

The Epidemiology of Traumatic Brain Injury



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National Center for Injury Prevention and Control
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Objectives

- ❑ **Why is CDC involved?**
- ❑ **Traumatic Brain Injury – What is it?**
- ❑ **Epidemiological Data**
- ❑ **Estimated Cost**

Why is CDC involved with TBI?

Congressional Mandates

❑ 1996: TBI Act

- Epidemiology of TBI in the civilian US population

❑ 2000: Children's Healthcare Act

- Determine appropriate methodology to measure the incidence and prevalence of mTBI in the US

❑ 2008: TBI Reauthorization Act

- Includes requests for CDC to prepare 2 reports to Congress regarding returning military personnel and rehabilitation of civilians with TBI

What Is a Traumatic Brain Injury (TBI)?

A TBI is a brain injury caused by a bump, blow, or jolt to the head, or a penetrating head injury that disrupts the normal function of the brain



Traumatic Brain Injury

IN THE UNITED STATES

Emergency Department Visits,
Hospitalizations and Deaths 2002–2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



www.cdc.gov/TraumaticBrainInjury

Public Health Burden of TBI in the United States: 1.7M TBIs Annually



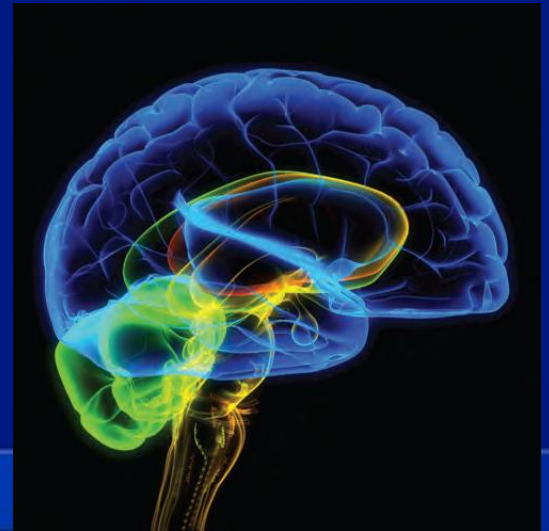
Faul, M et al. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2010

Public Health Burden of TBI: Changes from Previous Report

	1995-2001 Report	2002-2006 Report
ED Visits	1,111,000	1,365,000
Hospitalizations	235,000	275,000
Deaths	50,000	52,000

