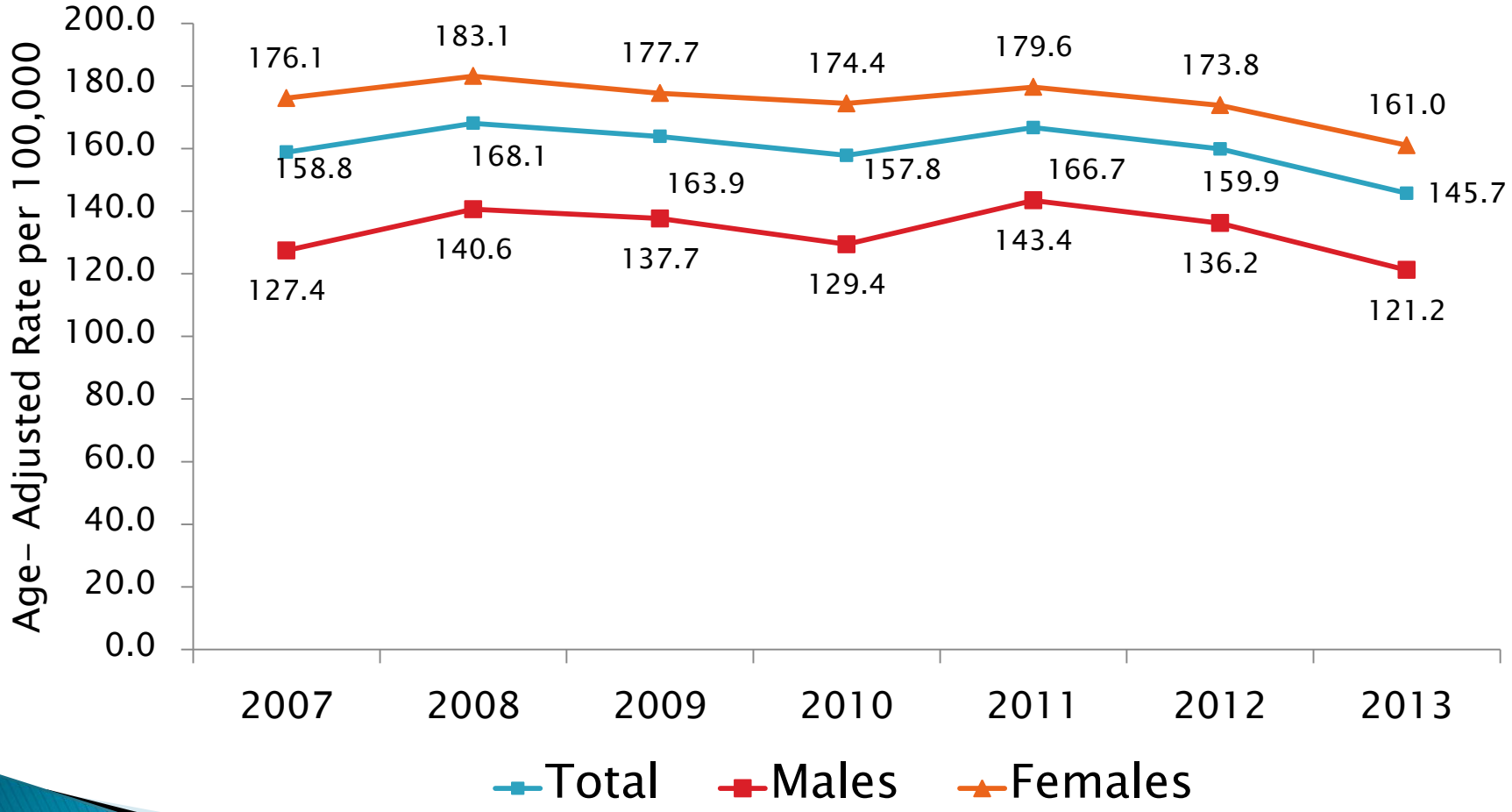
2) CDC. *Web-based Injury Statistics Q[illegible]d Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.[illegible]/injury/wisqars/index.html.

Fall-related ED Visits, Indiana, 2007-2013



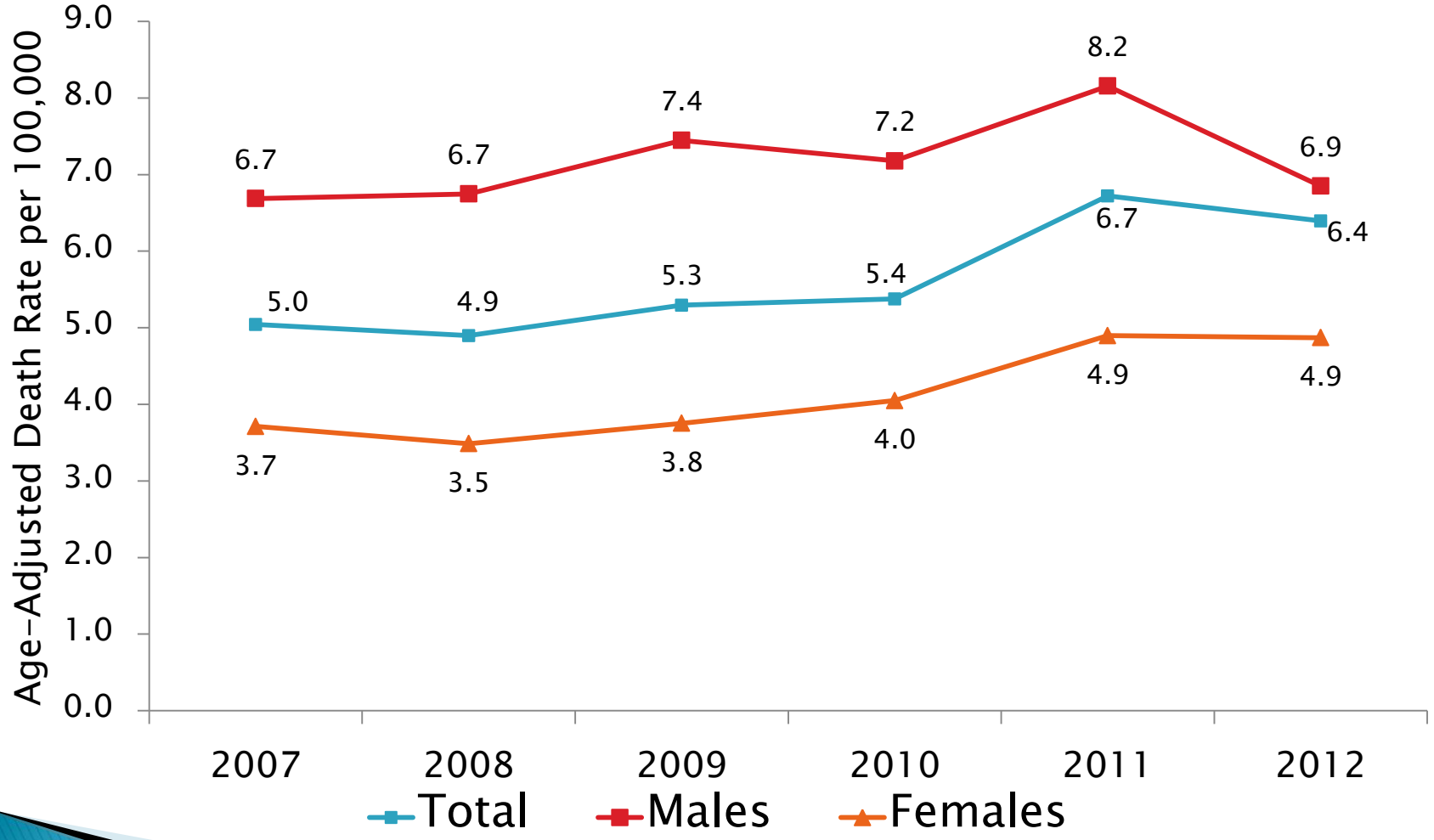
17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.
Figure by Division of Trauma and Injury Prevention

