Traumatic brain injury in rural communities

2024 AgrAbility National Training Workshop

March 27, 2024

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Learning Objectives

1. Provide a brief background on traumatic brain injury (TBI): what is it, how it affects the brain, and common signs and symptoms.

2. Highlight current evidence of disproportionate burden of TBI in rural communities.

3. Identify strategies for reducing TBI disparities in rural communities.

What is traumatic brain injury?

A TBI affects how the brain works

It may be caused by a:

- Bump, blow, or jolt to the head, or
- Penetrating injury (such as from a gunshot) to the head

TBIs can range in severity level.

A TBI during childhood may affect brain development.

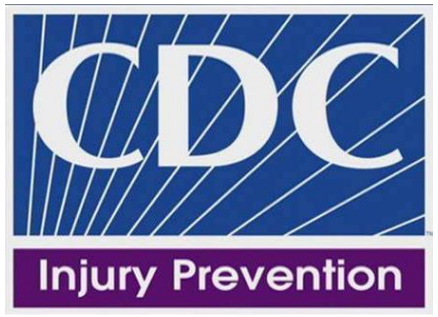
TBI is a major cause of death and disability.

A TBI may lead to short- or long-term health problems.

TBI Priority Areas

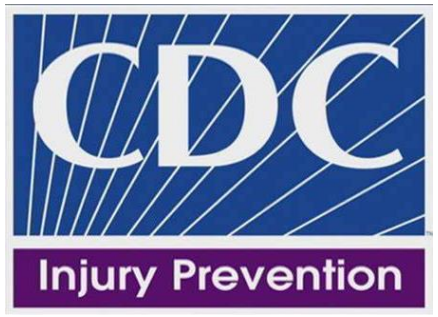
1. Identify effective strategies to prevent youth sports- and recreation-related TBI
2. **Identify and test methods to improve the measurement of TBI burden**
3. Characterize TBI-related disparities and identify strategies to increase health equity
4. Determine effective strategies to improve the diagnosis and management of TBI

TBI BURDEN



TBI surveillance

- Understand public health burden
- Monitor trends in incidence
- Identify groups at greatest risk



TBI surveillance

- Highlights groups experiencing disproportionate impact
- Aids in the development of specialized TBI-focused interventions
- Informs creation of mechanism-based TBI prevention efforts

Hospitalizations

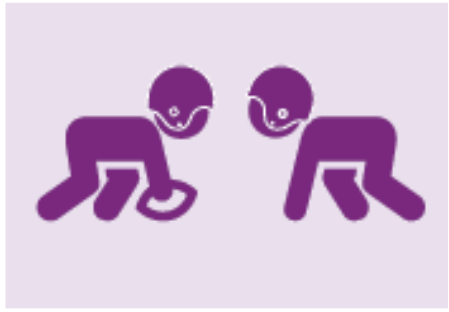
Approximately 214,000 TBI-related hospitalizations in 2020

Deaths

Approximately 69,000 TBI-related deaths in 2021

Source: Centers for Disease Control and Prevention (2023). Traumatic Brain Injury and Concussion. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. https://www.cdc.gov/traumaticbraininjury/index.html. Accessed April 24, 2023.

Common Causes of TBI



Traumatic Brain Injury–Related Emergency Department Visits, Hospitalizations, and Deaths — United States, 2007 and 2013. MMWR. Vol. 66 / No. 9,

So TBI is a big problem, maybe even bigger than we realized.

Is everyone equally affected or equally at risk for TBI?

Is everyone equally affected or equally at risk for TBI?

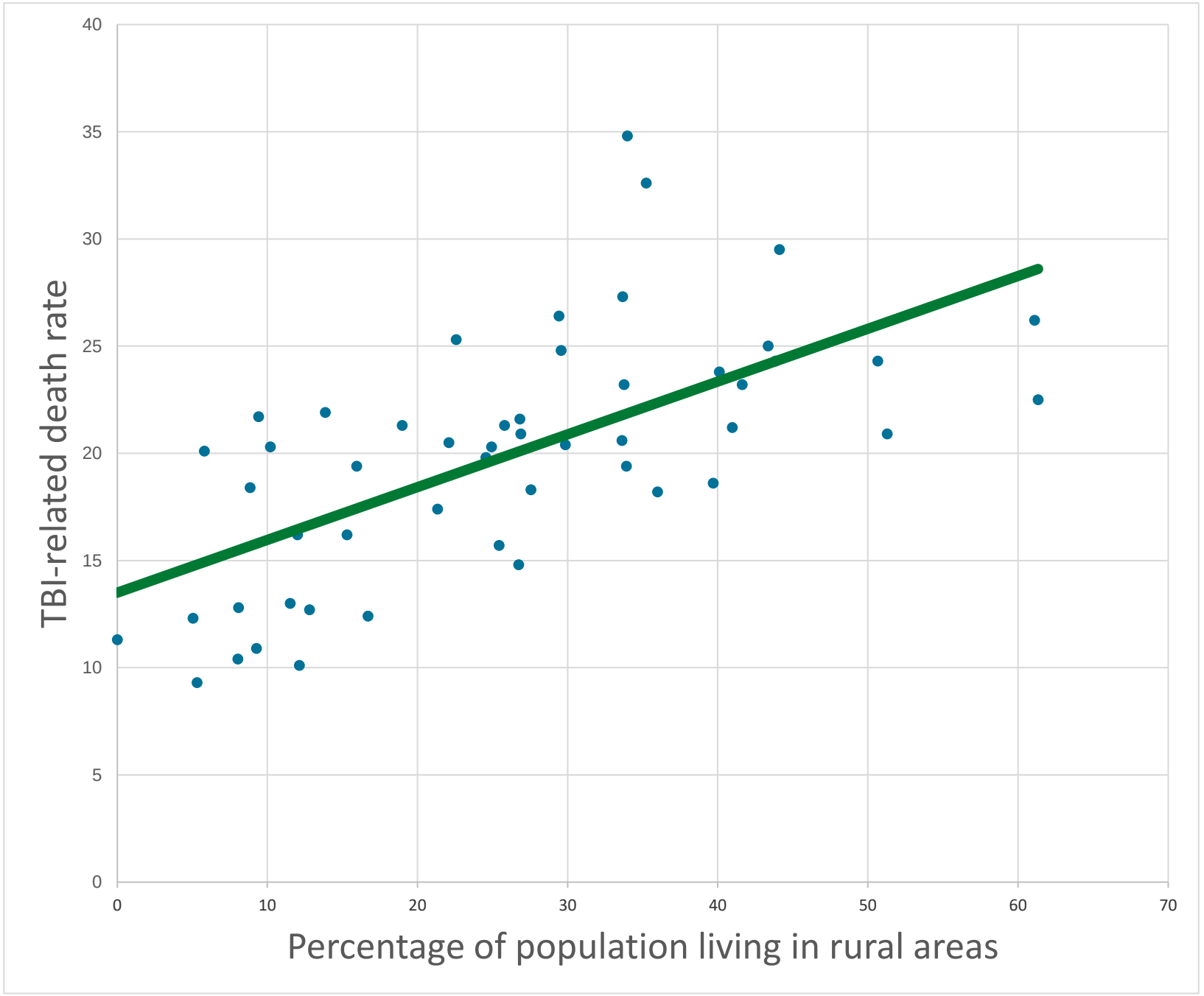
NO!

Let’s talk about TBI-related disparities by urban/rural residence

Rural/urban disparities in TBI incidence, outcomes, and mortality

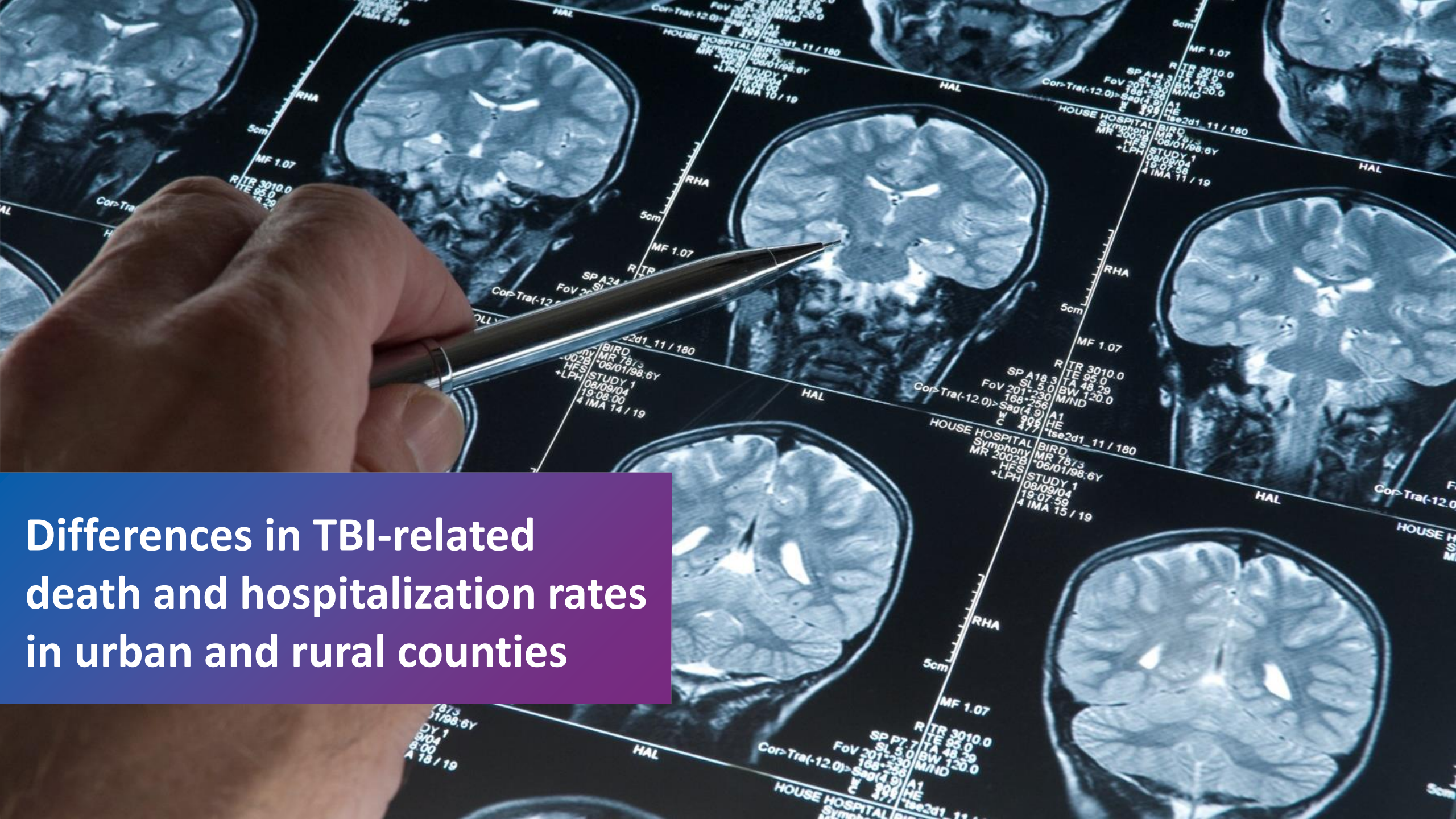
- Evidence suggests that people in rural areas:
  - Are at increased risk of TBI
  - Have higher rates of death due to TBI
  - Have challenges accessing TBI-related services
  - Experience worse outcomes after injury