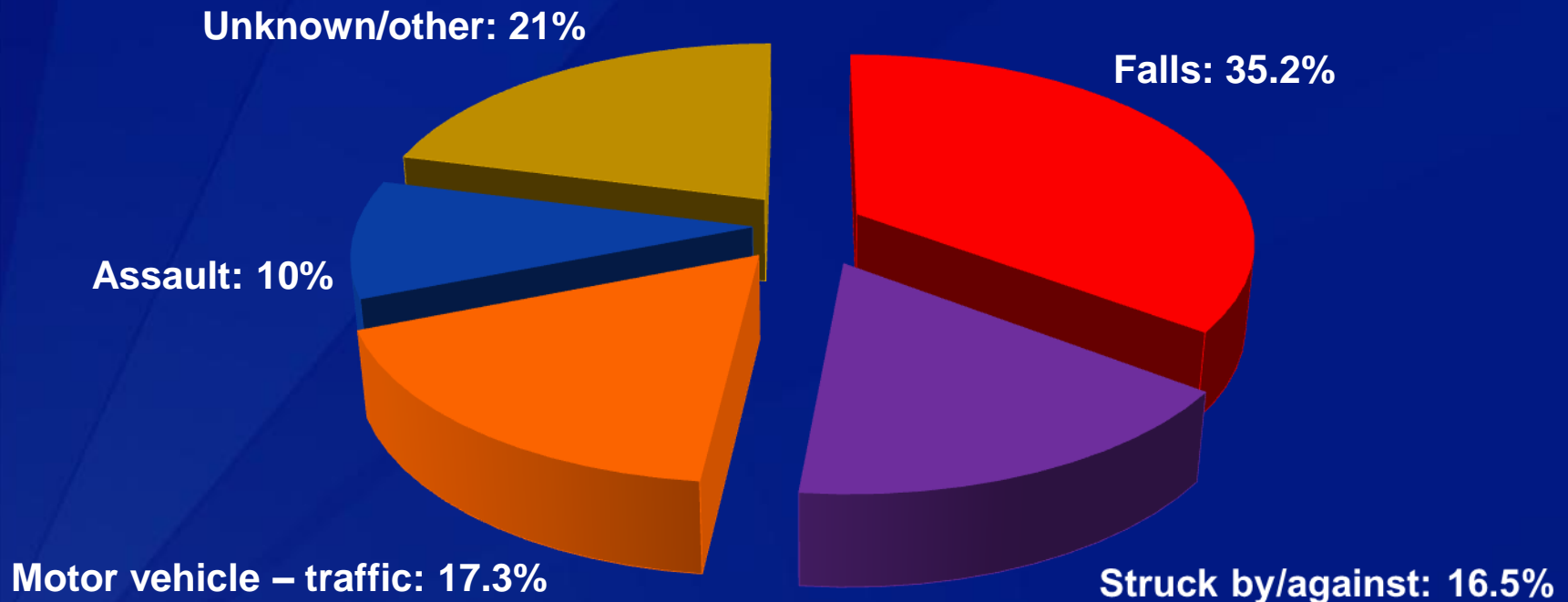
Public Health Burden of TBI

- ❑ **At least 3 TBIs are sustained every 1 minute**
- ❑ **Males are 3 times more likely to die of TBI than females**
- ❑ **5.3 million people are living with a TBI-related disability**