Fall-related Hospital Admissions, Indiana, 2007-2013



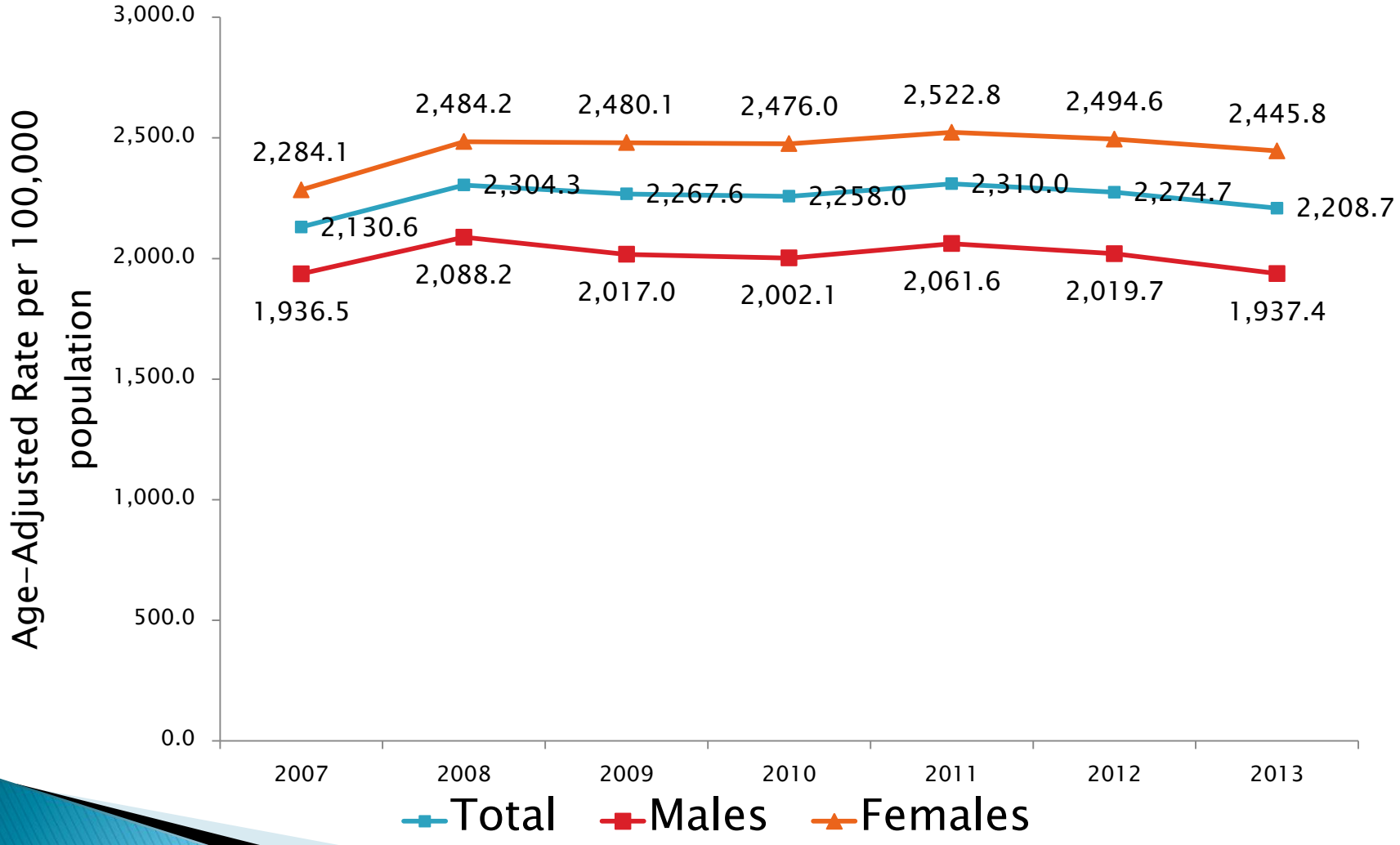
17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.
Figure by Division of Trauma and Injury Prevention

Fall-related Deaths, Indiana, 2007-2012



17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.
Figure by Division of Trauma and Injury Prevention

Unintentional Fall-related ED Visits, Indiana, 2007-2013



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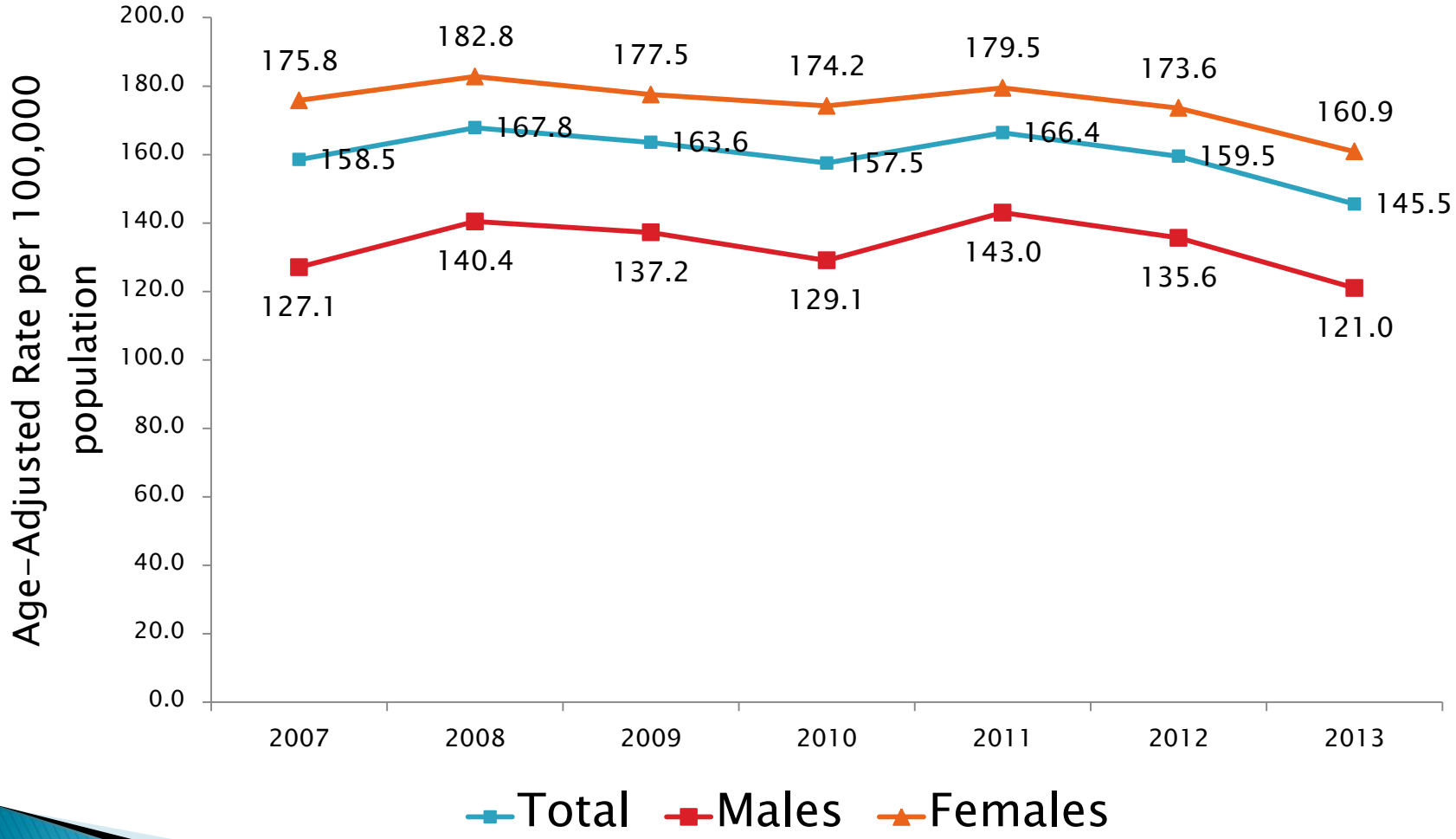