- Why?
  - Higher cost of care
  - Less access to Level 1 trauma centers and specialized TBI care
  - Further distance to care

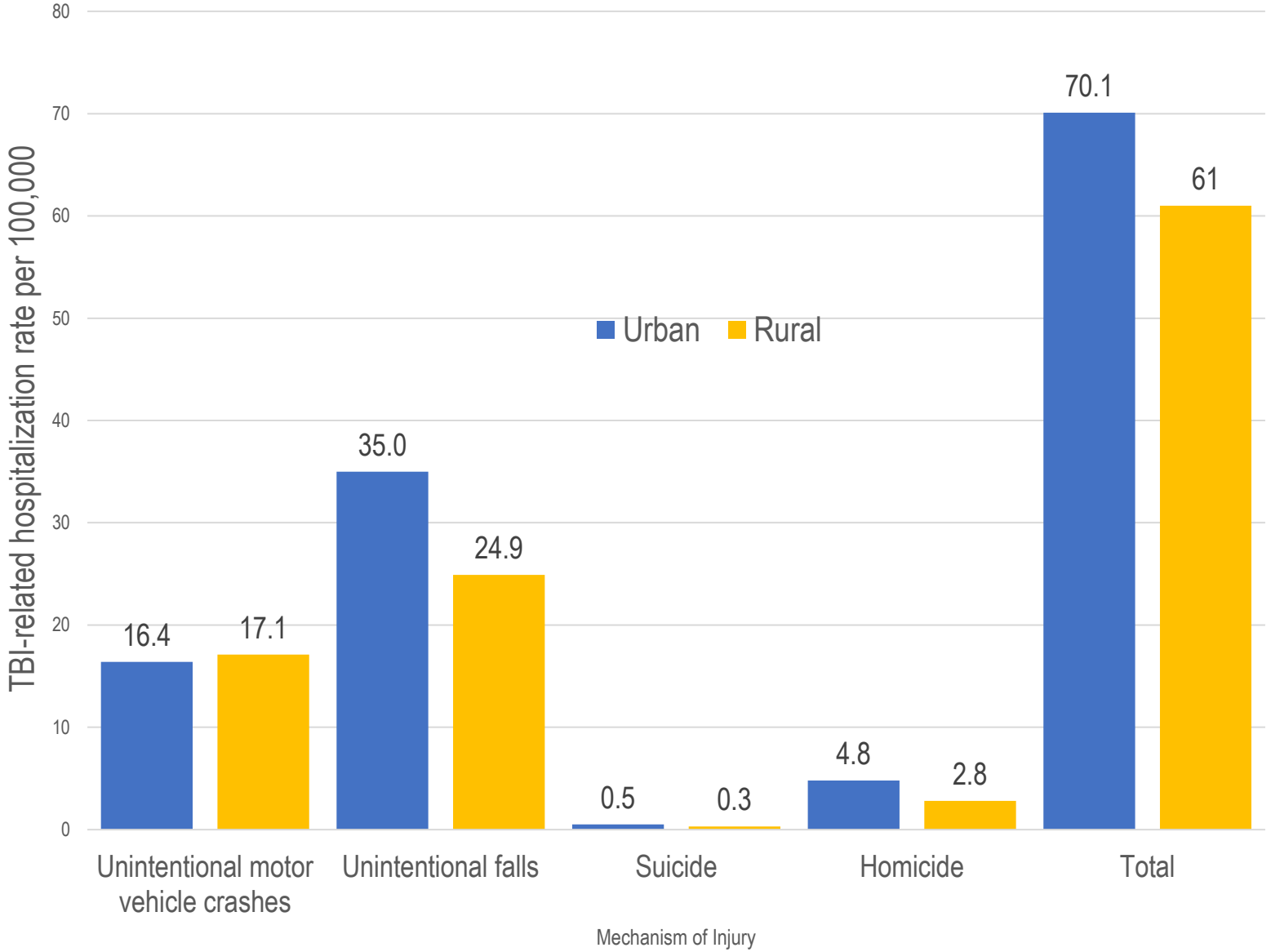


States with higher percentages of rural residents have higher TBI-related death rates

From: Daugherty J, Zhou H, Sarmiento K, Waltzman D. Differences in State Traumatic Brain Injury–Related Deaths, by Principal Mechanism of Injury, Intent, and Percentage of Population Living in Rural Areas — United States, 2016–2018. MMWR Morb Mortal Wkly Rep 2021;70:1447-1452.
DOI: http://dx.doi.org/10.15585/mmwr.mm7041a3



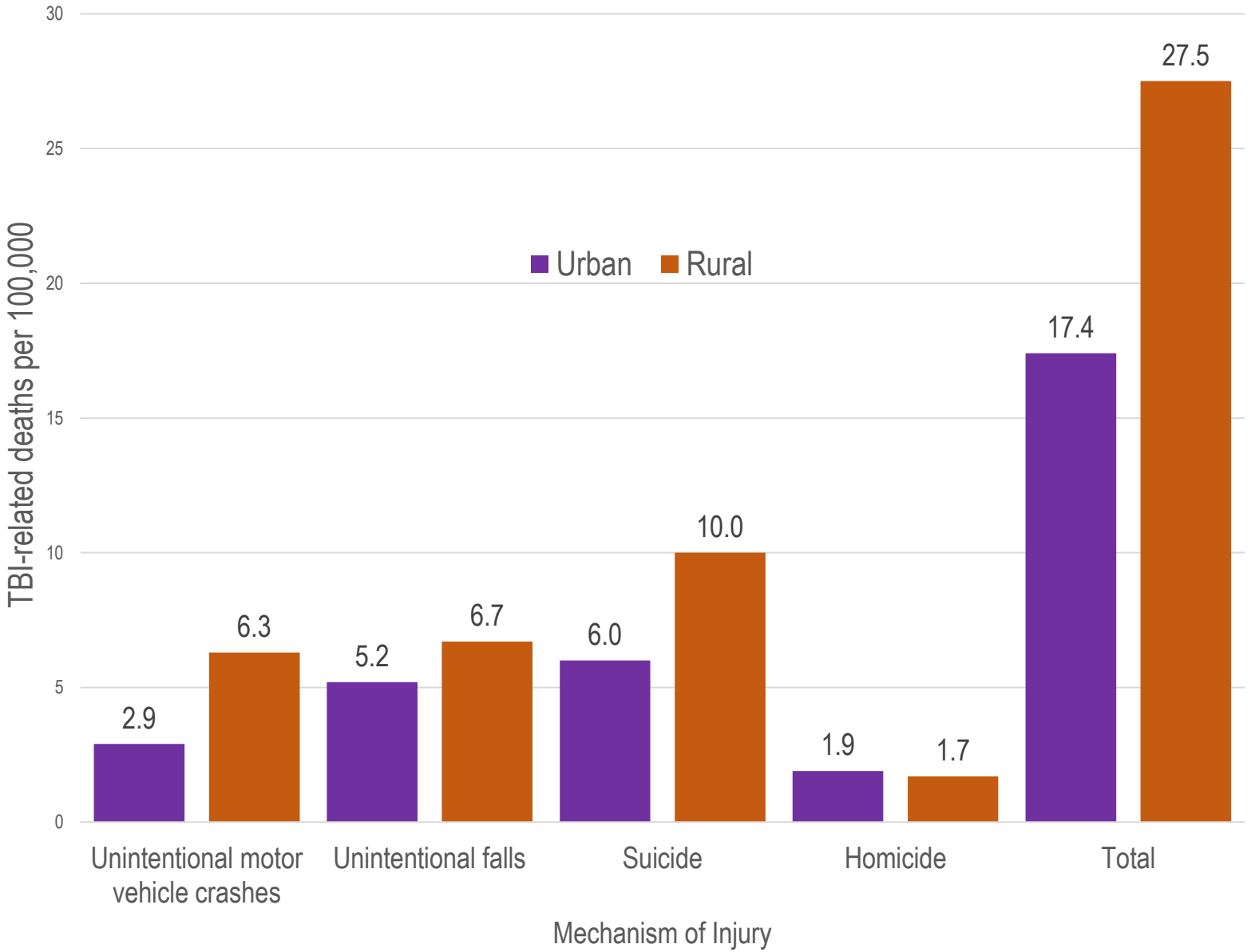
Differences in TBI-related death and hospitalization rates in urban and rural counties



TBI-related hospitalization rates are higher in urban areas

From: Daugherty J, Sarmiento K, Waltzman D, Xu L. 2021. Traumatic brain injury-related hospitalizations and deaths in urban and rural counties – 2017. Annals of Emergency Medicine;79(3): 288-296.