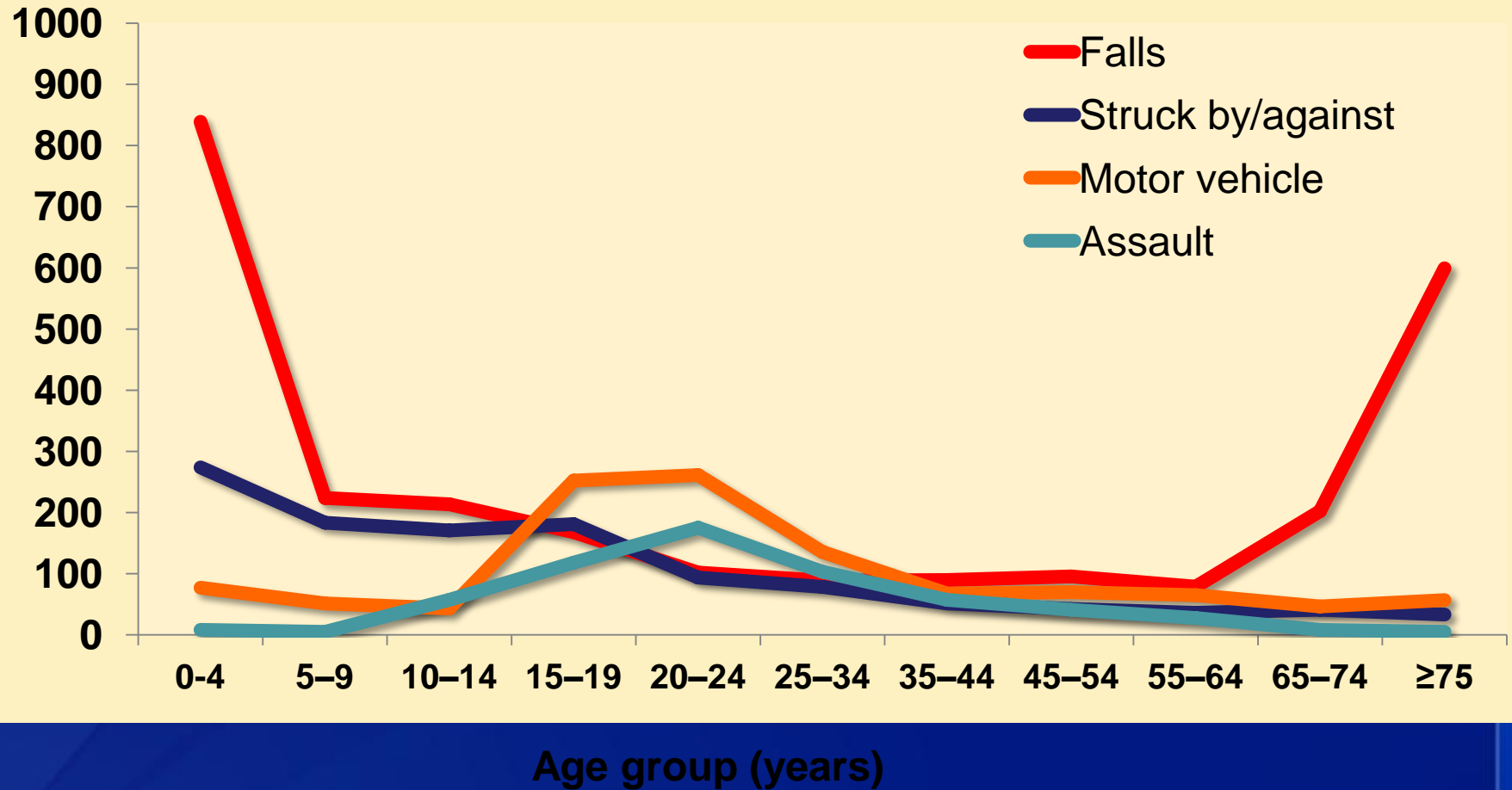


Causes of TBIs

Estimated Average Percentage of Annual TBI by External Cause
United States, 2002–2006



Causes of TBIs



Faul, M et al. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2010

TBI Public Health Burden

- ❑ **Approximately 511,000 TBIs occur among children aged 0 to 14 years**
 - ED visits account for more than 90% of TBIs
- ❑ **Falls are the leading cause of TBI**
 - Highest rates:
 - Children ages 0 to 4 years
 - Older adults ages 65 years and older
- ❑ **TBI rates are higher for males than for females**
- ❑ **Motor vehicle-traffic (MVT)**
 - Leading cause of TBI-related death
 - Highest rate: 20-24 years old

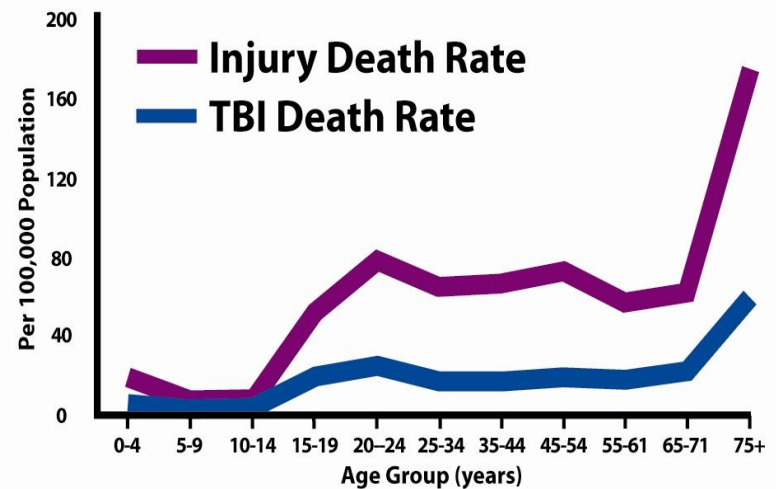
- TBI is a contributing factor in 30% of *All Injury Deaths* in the U.S.



INJURY *and*

Traumatic Brain Injury-Related Death Rates

by Age, United States



SOURCES: CDC. Mortality data, multiple cause-of-death public-use data files, 2006 data. Available at http://www.cdc.gov/nchs/products/elec_prods/subject/mortmcd.htm.
CDC. WISQARS injury mortality reports, 1999–2006. Available at http://webapp.cdc.gov/sasweb/ncipc/mortrate10_sy.html.