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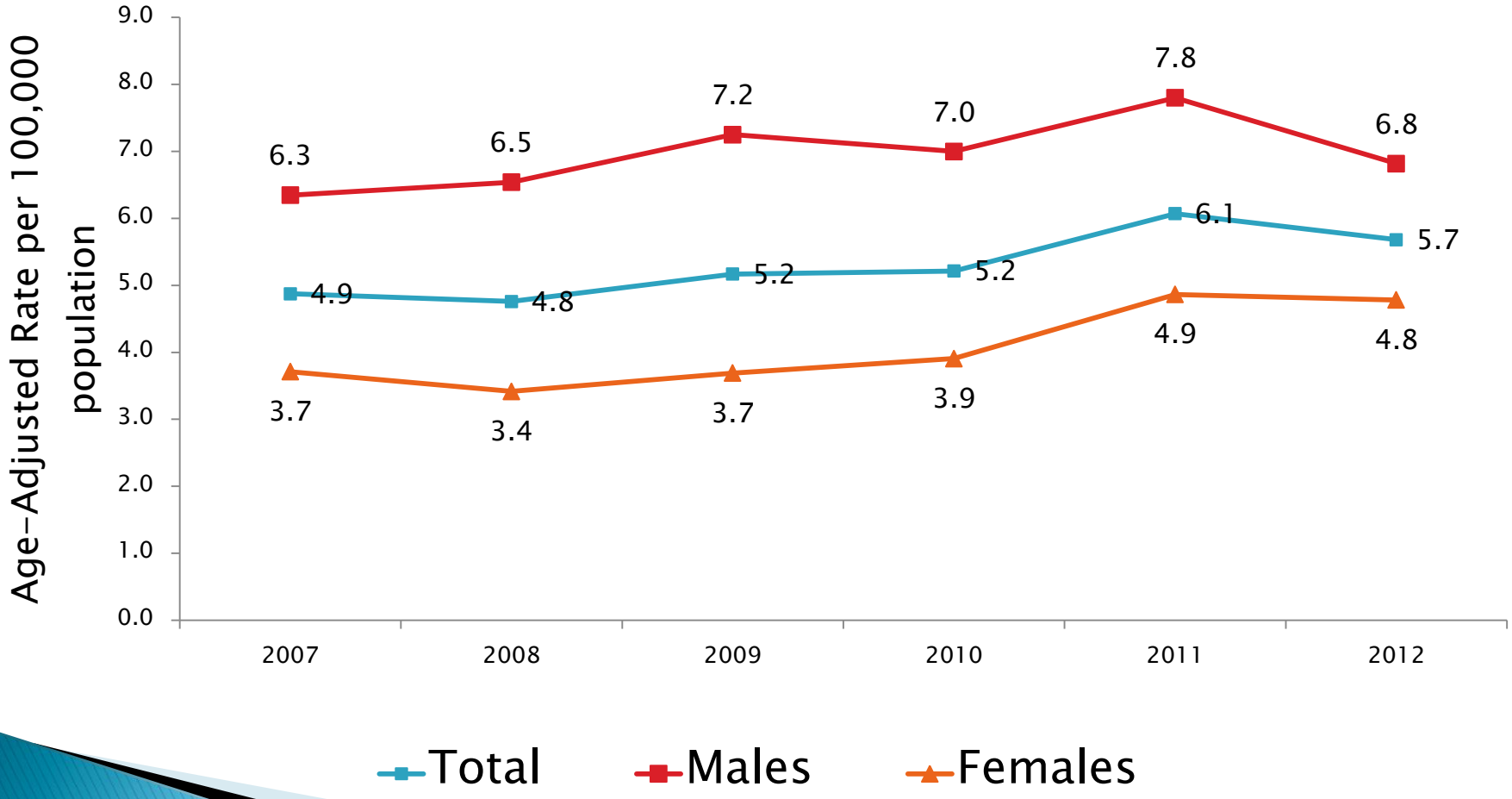
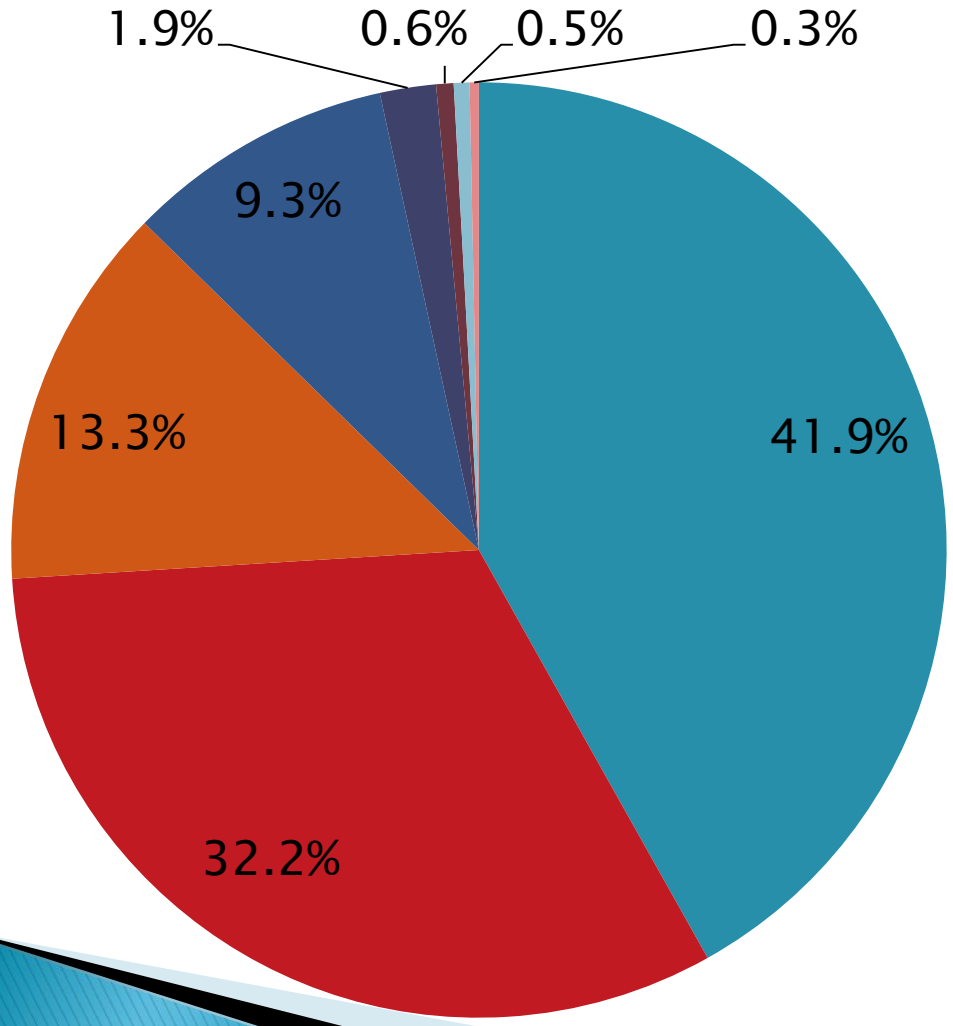
Figure by Division of Trauma and Injury Prevention