TBI-related death rates are higher in rural areas



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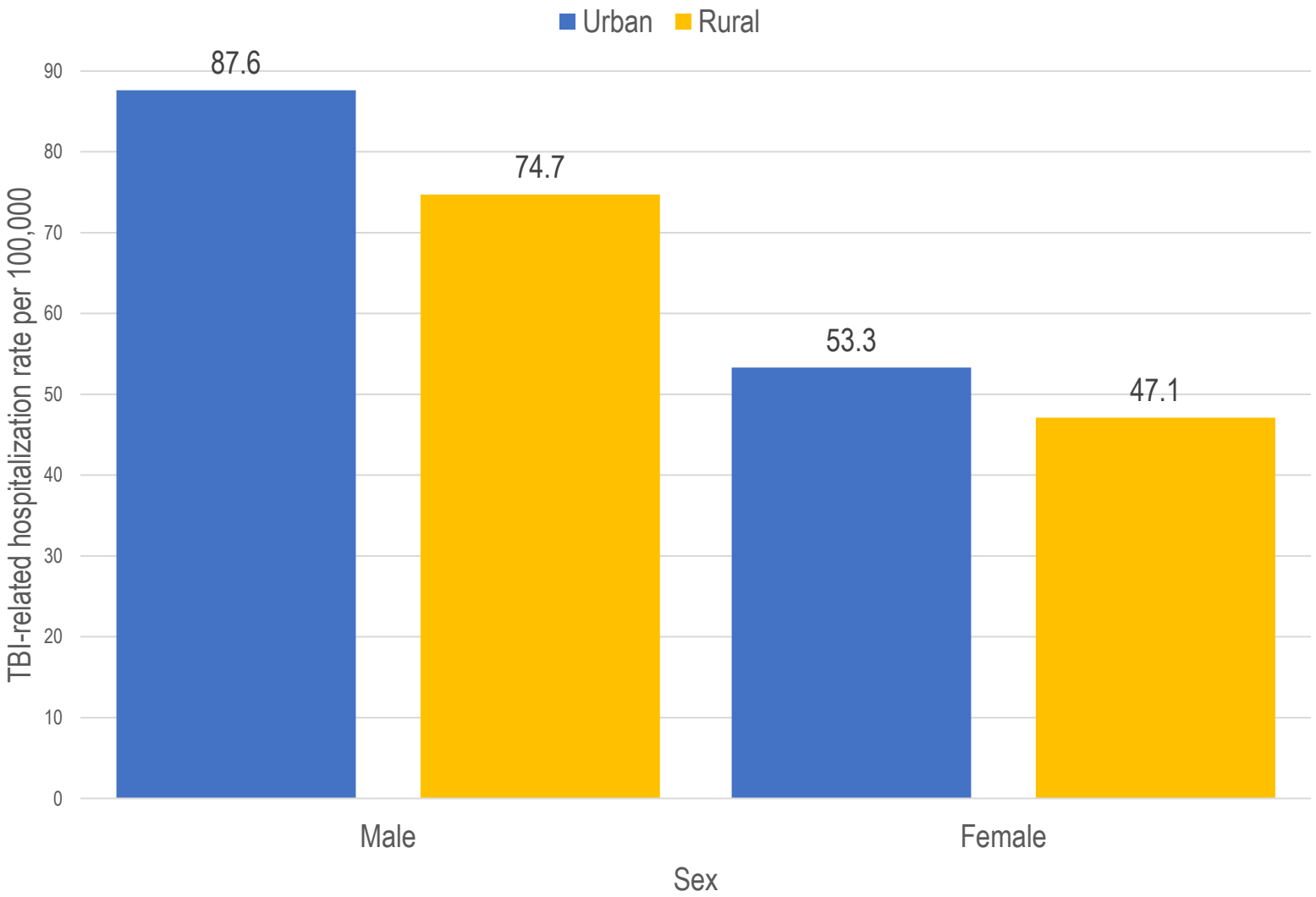
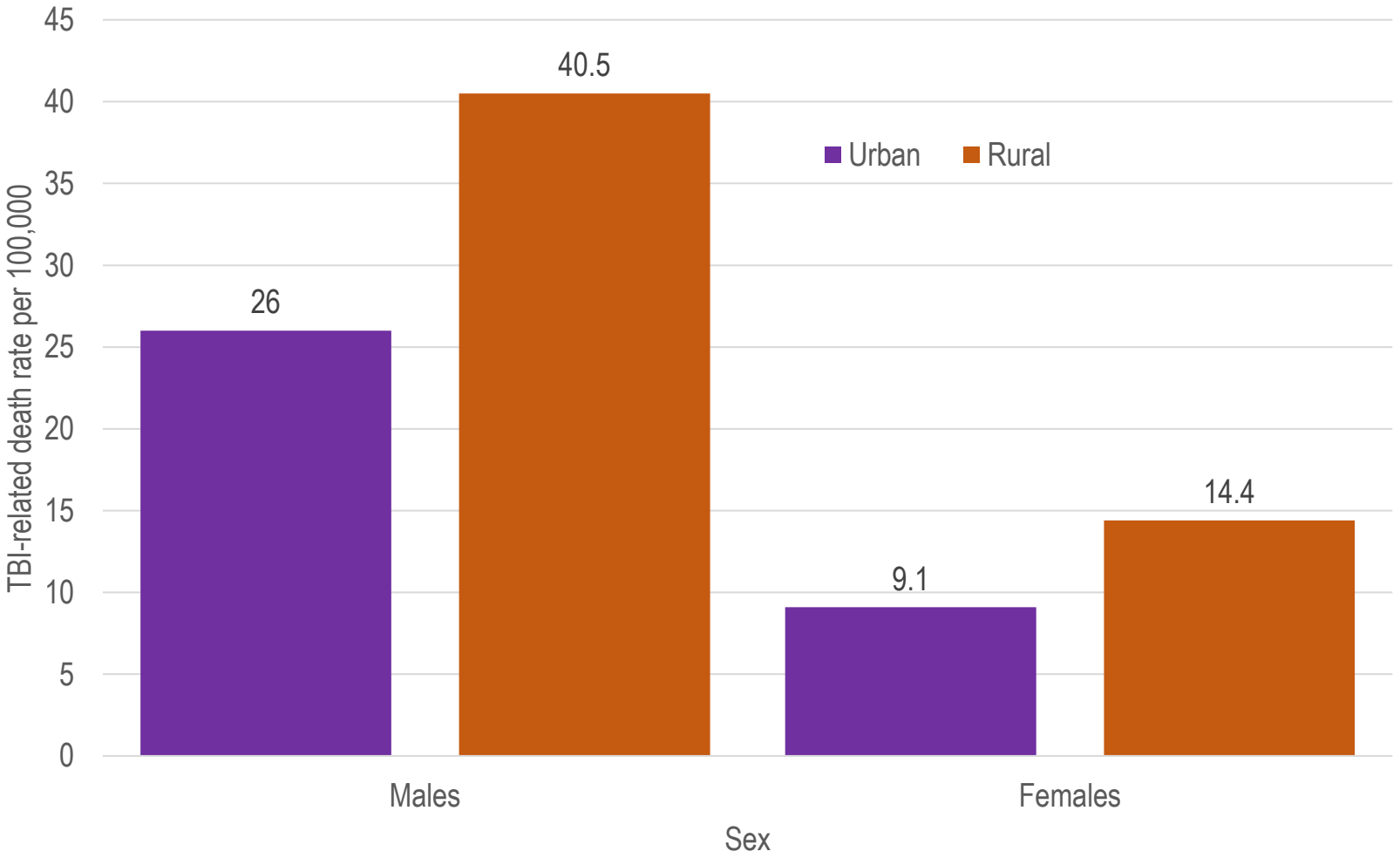


Men have higher rates of TBI-related hospitalizations than women, in both urban and rural areas

From: Daugherty J, Sarmiento K, Waltzman D, Xu L. 2021. Traumatic brain injury-related hospitalizations and deaths in urban and rural counties – 2017. Annals of Emergency Medicine (ePub ahead of print).



Men also have higher rates of TBI-related deaths than women, in both urban and rural areas