Centers for Disease Control and Prevention

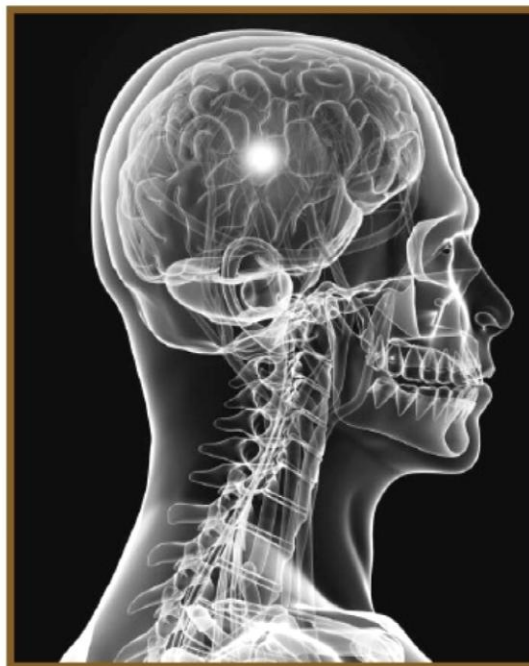
MMWR

Morbidity and Mortality Weekly Report

Surveillance Summaries / Vol. 60 / No. 5

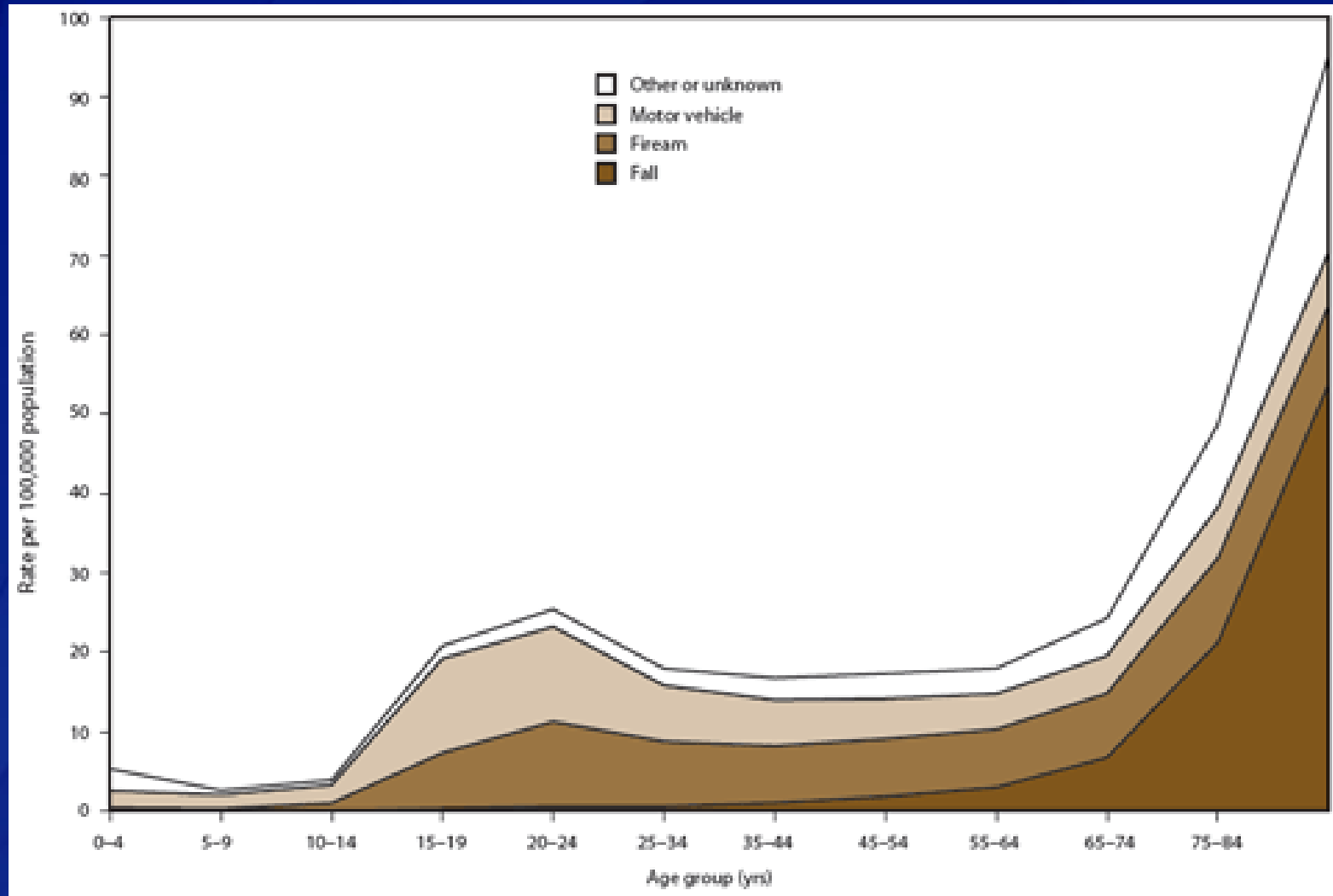
May 6, 2011

Surveillance for Traumatic Brain Injury–Related Deaths — United States, 1997–2007