Unintentional Fall-related Deaths, Indiana, 2007-2012



17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team. Figure by Division of Trauma and Injury Prevention

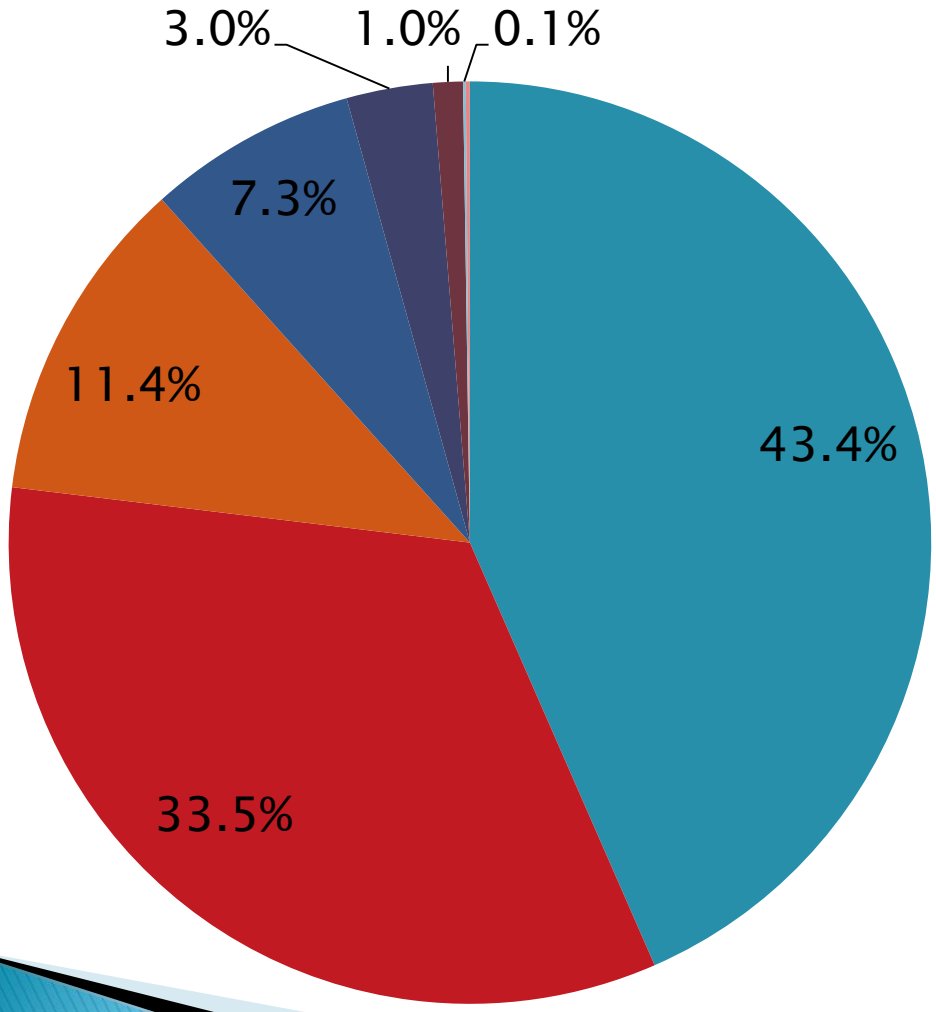
ED Visit for Unintentional Fall by Type, Indiana, 2013



- Other and unspecified
- Same level from slipping, tripping, or stumbling
- One level to another
- Stairs or steps
- Ladders or scaffolding
- Same level from collision, pushing, or shoving
- Hole or other opening in surface
- Building or other structure

17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team. Figure by Division of Trauma and Injury Prevention

Hospital Admissions for Unintentional Fall by Type, Indiana, 2013



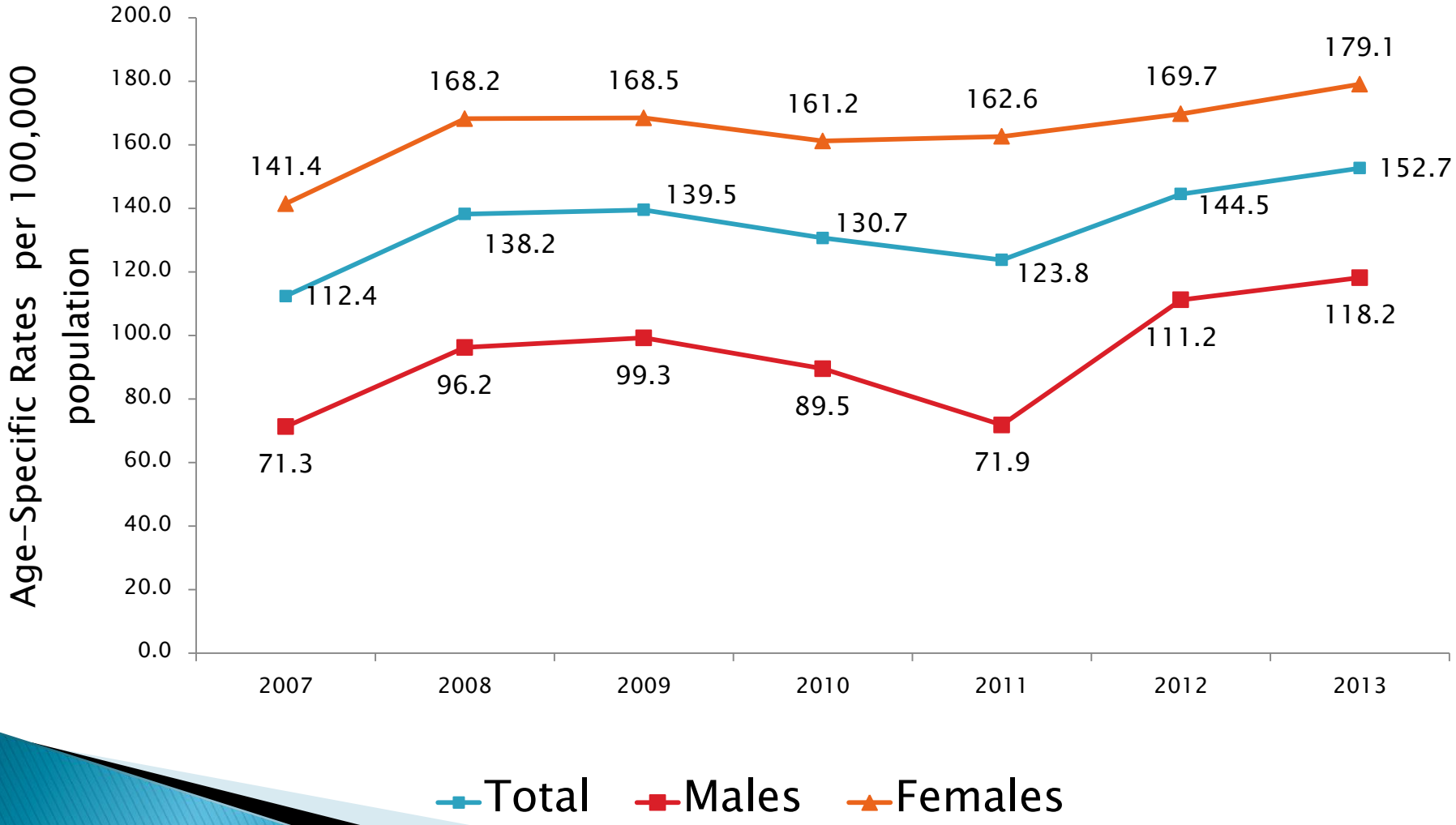
17) Indiana State Department of Health, [illegible]miology Resource Center, Data Analysis Team. Figure by Division of Trauma and Injury Preven[illegible]