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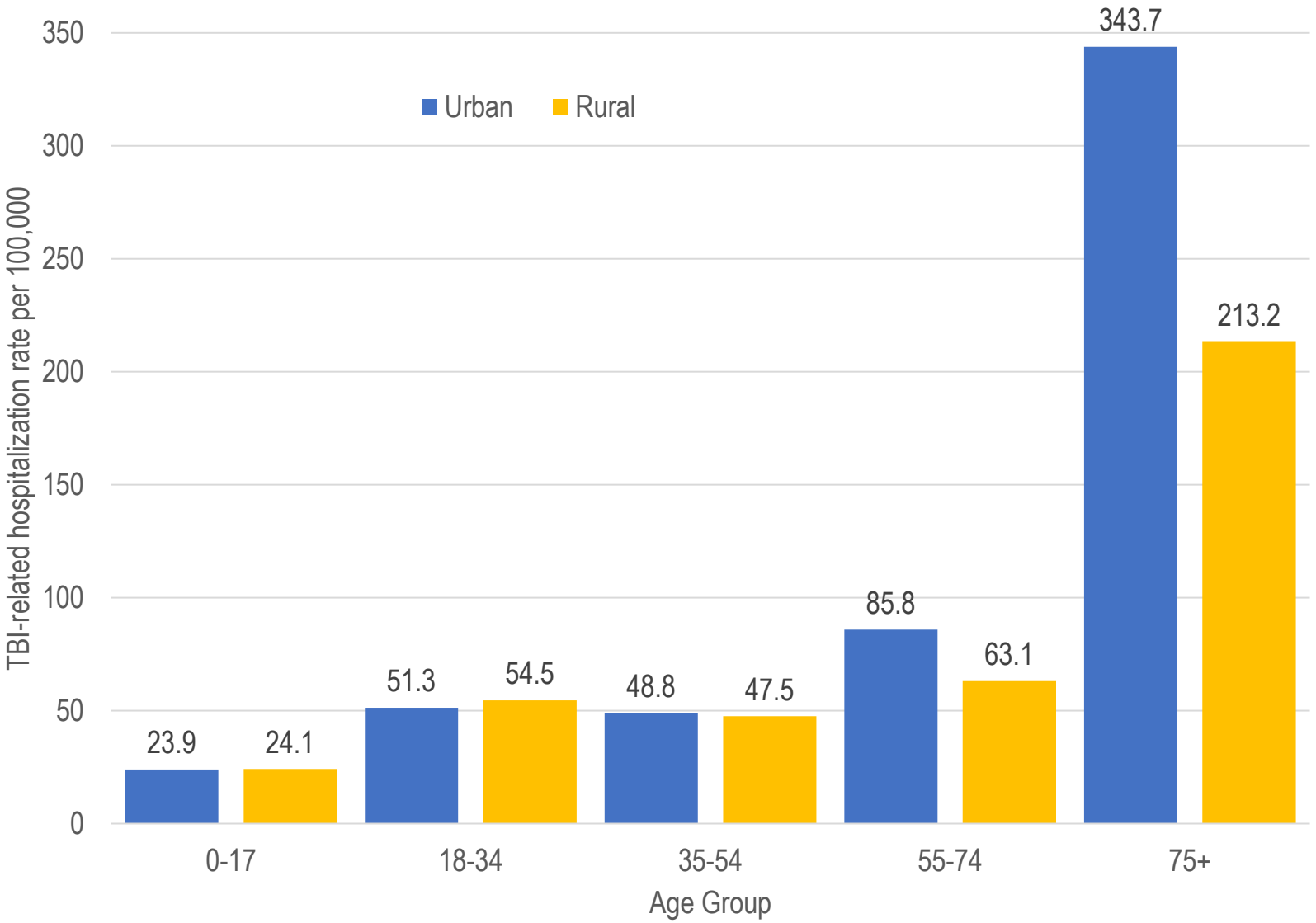
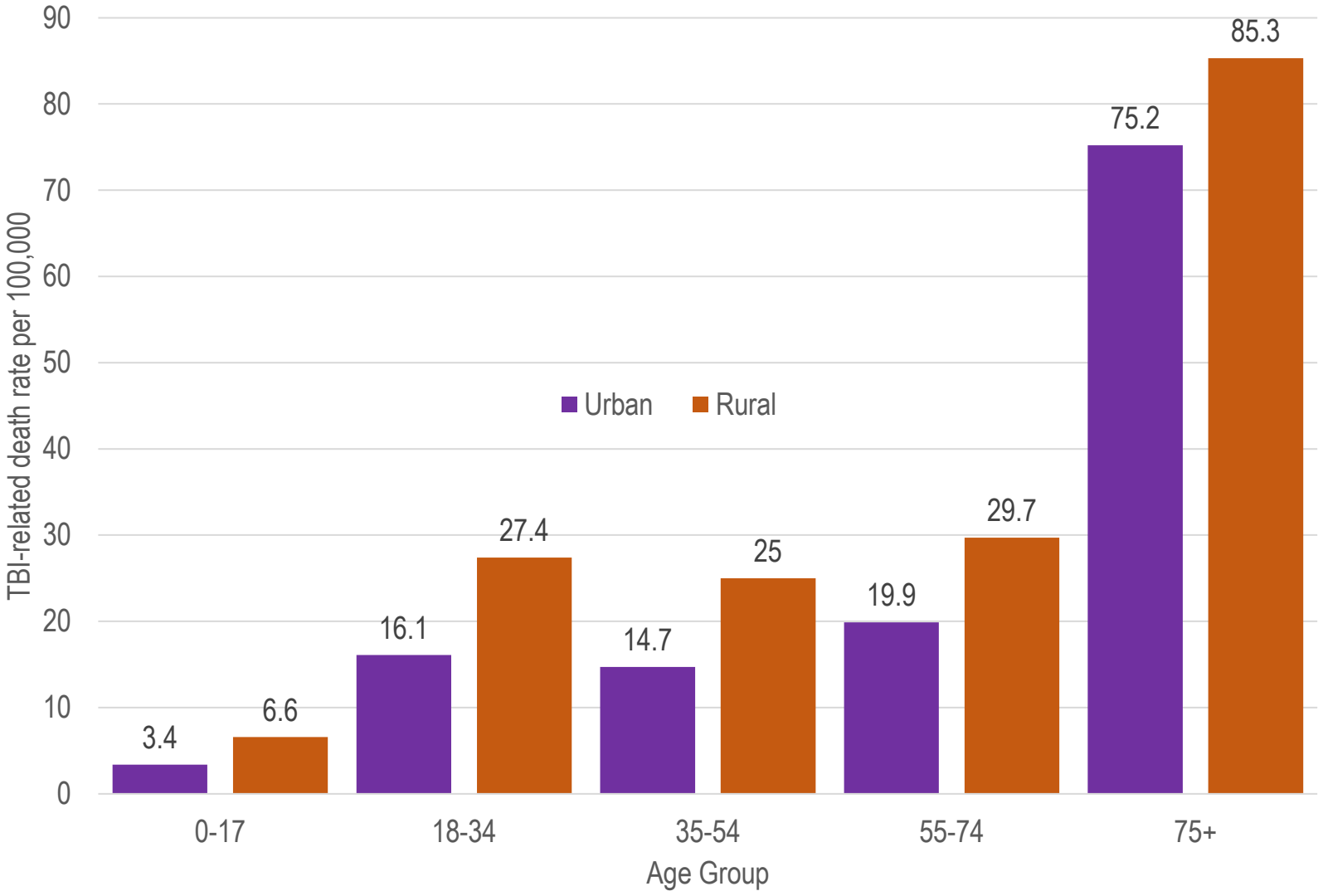


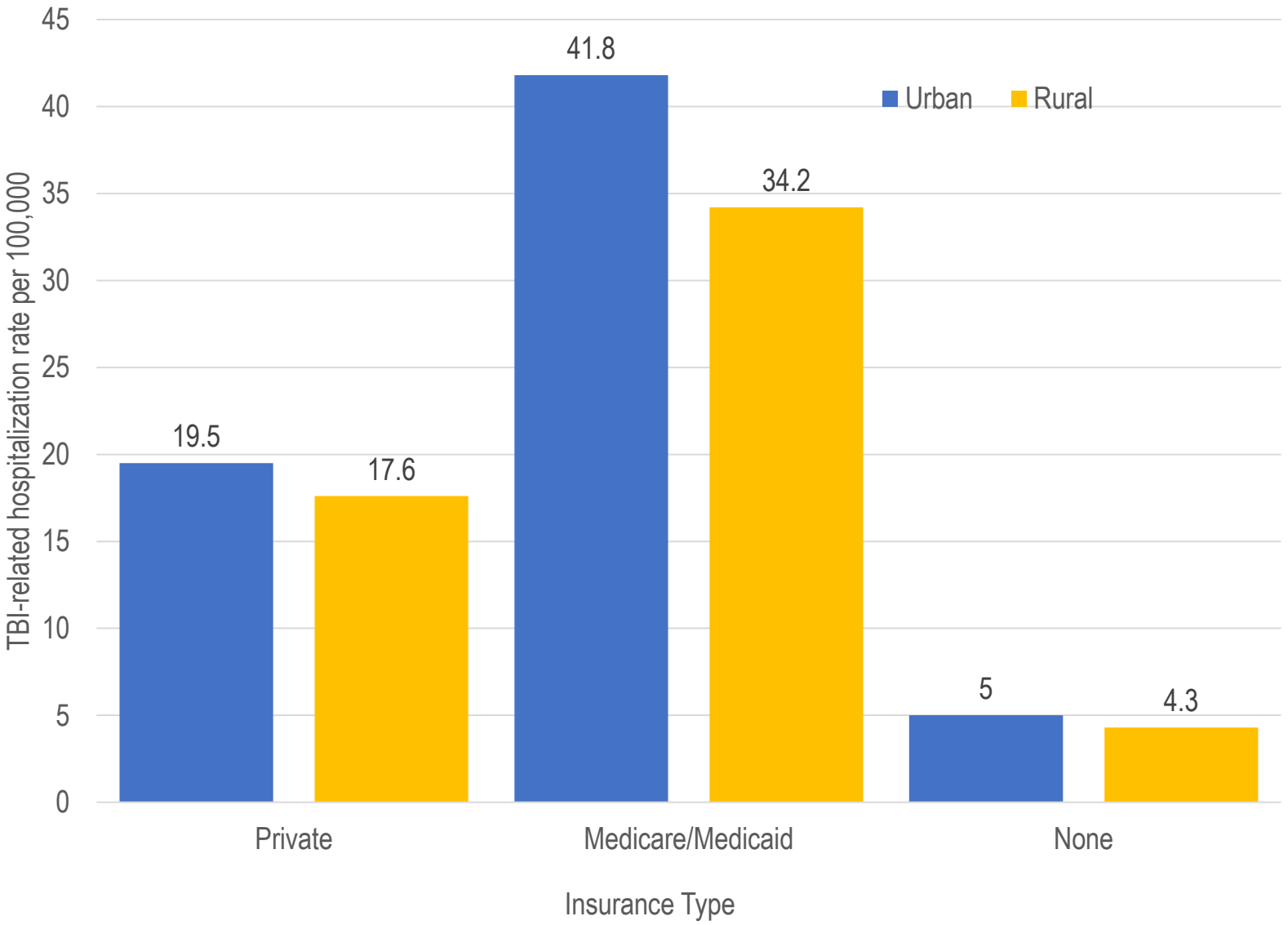
The only age-related differences in TBI-related hospitalizations were in those ages 55+

From: Daugherty J, Sarmiento K, Waltzman D, Xu L. 2021. Traumatic brain injury-related hospitalizations and deaths in urban and rural counties – 2017. Annals of Emergency Medicine;79(3): 288-296.



For TBI-related deaths, rural individuals had higher rates across all age groups

From: Daugherty J, Sarmiento K, Waltzman D, Xu L. 2021. Traumatic brain injury-related hospitalizations and deaths in urban and rural counties – 2017. Annals of Emergency Medicine;79(3): 288-296.