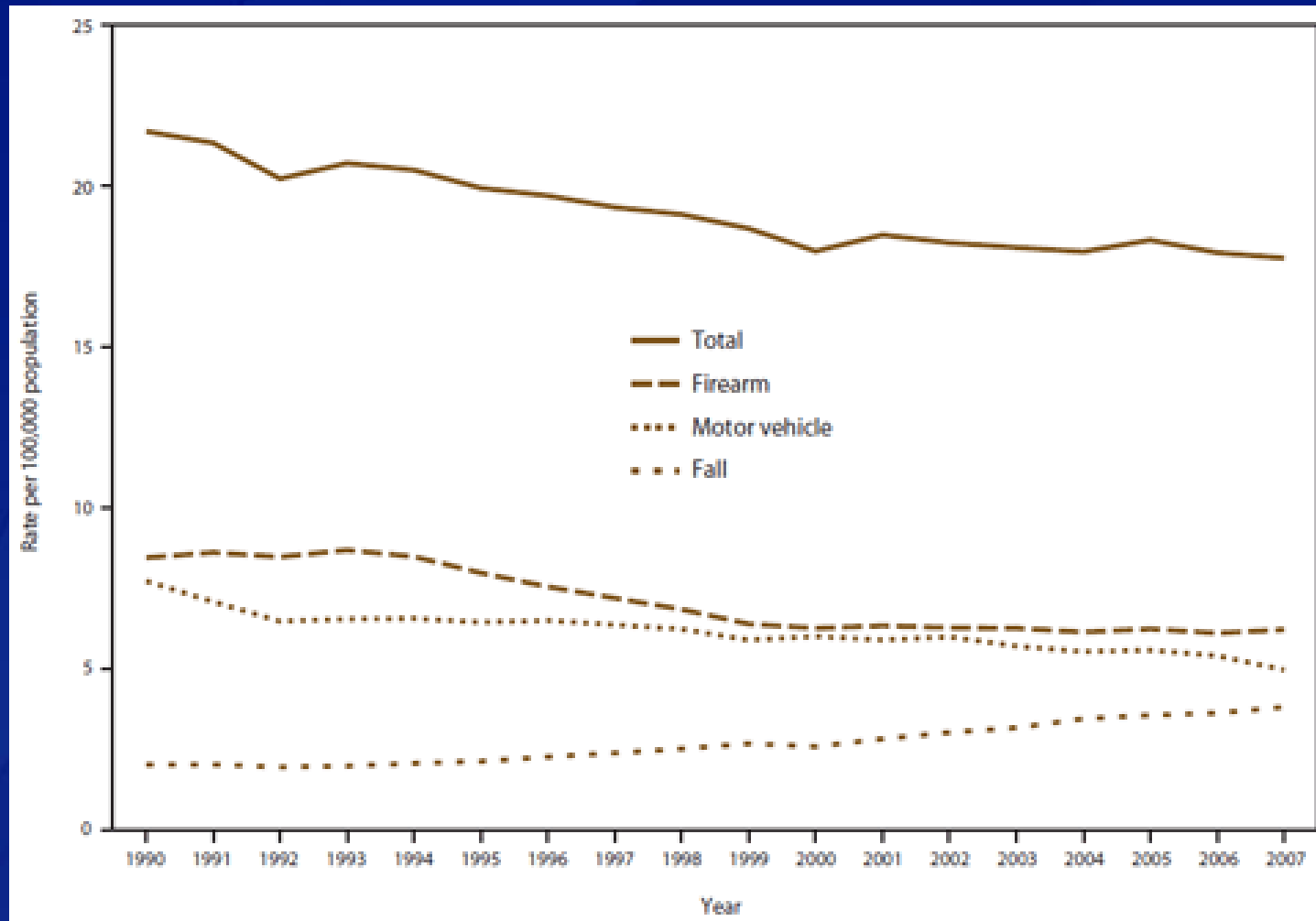


U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Average annual rates for traumatic brain injury deaths, by age group and external mechanism of injury --- United States, 1997--2007



Age-adjusted rates for traumatic brain injury deaths, by year and external mechanism of injury --- United States, 1990--2007



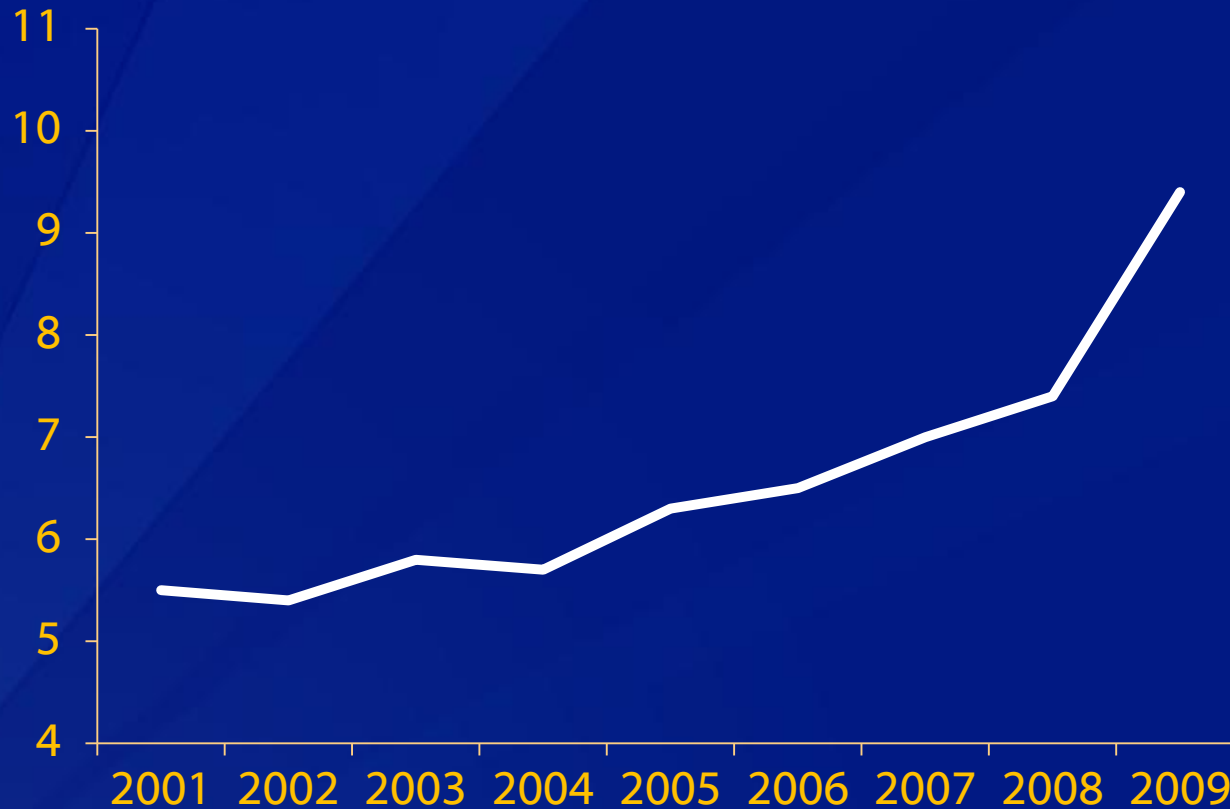
Sports and Recreation-related TBI Epidemiology

- ❑ **57 million engage in sports, exercise, and leisure activities each day**
 - 44 million boys and girls participate in an organized sport annually
 - 7.6 million High School students participated in school sponsored athletics during the 2009-2010 school year
- ❑ **As many as 3.8 million SR-related concussions and more severe TBIs occur in the US each year**

Hot off the Press!