Hip Fractures

- More than 95% of hip fractures caused by fall
- Women more likely to sustain hip fracture[2,17]
- One out of five hip fractures patients dies within a year of injury[18]

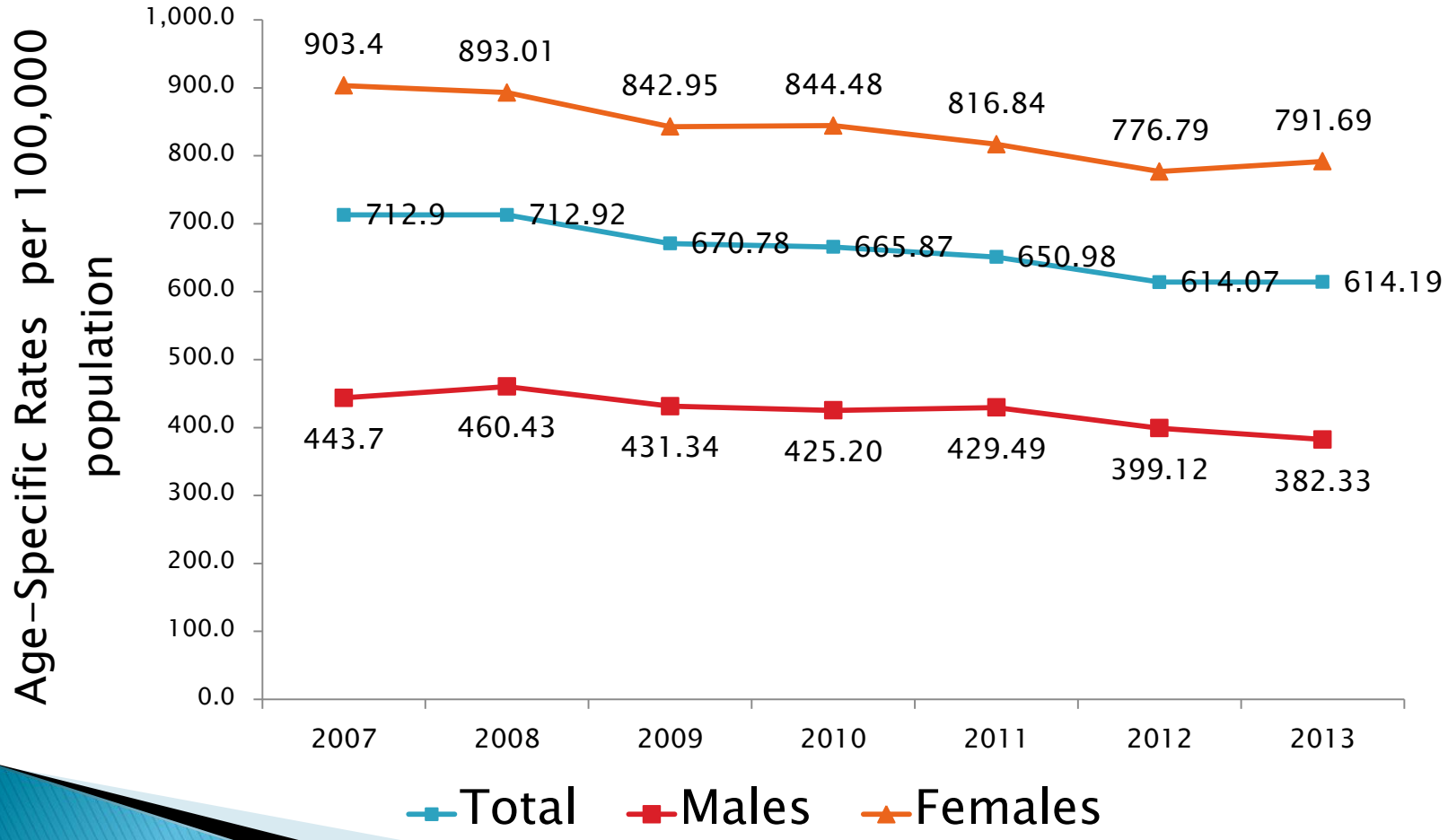
2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2014). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.
17) Indiana State Department of Health. Epidemiology Resource Center, Data Analysis Team.
18) Farahmand BY, Michaelsson K, Ahlbom A, Ljunghall S, Baron JA, Swedish Hip Fracture Study Group. Survival after Hip Fracture. Osteoporosis International. 2005;16(12):1583-

Age-Specific Rate of hip fracture ED visits in 65+, Indiana, 2007-2013



17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.
Figure by Division of Trauma and Injury Prevention

Age-Specific Rate of hip fracture hospital admission in 65+, Indiana, 2007-2013



17) Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.
Figure by Division of Trauma and Injury Prevention

Falls Prevention

- Evidence-Based Prevention & Best Practices

Role of Public Health

- Describe the magnitude of the problem by collecting data
- Study risk and protective factors
- Identify the economic impact of injury as a basis for benefit/cost analyses for interventions
- Promote prevention measures and policies
- Monitor and evaluate interventions
- Advocate for more attention to fall prevention
- Strengthen emergency response services

Why Prevent Falls?