There were only differences in rates of TBI-related hospitalizations among those with Medicare/ Medicaid

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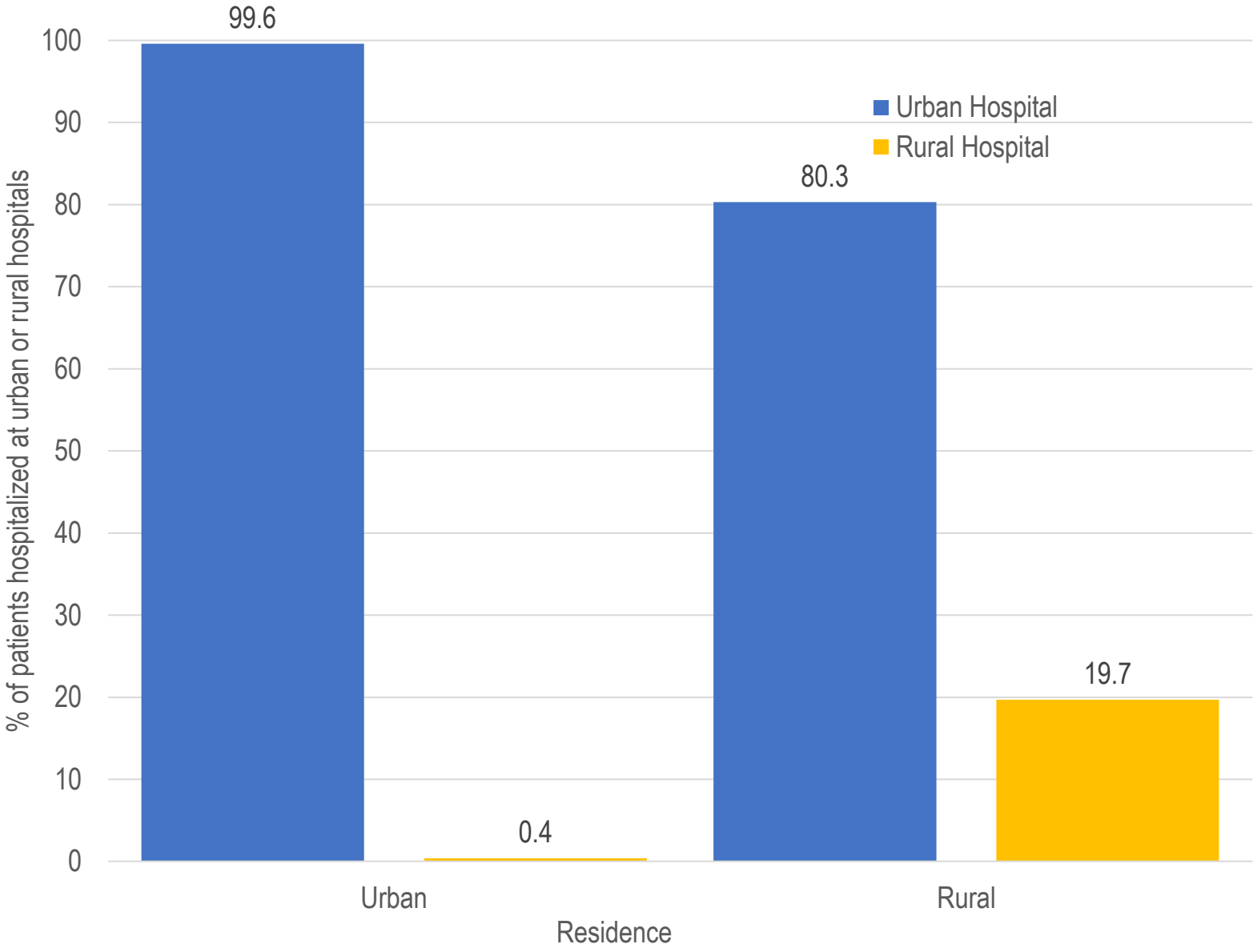
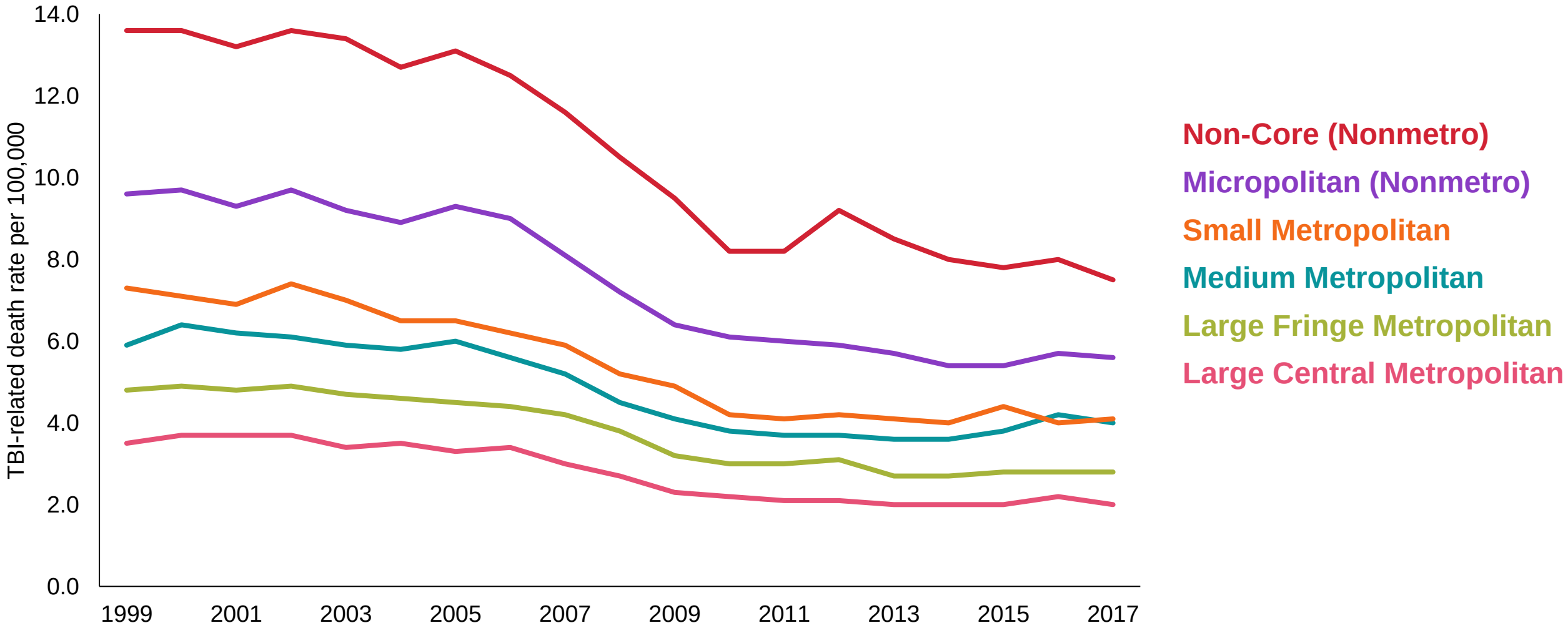


Most people – regardless of residence – receive care at urban hospitals

From: Daugherty J, Sarmiento K, Waltzman D, Xu L. 2021. Traumatic brain injury-related hospitalizations and deaths in urban and rural counties – 2017. Annals of Emergency Medicine;79(3): 288-296.

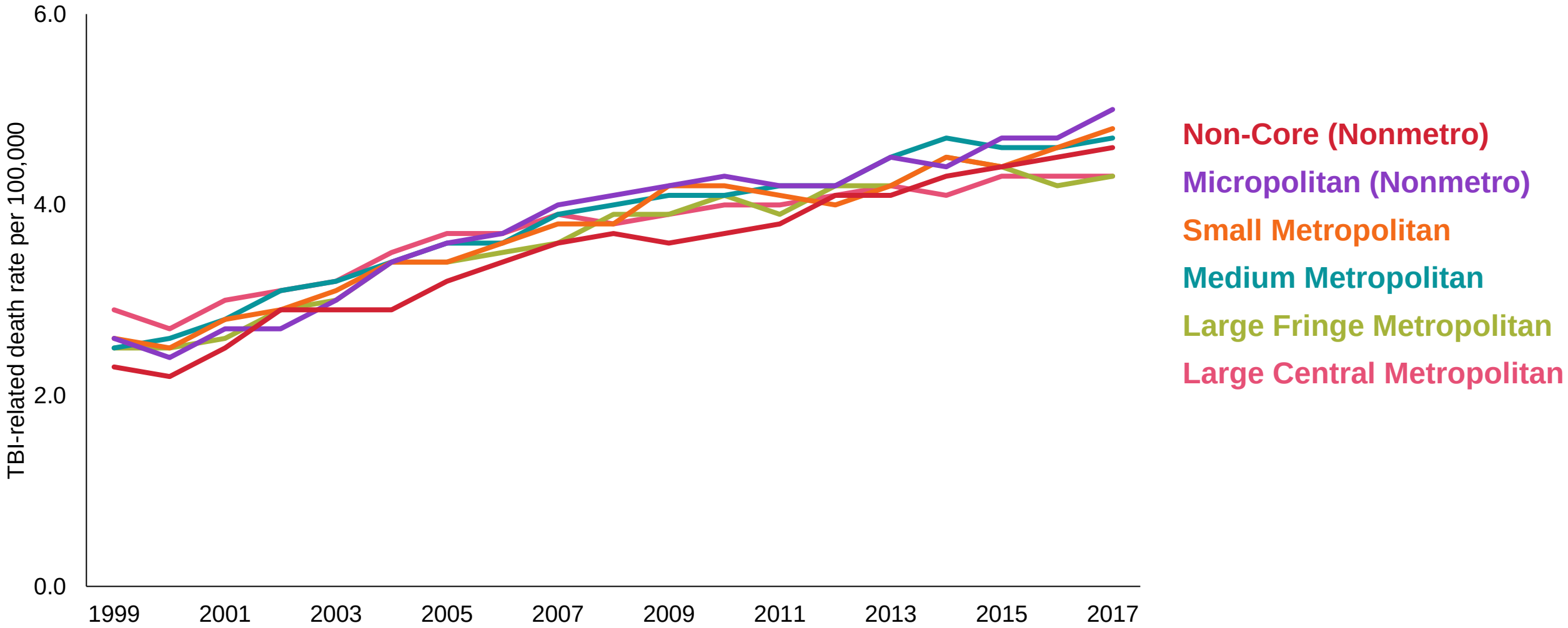
Age-adjusted rates of TBI-related deaths attributable to motor vehicle crashes are highest in non-metro counties but have decreased over time



NOTES: Traumatic brain injury-related deaths were identified using International Classification of Diseases, 10th Revision underlying-cause-of-death codes S01, S02.0, S02.1, S02.3, S02.7–S02.9, S04.0, S06, S07.0, S07.1, S07.8, S07.9, S09.7–S09.9, T90.1, T90.2, T90.4, T90.5, T90.8, and T90.9. Decedent's county of residence was classified based on the 2013 NCHS Urban–Rural Classification Scheme for Counties. Age-adjusted death rates were calculated using the direct method and the 2000 U.S. standard population.

