

Traumatic Brain Injury

UNDERSTANDING TBI

Traumatic brain injury (TBI) is a serious public health problem in the United States. A TBI is caused by a bump, blow, jolt, or penetration to the head that disrupts the normal function of the brain. Each year, TBIs contribute to a substantial number of deaths and cases of permanent disability.

Impact and Magnitude of TBI

Based on Ohio Department of Health vital statistics mortality data and Ohio Hospital Association discharge diagnosis data there were 39,216 TBIs among Ohioans in 2021. This includes 2,914 (23 per 100,000 population) TBI-related deaths,* 10,402 (78 per 100,000) TBI-related hospitalizations,** and 25,900 (228 per 100,000) TBI-related emergency department visits** (treated and released). The TBI could be either the only injury or one of several injuries and/or medical conditions listed.

Intent/Mechanism of TBI

The intent/mechanism of injury varied across the levels of severity. Firearm (all intents) was the leading mechanism of TBI-related deaths, accounting for 40% of deaths. Unintentional fall was the leading intent/mechanism of both TBI-related hospitalizations (41%) and TBI-related emergency department visits (29%) (data not shown).

TBI by Age and Sex

The highest number of TBI-related deaths were among males ages 25-34, as shown in Figure 3. The highest number of TBI-related hospitalizations occurred among Ohioans aged 75-84 years. The highest number of TBI-related emergency department visits occurred among Ohioans aged 25-34 years.

* TBI was reported as a cause of death on the death certificate alone or in combination with other injuries or conditions.

** TBI alone or in combination with other injuries or conditions.

Figure 1: Percentage of TBIs by Intent/Mechanism and Severity, 2021

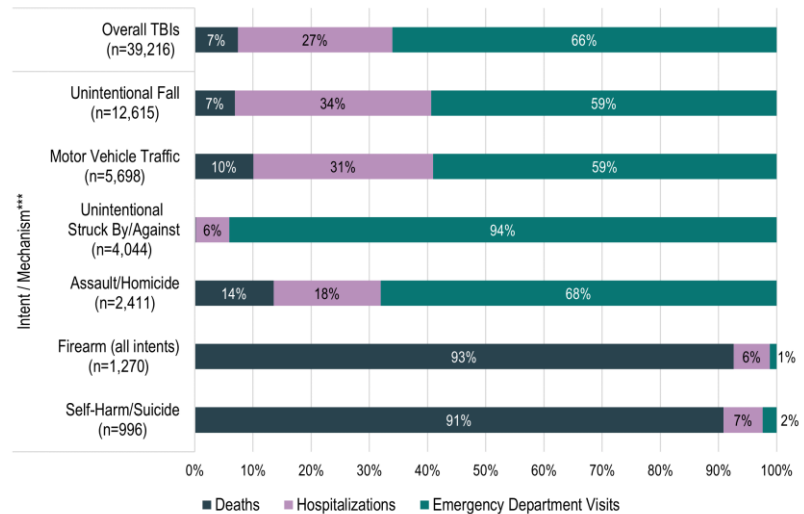


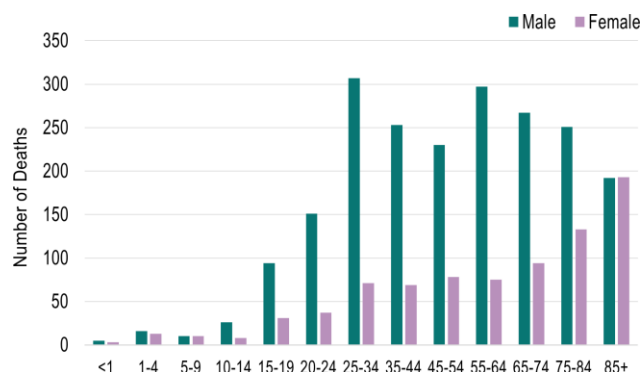
Figure 2: Number and Rate of TBI-Related Deaths by Intent/Mechanism, 2021

Intent/Mechanism of Injury***	Count	Rate per 100K People
Firearm (all intents)	1,176	10.0
Suicide	905	7.4
Unintentional Fall	870	5.7
Motor Vehicle Traffic	575	4.9
Homicide	327	3.0
Unintentional Struck By/Against	8	--

*** Categories are not mutually exclusive. Firearm includes all intents (e.g., unintentional, self-harm/suicide, and assault/homicide). For example, TBI deaths due to firearm-related suicide and homicide will be represented in all applicable categories.

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Figure 3: Number of TBI-Related Deaths by Age and Sex, 2021



TBI Prevention Strategies

CDC's National Center for Injury Prevention and Control (Injury Center) is committed to protecting people against preventable TBI by putting science into action.

To Help Older Adults: Make CDC's STEADI Part of Every Medical Practice.

STEADI (Stopping Elderly Accidents, Deaths, and Injuries) is a toolkit to help health care providers incorporate fall risk assessment and individualized fall interventions (e.g., exercise, medication management, and Vitamin D supplementation) into their practice. Learn more at www.cdc.gov/STEADI.

To Help Young Athletes: Get a HEADS UP on Creating a Culture of Concussion Safety in Sports.

HEADS UP educational materials are designed to support individuals (such as coaches and health care providers) and organizations (such as schools and sports programs) with their concussion safety efforts. Learn more at www.cdc.gov/HEADSUP.

To Help Parents and Teen Drivers: "Parents Are the Key" to Teen Driver Safety.

Parents Are the Key materials helps parents, pediatricians, and communities keep teen drivers safe on the road. Parents Are the Key includes evidence-based strategies and can be customized with an organization's logo. Learn more at www.cdc.gov/ParentsAretheKey.