- Falls can be devastating
- Falls can be deadly
- Falls are costly
- Falls are preventable

4 E's of Injury Prevention

- Education
- Enactment/Enforcement
- Engineering
- Economic incentives and penalties

Children

- CDC Campaign: Protect the Ones You Love: Child Injuries are Preventable

- Falls are the leading cause of non-fatal injuries for all children ages 0 to 19
  - Playground safety
  - Home safety
  - Sports safety
  - Supervision

http://www.cdc.gov/SafeChild/Falls/

Child Home Safety

- Teach children to wear safety gear
  - Helmets, knee pads, and elbow pads-each time they ride their bikes, scooters, and other wheeled toys
- Secure a baby gate at the top & bottom of stairways
  - Gate should fit snuggly between the walls, not propped up against the stairs
  - Use gate that requires mounting hardware, not pressure-fit at top of stairs
- Window screens will not prevent falls
  - Install safety latches on all windows above ground level.
  - Keep furniture and other objects that can be used for climbing away from windows.

19) Riley Hospital for Children, 2012 The [illegible] a Safe Home: Preventing the five most common childhood home injuries.

Child fall prevention programs

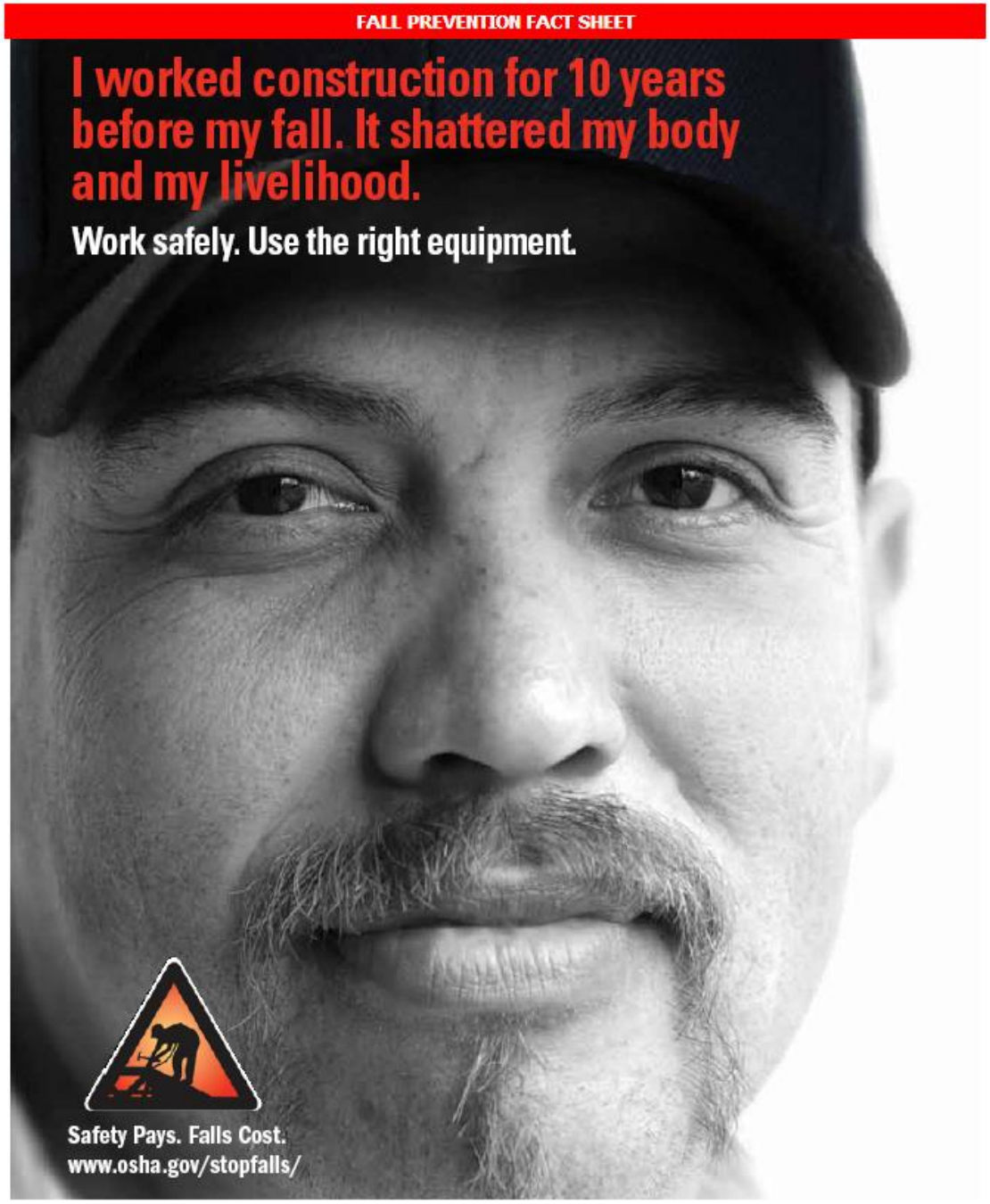
- Children's Hospital Safety From Falls Initiative
  - One to one family education following hospitalization
- Stop the Falls
  - Education to stop window falls
- Safe Play
  - Playground renovation project
- TRIP Program
  - Trauma Related Injury Prevention for elementary school students
- Safer Homes Initiative
  - Home safety assessments in high-risk, low income families

Falls Prevention in the workplace

- Plan ahead to get the job done safely
- Provide the right equipment
- Train everyone to use the equipment safely

Fall Prevention in Construction

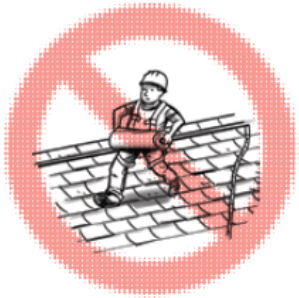
- OSHA's National Fall Prevention Stand-Down
  - Safety Stand-Down a voluntary event for employers to talk with employees about safety
  - Raise awareness of preventing fall hazards in construction
  - 269 construction fatalities in 2012



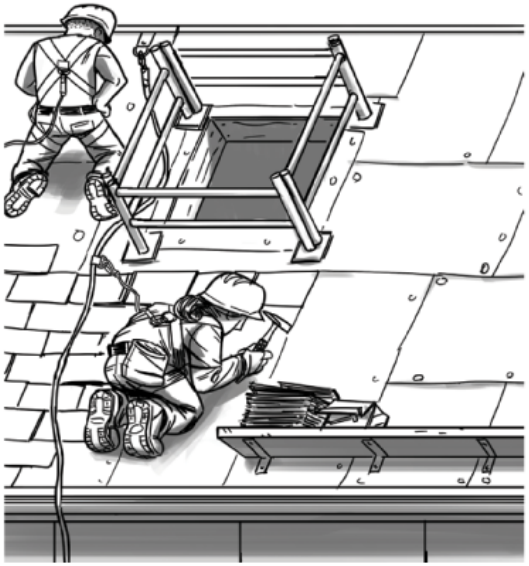
PLAN ahead to get the job done safely. **PROVIDE** the right equipment. **TRAIN** everyone to use the equipment safely.

FALLS FROM ROOFS CAN BE PREVENTED!

- ☑ Wear a harness and always stay connected
- ☑ Make sure your harness fits
- ☑ Use guardrails or lifelines
- ☑ Inspect all fall protection equipment before use
- ☑ Guard or cover all holes, openings, and skylights



DON'T
disconnect from the lifeline



DON'T
work around unprotected openings or skylights

DON'T
use defective equipment

PLAN ahead to get the job done safely.