SOURCE: NCHS, National Vital Statistics System, Mortality.

Age-adjusted rates of TBI-related deaths attributable to falls do not show wide differences by urban/rural residency and have increased over time



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SOURCE: NCHS, National Vital Statistics System, Mortality.

CDC's qualitative study on TBI in rural areas

- Residents of rural areas have higher TBI incidence and mortality rates
- Rural healthcare providers face difference obstacles than urban providers
- Important to talk to on-the-ground providers to see what issues they face

What rural healthcare providers want the CDC to know about TBI in rural areas?

- They're in the trenches. Don't have time to read guidelines.
- They need help with prevention.
- A lot of mild TBIs are probably being missed.
- Often no university tertiary care or pediatric hospital anywhere around in rural areas
- We focus a lot on football-related injuries, but they see a lot of different sports

Common mechanisms of injury in rural areas

- Sports!
  - Football
  - Soccer
  - Skiing
  - Rock-climbing
- ATVs
- Motor vehicle crashes

Where do pediatric patients go for TBI/concussion care?

- Many report initial encounters in emergency department
- Some primary care visits, some urgent care

What challenges do rural providers face in their TBI practice?

- Lack of access to specialists for follow-up
- Convincing parents that imaging is usually not necessary

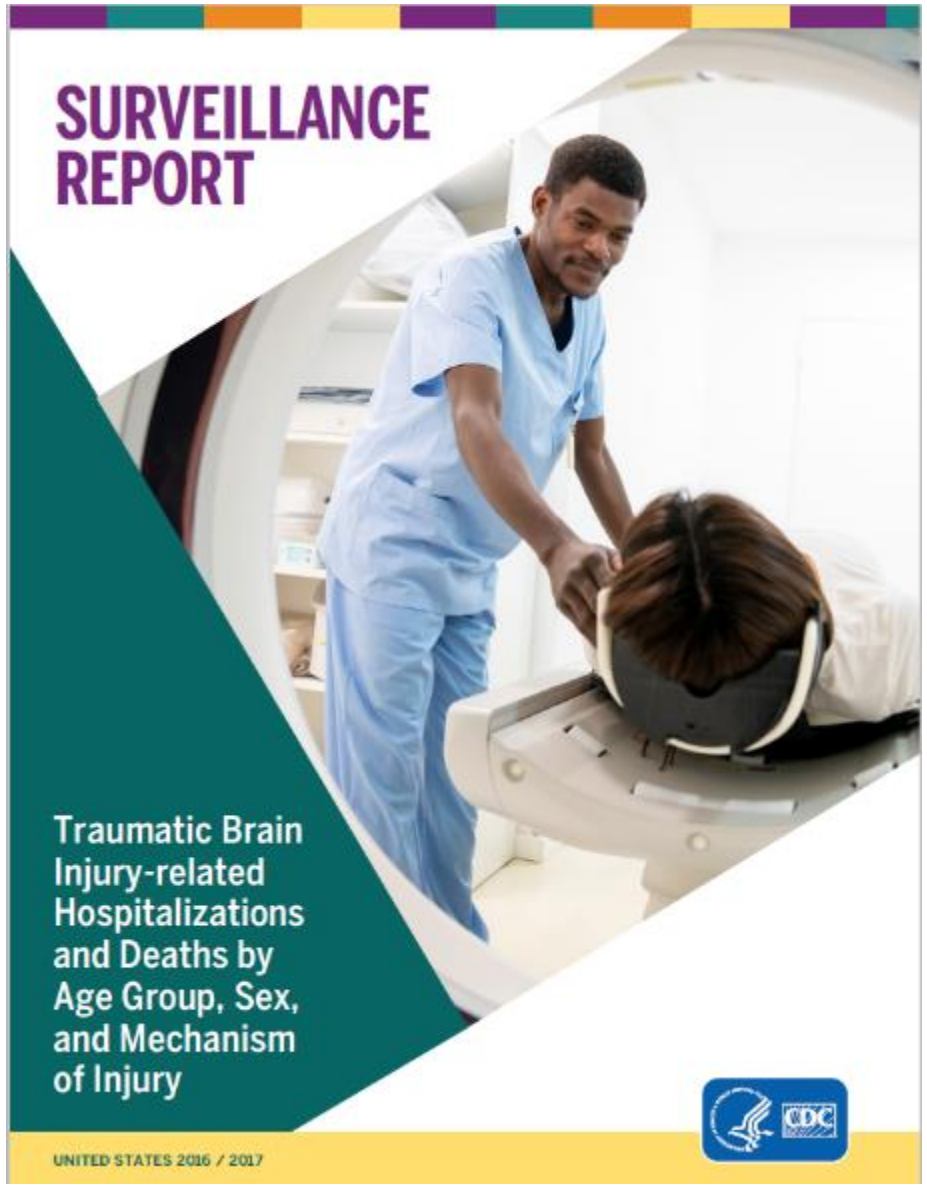
Summary of rural/urban disparities

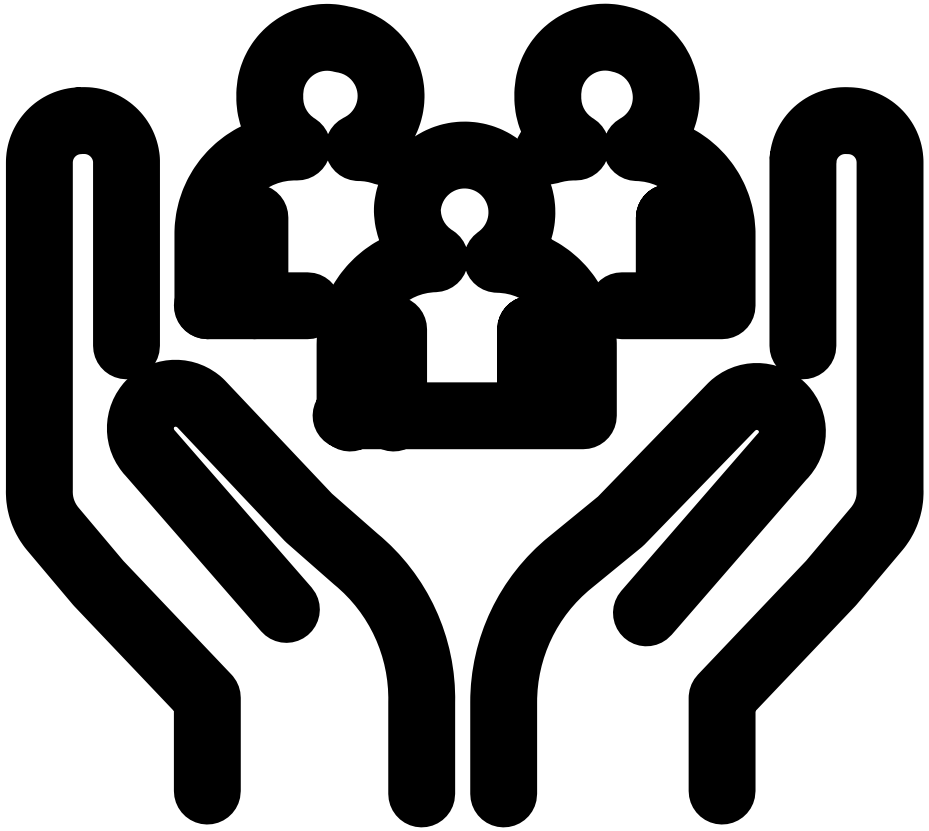
- People living in urban areas have higher rates of TBI-related hospitalizations
- People living in rural areas have higher rates of TBI-related deaths
- However, hospitalization + death rates added together are similar across urban and rural areas
- What's going on?
  - Differences in access to trauma care
  - More severe TBIs in rural areas
- Significant differences in mechanism of injury

How can we decrease TBI-related disparities?