- ❑ **60% increase in ED visits for SR TBI from 2001 to 2009 among children and adolescents (0-19 years old)**
- ❑ **Hospitalizations remained stable**
 - Over 200,000 treated in ED annually
 - 71% of visits were among males
 - 70.5% of visits were among persons aged 10-19 years old

Hot off the Press!



CDC, Gilchrest, J. et al *MMWR* 2011

Centers for Disease Control and Prevention

MMWR

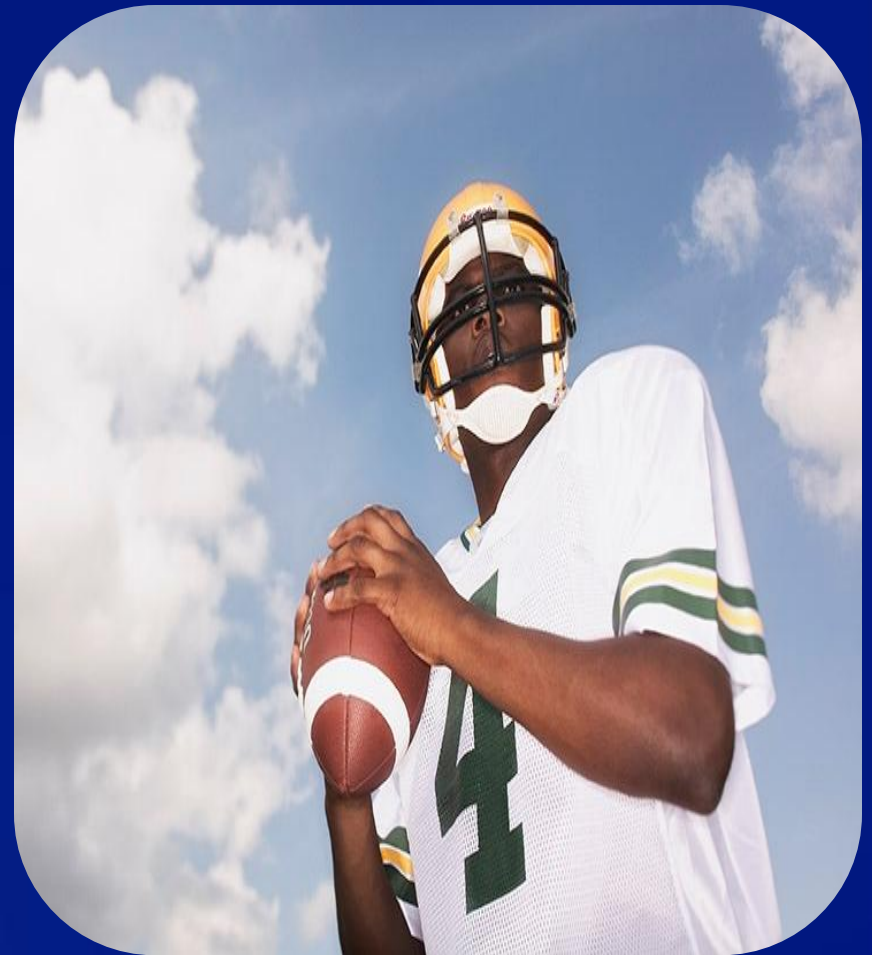
Morbidity and Mortality Weekly Report

Hot off the Press!