PROVIDE the right roof equipment.

TRAIN everyone to use the equipment safely.

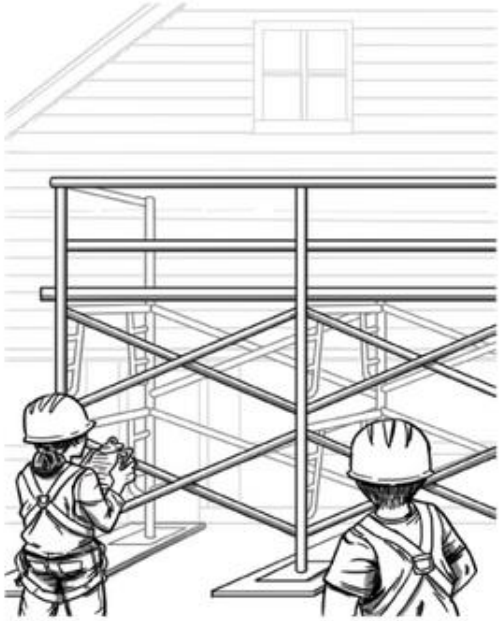
OSHA® Occupational Safety and Health Administration
1-800-321-OSHA (6742) • TTY 1-877-889-5627
www.osha.gov
NIOSH 2012-142 / OSHA 3533-04 2012

FALLS FROM SCAFFOLDS CAN BE PREVENTED!

- ☑ Use fully planked scaffolds
- ☑ Ensure proper access to scaffold
- ☑ Plumb and level
- ☑ Complete ALL guardrails
- ☑ Ensure stable footing
- ☑ Inspect before use (by competent person)

DON'T
use a ladder on top of a scaffold

DON'T
stand on guardrails



DON'T
climb on the cross-braces

PLAN ahead to get the job done safely.

PROVIDE the right roof equipment.

TRAIN everyone to use the equipment safely.

FALLS FROM LADDERS CAN BE PREVENTED!

- ☑ Choose the right ladder for the job
- ☑ Maintain three points of contact
- ☑ Secure the ladder
- ☑ Always face the ladder
- ☑ Guard or cover all holes, openings, and skylights

PLAN ahead to get the job done safely.

PROVIDE the right roof equipment.

TRAIN everyone to use the equipment safely.

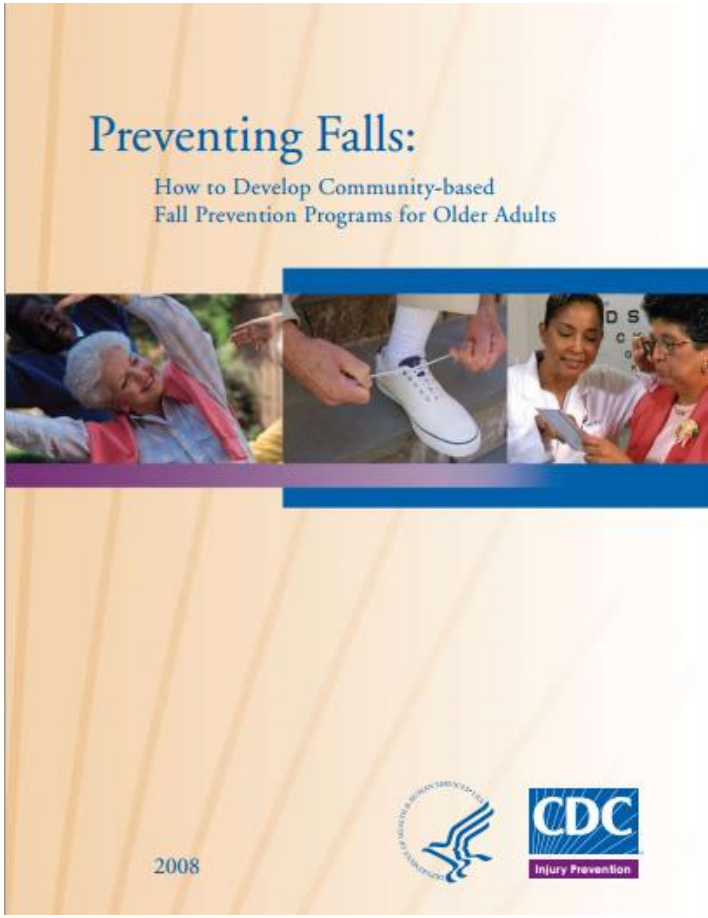
DON'T
stand on top or on the top step of a stepladder

DON'T
overreach

DON'T
place the ladder on unlevel footing

Preventing Falls: How to develop community-based fall prevention programs for older adults

- Education
- Exercise programs
- Medication management
- Vision checking & improvement
- Home hazard assessment & modification



10) National Center for Injury Prevention and Control. Preventing falls: How to develop community-based fall prevention programs for older adults. Atlanta, GA: Centers for Disease Control and Prevention. 2008

Older Adults

1) Exercise regularly
   - Tai Chi
   - Stepping on Fall Prevention
   - Otago
2) Screen by physician
   - STEADI tool-kit
3) Improve home safety
   - Improve lighting, reduce tripping hazards, add grab bars and railings to home
4) Avoid harmful medication combinations
   - Avoid being dizzy, drowsy, confused
5) Have eyes checked regularly

10) National Center for Injury Prevention and Control. Preventing falls: How to develop community-based fall prevention programs for older adults. Atlanta, GA: Centers for Disease Control and Prevention. 2008

Tai Chi for Fall Prevention Program

- Tai Chi increases & improves
- Balance and leg strength
- Mobility & flexibility
- Psychological health: Reduces fear of falling

- To obtain fall prevention benefits
  - Attend Tai Chi classes at least twice a week and participate actively in class
  - Practice Tai Chi regularly for a total of 50 hours or more

20) Sherrington C, Tiedemann A, Fairhall N, Close JCT, Lord S. Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations. *New South Wales Public Health Bulletin.* 2011;22(3-4):78-83.

Stepping on Fall Prevention Program

- 2-hour classes once per week for 7 weeks
- Empowers older adults to carry out health behaviors to:
  - Reduce risk of falls
  - Improve self-management
  - Increase quality of life

- CDC-Approved Multifactorial Approach:
  - Balance & Strength Building
  - Home Environment Safety/ Home modification
  - Management of medication
  - Vision

21) Stepping On Falls Prevention Program. Retrieved from http://www.steppingon.com/

OTAGO: Fall Prevention Program

- Physical Therapist visits patient 4 times during first 2 months at home
  - Booster visit at 6 months
- PT prescribes exercises 3 times/week & walks at least 2 times/week
- Focuses on:
  - Strength training
  - Balance & stability
  - Active range of motion
  - Mobility

22) Campbell, et al. and Robertson, et al. Exercise-based Interventions: The Otago Exercise Programme. Retrieved from http://www.cdc.gov/HomeandRecreationalSafety/Falls/compendium/1.2_otago.html

ROI of Exercise-based Fall Prevention Programs

- Tai Chi Moving for Better Balance
  - $1.60 return for every $1 investment in direct medical costs
- Stepping on Fall Prevention Program
  - $0.70 return on a $1 investment in direct medical costs
- Otago Exercise Program for persons aged 80+ years
  - $1 return on a $1 investment in direct medical costs