Conduct Surveillance and Research

Regularly collecting data and calculating TBI estimates by certain demographic characteristics enables CDC to see changes over time and see which groups are at highest risk

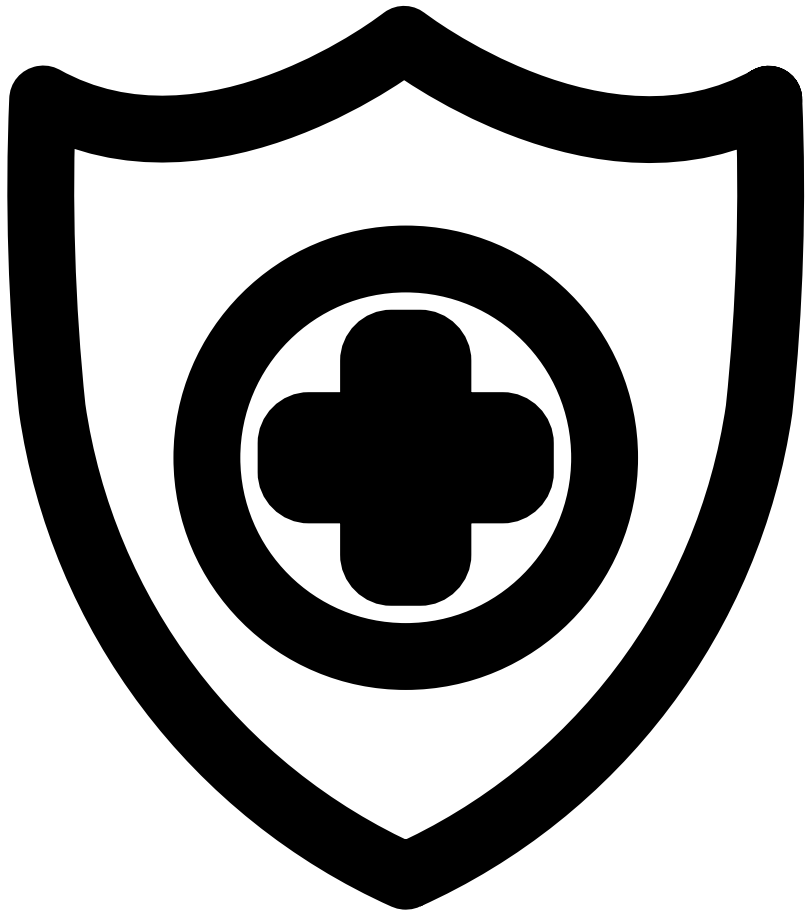

SURVEILLANCE REPORT
Traumatic Brain Injury-related Hospitalizations and Deaths by Age Group, Sex, and Mechanism of Injury
UNITED STATES 2016 / 2017
CDC



Specialized Outreach

Collaboration with American Academy of Pediatrics (AAP): Project ECHO

- Project ECHO (Extension for Community Healthcare Outcomes) is an innovative telementoring program
- Piloted two TeleECHOs
  - Rural health care providers
  - School administrators



General Prevention Strategies

CDC's STEADI Initiative

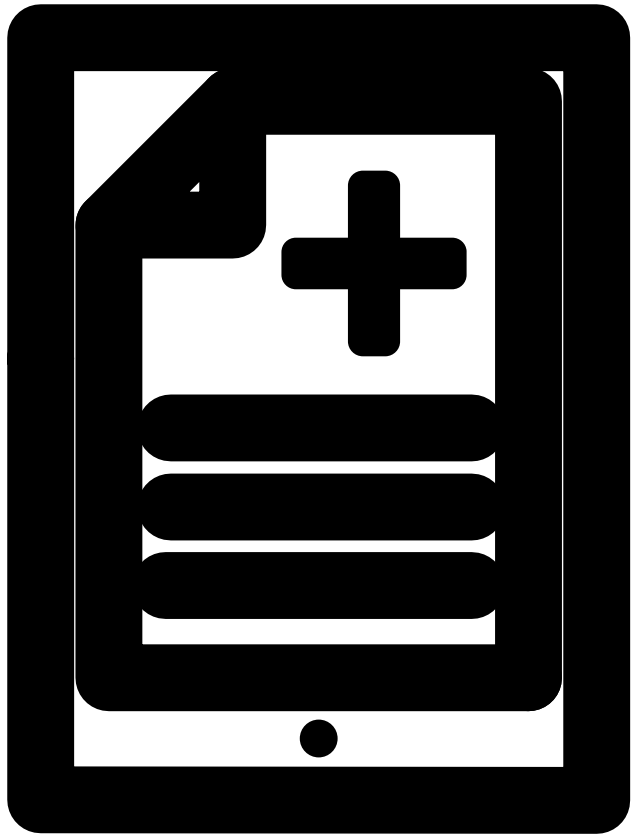
- ✓ **Includes trainings and guidance for healthcare providers on how to:**
  - Screen older adult patients for fall risk
  - Assess modifiable risk factors
  - Intervene to reduce risk by using effective clinical and community strategies

www.cdc.gov/STEADI

CDC Resources on Transportation Safety

- Car and booster seat safety
- Teen driver tips
- Planning for mobility as an older adult

www.cdc.gov/transportationsafety



Dissemination of Clinical Guidelines

CDC Pediatric mTBI Guideline

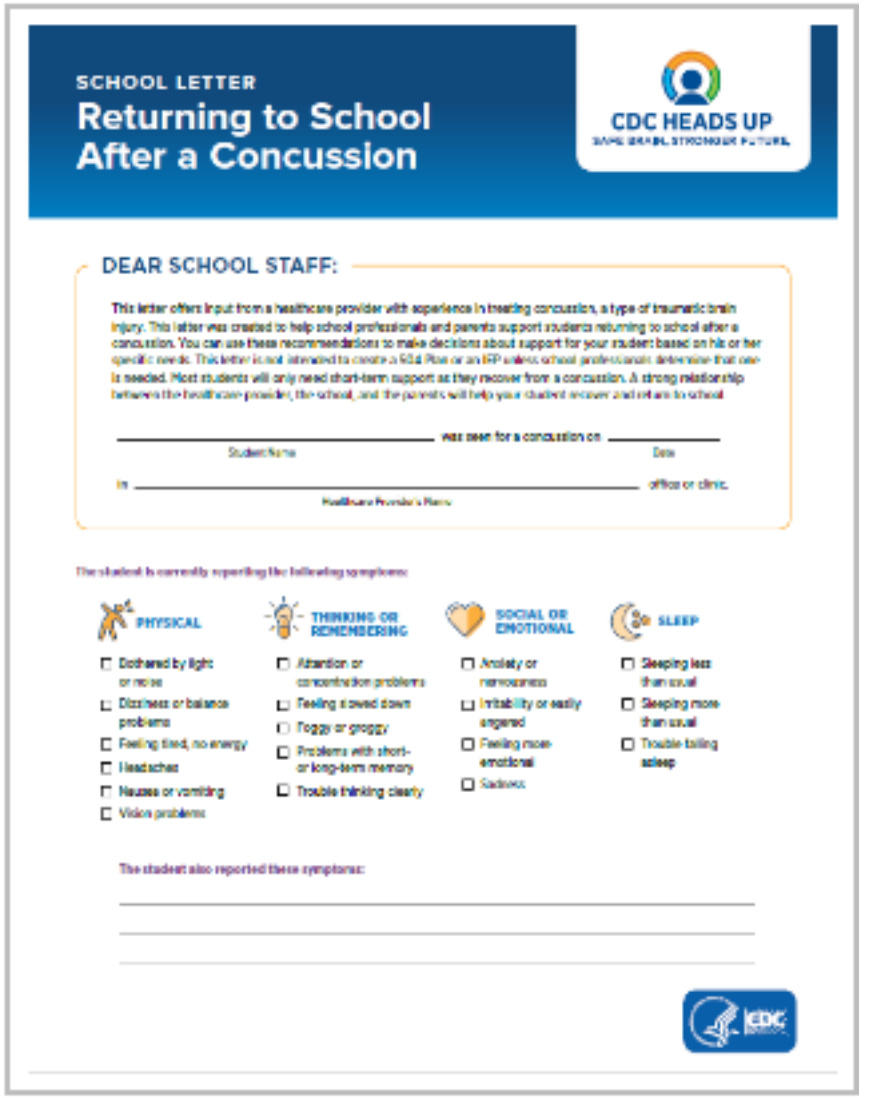
- **Goal:** Improve diagnosis and management of mTBI among children ages 18 years and younger by:
  - Conducting a rigorous systematic review of the scientific literature
  - Creating evidence-based clinical recommendations for healthcare providers in both acute and primary care settings

CDC Pediatric mTBI Guideline (continued)

- Most comprehensive review of pediatric mTBI scientific evidence to date—**summarizing 25 years of scientific research**
- Only U.S. evidence-based clinical recommendations for healthcare providers that:
  - Cover all causes of pediatric mTBI
  - Include guidance for:
    - Primary care
    - Outpatient specialty
    - Inpatient care
    - Emergency care settings

Pediatric mTBI guideline provider tools

- Checklist on Diagnosis and Management
- Acute Concussion Evaluation (ACE) Forms
- “At A Glances” for diagnosis, prognosis, and management
- Letter to schools to be filled in by healthcare providers



SCHOOL LETTER

Returning to School After a Concussion

CDC HEADS UP

DEAR SCHOOL STAFF:

This letter offers input from a healthcare provider with experience in treating concussion, a type of traumatic brain injury. This letter was created to help school professionals and parents support students returning to school after a concussion. You can use these recommendations to make decisions about support for your student based on his or her specific needs. This letter is not intended to create a 504 Plan or an IEP unless school professionals determine that one is needed. Most students will only need short-term support as they recover from a concussion. A strong relationship between the healthcare provider, the school, and the parents will help your student recover and return to school.

_____ was seen for a concussion on _____

Student Name — Date

In _____ office or clinic.