- ❑ **Bicycling and playground activities (0-9 years old)**
- ❑ **10-19 year olds**
 - Males: Football or Bicycling
 - Females: Soccer, Basketball, or Bicycling

Top 10: Concussions by sport and recreational activity (0-19 yrs old)

1. Bicycle
2. Football
3. Playground
4. Basketball
5. Soccer
6. Baseball
7. ATV
8. Skate Board
9. Swimming & Diving
10. Hockey



Abusive Head Trauma (AHT)

- ❑ **Serious injury to the head or brain of young children resulting from:**
 - Violent shaking and/or,
 - Blunt impact

- ❑ **Synonyms:**
 - Shaken baby/infant syndrome
 - Shaken impact syndrome
 - Infant whiplash-shake injury syndrome
 - Inflicted TBI
 - Inflicted, non-accidental, or intentional head injury

Epidemiology of AHT-related Death

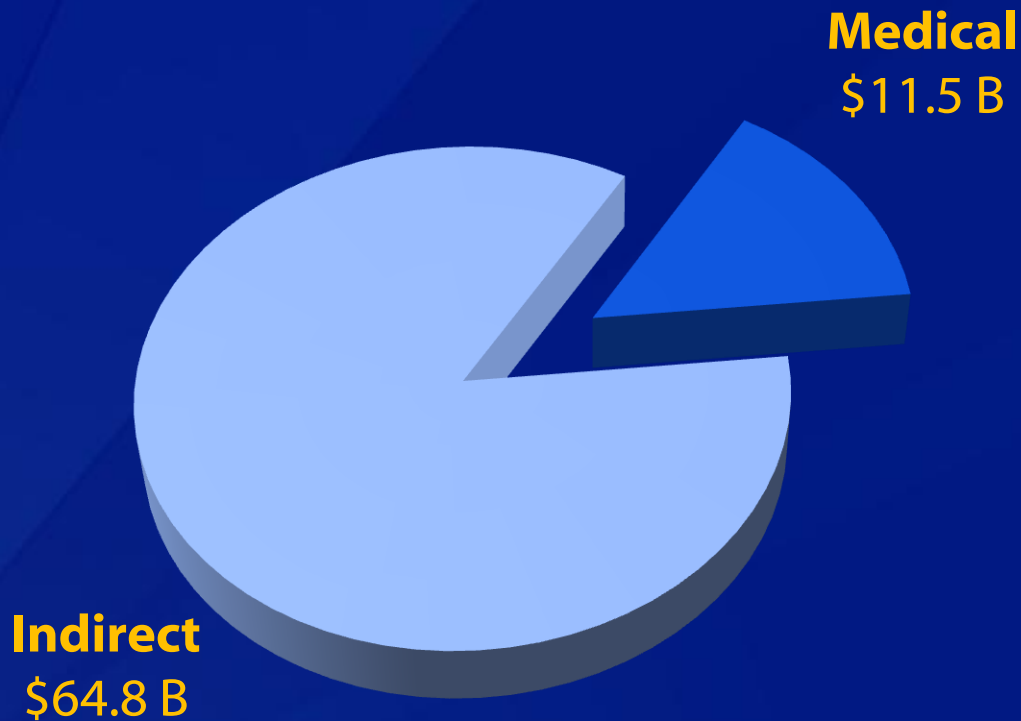
- ❑ **One of the leading causes of child maltreatment-related death**

- ❑ **Who is at risk:**
 - Children < 2 years of age
 - Incidence: 15 to 19 per 100,000
 - Peak incidence: 2-4 months of age

- ❑ **Survivors with no impairment or disability**
 - Only 10-15%

- ❑ **Mortality rate: 13% to 35%**

Estimated Economic Costs of TBI: \$76.3 Billion in 2010



Finkelstein, E et al. The Incidence and Economic Burden of Injuries in the United States. New York (NY): Oxford University Press, 2006
Coronado, VG et al. The epidemiology and prevention of TBI, in press, 2012

Total Lifetime Cost of TBI by Severity

	Total Costs (2011)
Fatal	\$79.5 billion
Hospitalizations	\$23.0 billion
Non-Hospitalizations	\$5.3 billion
Total	\$79.5 billion

Public Health Role in Addressing TBI

Importance of Partnerships

❑ Building partnerships

- ❑ Close gaps and move forward with effective surveillance
- ❑ Develop new interventions
- ❑ Promote the widespread adoption of evidence-based prevention and treatment strategies

❑ Partners

- ❑ Federal agencies
- ❑ State and local health departments
- ❑ National and community organizations
- ❑ Medical community



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**Visit our CDC website for more
information on CDC's TBI activities**

www.CDC.gov/traumaticbraininjury

For more information please contact Centers for Disease Control and Prevention

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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