24) Communication with Vilma G. Carande-Kulis, February 2009, unpublished CDC study

STEADI Stopping Elderly Accidents, Deaths & Injuries

- Stopping Elderly Accidents, Deaths & Injuries
- Hospital or physician-based Program
- Algorithm adapted from American and British Geriatric Societies' Clinical Practice Guidelines
- Designed by CDC for healthcare providers who treat older adults who may be at risk of falling or have fallen

23) CDC. Stopping Elderly Accidents, Deaths & Injuries (STEADI). Retrieved from: http://www.cdc.gov/homeandrecreationalsafety/steadi/index.html?s_cid=tw_injdir154

STEADI: Integrates Fall Prevention into practice

- Screen all older patients for falls
- Identify modifiable fall risk factors
- Evaluate gait, lower body strength & balance
  - Address identified deficits
- Conduct focused physical exam
  - Address modifiable and/or treatable risk factors
- Assess & manage postural hypotension
- Review & manage medications
- Increase Vitamin D
- Assess visual acuity & refer to specialist
- Address home safety & reduce home fall hazards
- Educate about what causes falls & *What YOU Can Do to Prevent Falls*
- Identify community exercise & fall prevention programs

23) CDC. Stopping Elderly Accidents, Deaths & Injuries (STEADI). Retrieved from: http://www.cdc.gov/homeandrecreationalsafety/falls/steadi/index.html?s_cid=tw_injdir154

Home Modification Interventions: Fall HIT Program

- Home Intervention Team Program
- Focus on assessing & reducing fall hazards

- 2 or more home visits 1.5 hours:
  - Identifies hazards that increase the risk of falling
  - Provided advice about possible changes
  - Offered assistance with home modifications
  - Provided training in using safety devices and mobility aids

- Average fall rate reduce by 31%
  - 2 or more previous fall rate reduce by 37%

25) Nikolaus T, Bach M. Preventing fa[illegible]community-dwelling frail older people using a home intervention team (HIT): Results from the randomized falls-HIT trial. *Journal of the Am[illegible]Geriatrics Society.* 2003 Mar;51(3):300-5.

Fall Prevention Organizations

- Indiana State Department of Health
- Indiana Division on Aging
- Indiana Fall Prevention Coalition
- Midwest Injury Prevention Alliance (MIPA)
- Safe Kids Indiana/ Safe Kids Worldwide
- Occupational Safety & Health Administration
- National Institute for Occupational Safety and Health
- Safe States Alliance
- Centers for Disease Control & Prevention
- National Council on Aging
- Council for State and Territorial Epidemiologists
- Trauma Centers/ hospital based fall programs

References

1) Adapted from Safe States Alliance (Formerly known as State and Territorial Injury Prevention Directors Association (STIPDA)): Safe States, 2003 Edition

2) CDC. *Web-based Injury Statistics Query and Reporting System* (WISQARS) (Online) (2012). National Center for Injury Prevention and Control, CDC. Available from URL: http://www.cdc.gov/injury/wisqars/index.html.

3)Finkelstein EA, Corso PS, Miller TR, Associates. Incidence and Economic Burden of Injuries in the United States. New York, NY: Oxford University Press; 2006.

4) LBFD EMS Education and Quality Management, http://www.lbfdtraining.com/emt.html.

5) Sterling DA, O'Connor JA, Bonadies J. Geriatric falls: injury severity is high and disproportionate to mechanism. Journal of Trauma-Injury, Infection and Critical Care 2001;50(1):116-9.

6) Scheffer AC, Schuurmans MJ, Van Dijk N, Van Der Hoof T. Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. Age and Ageing 2008;37:19-24.

7) Alexander BH, Rivara FP, Wolf ME. The cost and frequency of hospitalization for fall-related injuries in older adults. American Journal of Public Health 1992;82(7):1020-3.

9) Vellas BJ, Wayne SJ, Romero LJ, Baumgartner RN, Garry PJ. Fear of falling and restriction of mobility in elderly fallers. Age and Ageing 1997;26:189-193.

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11) Winn, D., Anderson, C. Understanding and Preventing Child Fall Injuries and Fatalities: The Status of Prevention Efforts in California. University of California, Center for Trauma and Injury Prevention Research. Retrieved from: http://www.ctipr.uci.edu/events/pubs/FallsWhitePaper.pdf

12) Roberson, B.D., Lang, C., Bachim, A. At-risk children of at-risk parents: Assessing Common Injuries to Children of Teenage Parents. The Journal of Pediatrics. 2013. DOI 10.1016/j.jpeds.2013.09.024.

13) Health and Safety Authority. Retrieved from http://www.hsa.ie/eng/Topics/Slips_Trips_Falls/

14) Adams PF, Martinez ME, Vickerie JL, Kirzinger WK. Summary health statistics for the U.S. population: National Health Interview Survey, 2010. Vital Health Stat 2011;10(251).

15) Tromp AM, Pluijm SMF, Smit JH, et al. Fall-risk screening test: a prospective study on predictors for falls in community-dwelling elderly. J Clin Epidemiol 2001;54(8):837-844.

16) Stevens JA, Ballesteros MF, Mack KA, Rudd RA, DeCaro E, Adler G. Gender differences in seeking care for falls in the aged Medicare Population. American Journal of Preventive Medicine 2012;43:59-62

17)Indiana State Department of Health, Epidemiology Resource Center, Data Analysis Team.

18) Farahmand BY, Michaelsson K, Ahlbom A, Ljunghall S, Baron JA, Swedish Hip Fracture Study Group. Survival after Hip Fracture. Osteoporosis International. 2005;16(12):1583-90.

19) Riley Hospital for Children, 2012 The Key to a Safe Home: Preventing the five most common childhood home injuries.

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21) Stepping On Falls Prevention Program. Retrieved from http://www.steppingon.com/

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Questions?

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Balance Exercise Programs

PROGRAM NAME	TAI CHI MOVING FOR BETTER BALANCE	MATTER OF BALANCE	STEPPING ON	OTAG
TARGET POPULATION	≥ 60 years Community, 'healthy'	≥ 60 years Community , fallers or FOF	≥60 years Community, fallers or FOF	>80 or high r Homebound
KEY ASPECTS	Simplified Tai Chi forms- (chair also)	Balance exercises and education	Balance exercises and education	Individually t balance exerc
INSTRUCTOR	ORI certified instructors	Trained lay instructors	Physical Therapists	Physical Ther
PROGRAM FORMAT	2x's/week for 12 weeks, 1 hr group sessions	1x/week for 8 weeks, 2 hr group sessions	1x/week for 7 weeks, 2 hour group	4 PT home vi booster sessi Phone; follow 1 YR
LOCATION	Various locations	OHSU Think First Program	Legacy Emanuel , Providence, PVAMC	Patient's hom through Beyo Clinic PT
REGISTRATION INFORMATION	Class locations/times change frequently; http://healthoregon.o	Kayt Zundel 503-494-5353	Lynne MacMillan, PT at Emanuel (503)413-1605; Chase Katich, PT at Prov. Milwaukie,	Beyond the C 503-496-038 check http://healthor