Healthcare Provider's Name

The student is currently reporting the following symptoms:

PHYSICAL

- ☐ Bothered by light or noise
- ☐ Dizziness or balance problems
- ☐ Feeling tired, no energy
- ☐ Headaches
- ☐ Nausea or vomiting
- ☐ Vision problems

THINKING OR REMEMBERING

- ☐ Attention or concentration problems
- ☐ Feeling slowed down
- ☐ Foggy or groggy
- ☐ Problems with short- or long-term memory
- ☐ Trouble thinking clearly

SOCIAL OR EMOTIONAL

- ☐ Anxiety or nervousness
- ☐ Irritability or easily angered
- ☐ Feeling more emotional
- ☐ Sadness

SLEEP

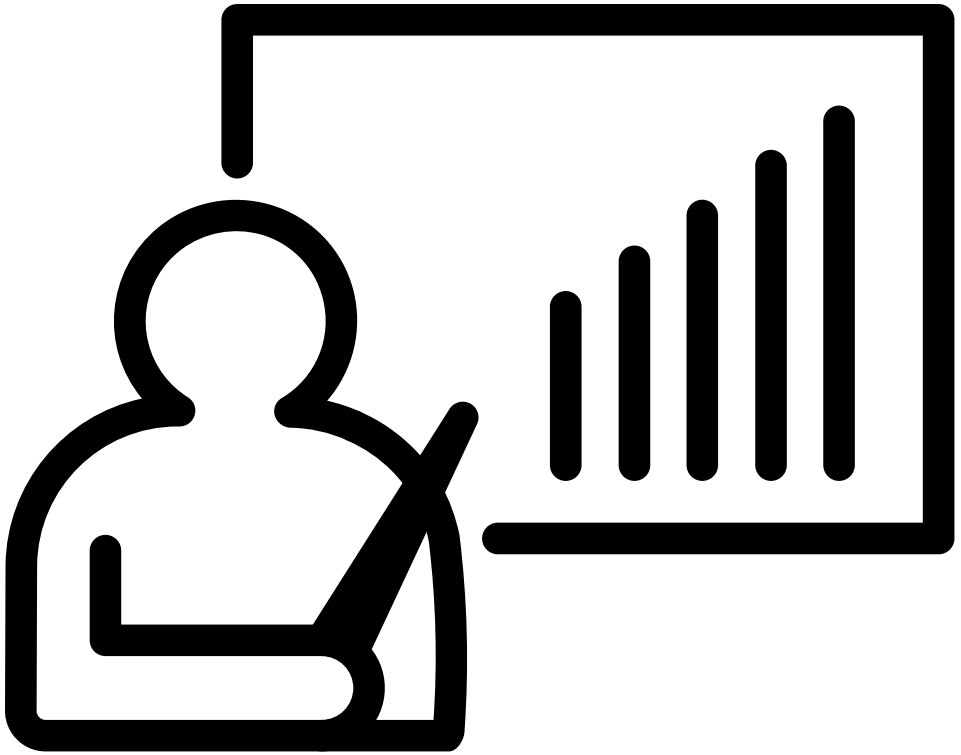
- ☐ Sleeping less than usual
- ☐ Sleeping more than usual
- ☐ Trouble falling asleep

The student also reported these symptoms:

_____

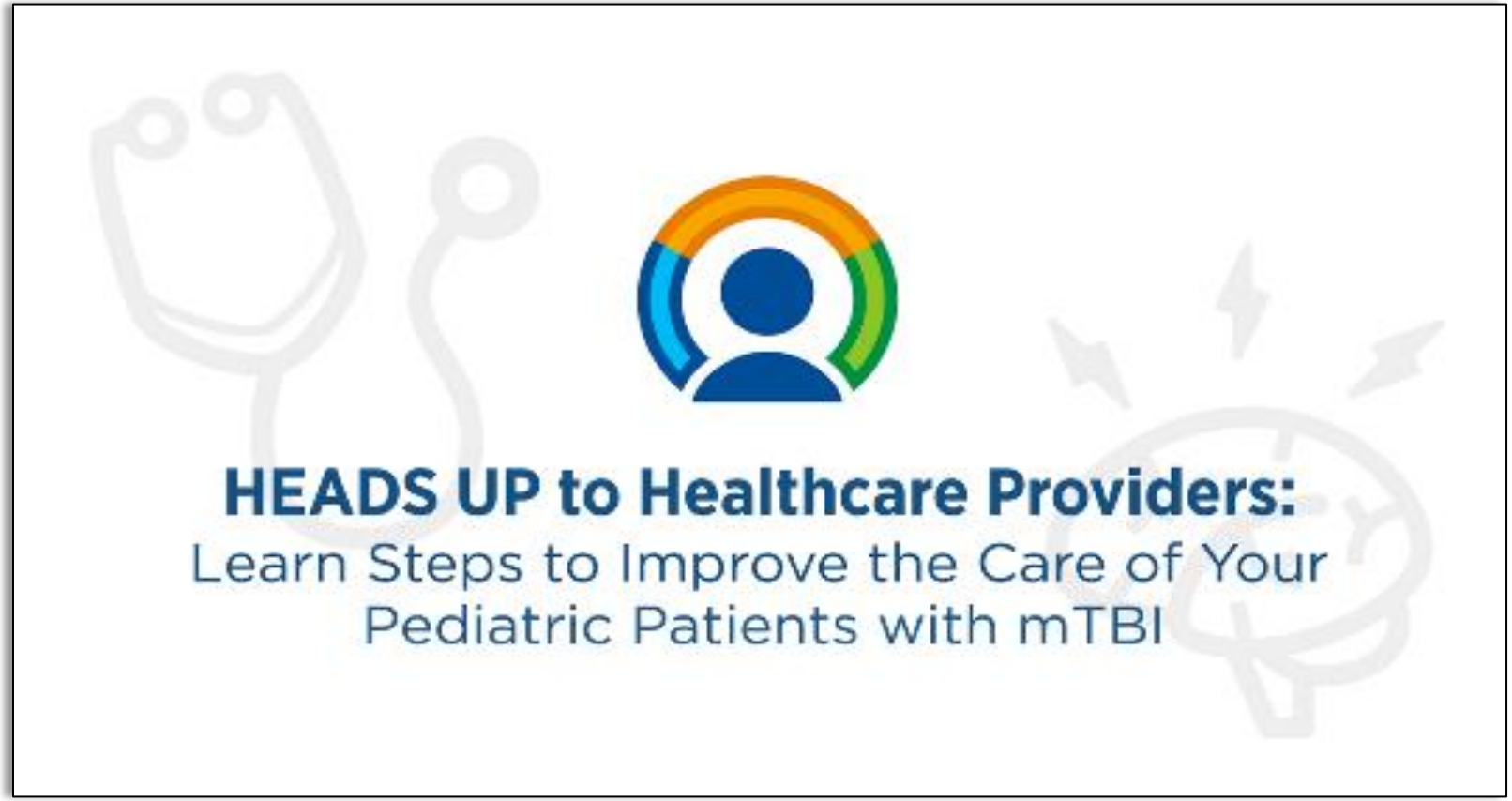
_____

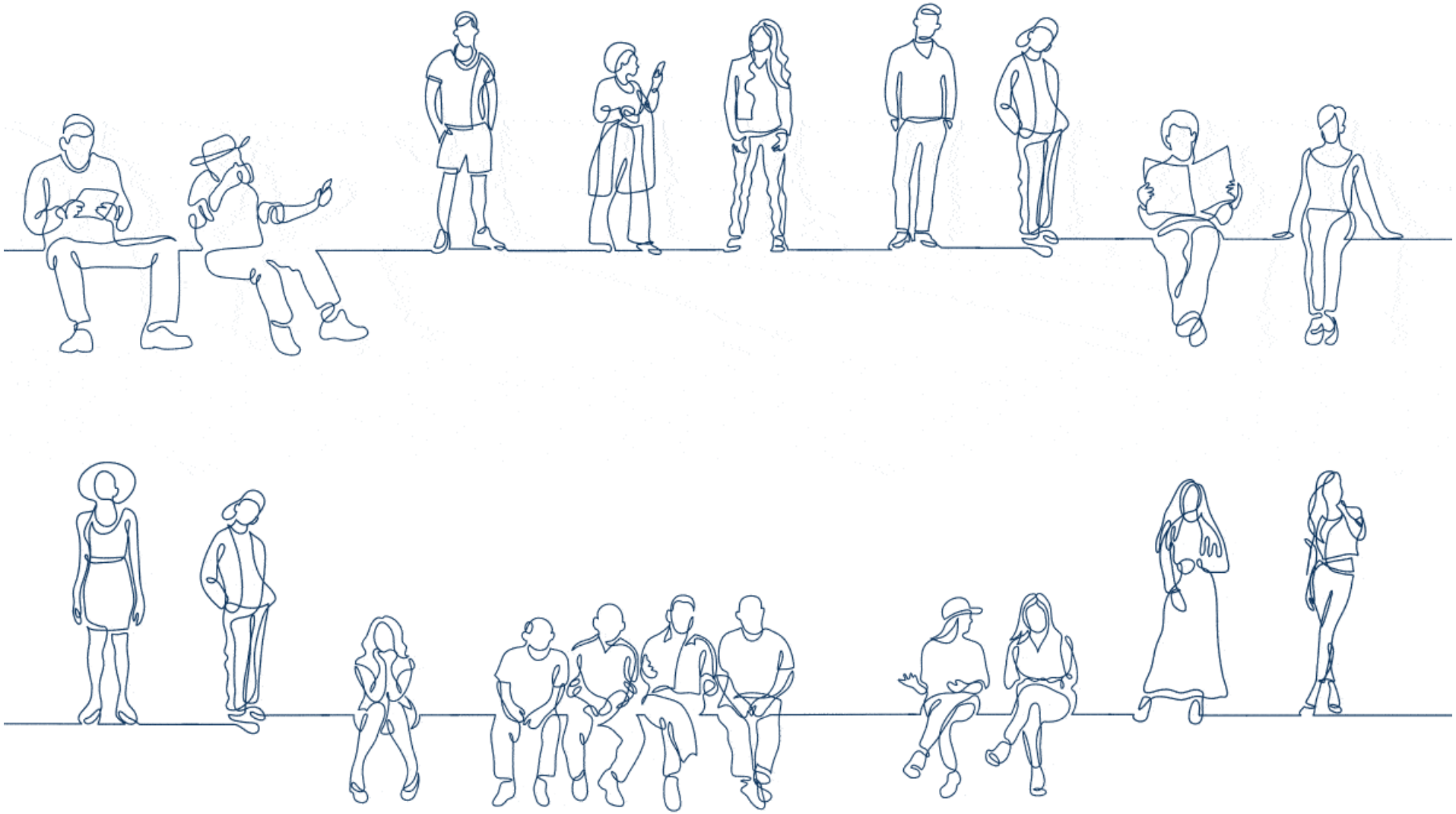
_____



Trainings for Healthcare Providers

- Developed with the American Academy of Pediatrics
- Free CME, CNE, CEU credits
- Includes:
  - CDC guideline recommendations
  - Interactive graphics and videos





Thank you!

The findings and conclusions in this presentation 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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