TBI by Race/Ethnicity

Identifying populations at greater risk of TBIs can help target prevention measures. In 2021, Black non-Hispanic Ohioans had the highest rate of TBI.

Figure 4: Number and Rate of TBI by Race/Ethnicity, 2021

Race/Ethnicity	Count †	Rate
Black Non-Hispanic	6,147	387.5
White Non-Hispanic	30,231	315.3
Hispanic	1,407	307.5
Asian/Pacific Islander Non-Hispanic	400	135.2
America Indian/Alaska Native Non-Hispanic	39	123.9

† Count of TBI include deaths, hospitalizations, and emergency department visits combined.



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TBI Activities

National Activities	
PREVENTION	Ohio used CDC HEADS UP materials for a media campaign and participated in TBI Awareness Month. Ohio also participates in National Falls Awareness Week to promote falls among older adults and is an active member with National Council on Aging.
SURVEILLANCE	The Ohio Department of Health (ODH) Violence and Injury Epidemiology and Surveillance Section (VIESS) participates in the CSTE Injury Surveillance Workgroup and utilizes national definitions to conduct surveillance.
PARTNERSHIPS	National partnerships include Greater Lakes & Mid Atlantic Injury Prevention Network, CSTE, National Council on Aging, Western Kentucky University, and the Wisconsin Institute for Healthy Aging.
State Activities	
PREVENTION	The ODH Violence and Injury Prevention Section (VIPS) is responsible for ensuring Ohio's Return to Play Law is made available online, including rules, coaches training, concussion information sheet, and signature pages for parents/caregivers. ODH VIPS also promotes the Ohio Return to Learn Model to return a student to the academic setting following a concussion, utilizes HEADS UP materials for a statewide social media campaign, and provides education materials to athletic organizations, childcare centers, schools, and other settings regarding concussions. Additionally, ODH supports evidence-based balance and mobility programs for older adults by offering facilitator training and resources, collecting data, as well as holding the state license for Stepping On.
SURVEILLANCE	ODH VIESS conducts statewide TBI surveillance through death certificates, inpatient hospitalizations, emergency department visits, and through the Ohio Behavioral Risk Factor Surveillance System.
PARTNERSHIPS	ODH VIPS coordinates the Ohio Injury Prevention Partnership's (OIPP) Child Injury Action Group and Older Adult Falls Prevention Coalition , which both focus on decreasing TBIs among the respective populations. ODH partners with the Ohio Brain Injury Program and participates on the Brain Injury Advisory Committee , a statewide effort that creates a biennial report on the impact of brain injury on the state's population. Other partnerships include Ohio Department of Aging, Ohio Area Agency on Aging, People Working Cooperatively, and various health systems, local health departments, and Fire/EMS departments around the state.
ACCOMPLISHMENTS/ SUCCESSES	ODH created TBI ads placed in game day books and on social media with a total estimated reach of 2,050,000 Ohioans; created a toolkit for TBI Month; provided three facilitator trainings for older adult fall prevention for a total of 20 new trainers covering 49 of Ohio's 88 counties; and contributed TBI morbidity and mortality data to the 2022 Biennial Report on Impact of TBI on the People of Ohio.

Footnotes

Mortality data was provided by the ODH Bureau of Vital Statistics. Analysis was conducted by ODH Violence and Injury Epidemiology and Surveillance Section. Analysis includes Ohio residents who had an injury as an underlying cause of death (ICD-10 codes V01-Y36, Y85-Y87, Y89, U01-U03) and a TBI code in any of the multiple cause of death fields (ICD-10 codes S01.0-S01.9, S02.0, S02.1, S02.3, S02.7-S02.9, S04.0, S06.0-S06.9, S07.0, S07.1, S07.8, S07.9, S09.7-S09.9, T90.1, T90.2, T90.4, T90.5, T90.8, T90.9).

Hospitalizations and emergency department (ED) visits are based on discharge diagnosis data provided by the Ohio Hospital Association. ED visits exclude fatal cases. Hospitalization exclude ED visits and fatal cases. Injury hospital inpatient visits were defined as a hospital admission with an injury listed in the principal diagnosis discharge field (ICD-10-CM codes S00-S99, T07-T34, T36-T50 with a sixth character of 1-4 [except for T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9, which are included if the fifth character is 1-4], T51-T65, T66-T76, T79, O9A.2-O9A.5, T84.04, and M97). From the injury hospital subset, TBI hospital inpatient visits included records with one of the following diagnosis codes: S02.0, S02.1, S02.80, S02.81, S02.82, S02.91, S04.02, S04.03, S04.04, S06, S07.1, and T74.4. Injury ED visits were defined as an ED visit with an injury listed in any diagnosis discharge field (ICD-10-CM codes S00-S99, T07-T34, T36-T50 with a sixth character of 1-4 [except for T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9, which are included if the fifth character is 1-4], T51-T65, T66-T76, T79, O9A.2-O9A.5, T84.04, and M97) or a valid external cause code listed in any diagnosis discharge field (V00-V99, W00-X58, X71-X83, X92-Y09, Y21-Y33, and Y35-Y38). From the injury ED subset, TBI ED visits included records with one of the following diagnosis codes: S02.0, S02.1, S02.80, S02.81, S02.82, S02.91, S04.02, S04.03, S04.04, S06, S07.1, and T74.4.

Race/ethnicity categories are mutually exclusive. Hispanic includes any race. Specified race (Black, white, etc.) excludes Hispanic ethnicity. Rates presented by intent/mechanism and race/ethnicity are age-adjusted to the 2000 U.S. standard population. Rates are calculated per 100,000 population and suppressed when counts <10.