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Traumatic Brain Injury Mortality in the United States, 2024

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Abstract

Objectives—This report describes trends in traumatic brain injury (TBI) death rates, describes differences in TBI death rates by sex and age group, race and Hispanic origin, census region, injury intent, and injury mechanism, and compares TBIs as a percentage of total deaths and total injury deaths by demographic group and census region.

Methods—Data from the National Vital Statistics System were used and injury deaths were identified using *International Statistical Classification of Diseases, 10th Revision* underlying cause-of-death codes V01–Y36, Y85–Y87, Y89, and *U01–*U03. Among injury deaths, TBI deaths were identified using multiple cause-of-death codes S01, S02.0, S02.1, S02.3, S02.7–S02.9, S04.0, S06, S07, S09.7–S09.9, T90.1, T90.2, T90.4, T90.5, T90.8, and T90.9.

Results—The age-adjusted TBI death rate varied between 2014 (16.3 deaths per 100,000 standard population) and 2024 (18.0), with periods of increasing and decreasing trends. The 2024 TBI death rate was more than three times higher for males than females. Rates for males were also higher compared with females across all age groups, race and Hispanic-origin groups, census regions, and injury intents and mechanisms. For both males and females, TBI death rates increased with age and were highest among American Indian and Alaska Native non-Hispanic people. Among males, the leading mechanism of TBI mortality was firearms, with a death rate of 14.2. Among females, the leading mechanism of TBI mortality was falls, with a death rate of 3.7. In 2024, TBIs accounted for 2.2% of total deaths and 25.0% of total injury deaths nationally, and these percentages varied across demographic groups and census regions.

Keywords: head injury • head trauma • intentional injury • unintentional injury • National Vital Statistics System (NVSS)

Introduction

Traumatic brain injuries, or TBIs, are injuries affecting brain function that are caused by a "bump, blow, or jolt to the head, or a penetrating injury" (1). TBIs range in severity from injuries that require minimal recovery time and medical intervention to those that cause significant disability or death (1,2).

An analysis of earlier TBI mortality data in the United States found that the TBI death rate among adults increased between 2010 and 2020, with older adults contributing the most to this increase (3). Other publications noted decreasing TBI death rates among younger age groups, decreased TBI death rates due to motor vehicle traffic, and increasing TBI death rates due to falls in the same period (4–6). Older adults, males, American Indian and Alaska Native people, Black people, and people living in nonurban areas have higher rates of TBI death (3,7–9). Leading mechanisms (causes) of fatal TBIs include unintentional falls, motor vehicle traffic, firearms, suicide, and homicide (10–14).

This report presents an analysis of TBI mortality in the United States based on data from the National Vital Statistics System (NVSS). It describes trends in TBI death rates between 2014 and 2024 overall and by sex. The report also describes differences in 2024 TBI death rates by sociodemographic characteristics, injury intent, and injury mechanism, and presents TBI deaths as a percentage of all deaths and all injury deaths by sex, age group, race and Hispanic origin, and census region.

Methods

Data source and study population

Death certificate records from the NVSS mortality data files for 2014–2024 were used to study deaths due to TBIs among U.S. residents. Using *International Statistical Classification of Diseases, 10th Revision* (ICD–10) codes, TBI deaths

were defined as deaths meeting two criteria, consistent with established practices (15,16). TBI deaths are deaths with a) an external underlying cause (injuries), and b) a mention of one or more nature-of-injury codes describing a TBI in the multiple causes of death. ICD–10 code definitions for these two criteria are:

- Deaths with an external cause in the underlying cause-of-death field: V01–Y36, Y85–Y87, Y89, or *U01–*U03
- Deaths with any mention of one or more nature-of-injury codes describing a TBI in the multiple cause-of-death fields: S01, S02.0, S02.1, S02.3, S02.7–S02.9, S04.0, S06, S07, S09.7–S09.9, T90.1, T90.2, T90.4, T90.5, T90.8, and T90.9.

For injury deaths, including TBIs, external cause codes provide information about the mechanism of injury (such as motor vehicle traffic or falls) and injury intent (such as unintentional, suicide, or homicide). Nature-of-injury codes describe the types of tissue damage and body regions injured by the external cause (such as a fracture to the skull or a crushing injury of the orbital bones).

Classifying injury intent and mechanism

TBI deaths were classified by injury intent using the following underlying cause-of-death ICD–10 codes:

- Unintentional: V01–X59 and Y85–Y86
- Suicide: X60–X84, Y87.0, and *U03
- Homicide: X85–Y09, Y87.1, and *U01–*U02
- Undetermined intent: Y10–Y34, Y87.2, and Y89.9
- Legal intervention or war: Y35–Y36 and Y89(.0,.1).

TBI deaths were also classified by injury mechanism using the following underlying cause-of-death ICD–10 codes:

- Falls: W00–W19, X80, Y01, and Y30
- Firearms: W32–W34, X72–X74, X93–X95, Y22–Y24, Y35.0, and *U01.4
- Motor vehicle traffic: [V02–V04](.1,.9), V09.2, [V12–V14](.3–.9), V19(.4–.6), [V20–V28](.3–.9), [V29–V79](.4–.9), V80(.3–.5), V81.1, V82.1, [V83–V86](.0–.3), V87(.0–.8), and V89.2
- Struck by or against W20–W22, W50–W52, X79, Y00, Y04, Y29, and Y35.3
- All other mechanisms: TBI deaths not included in the four mechanism definitions listed above.

Falls, firearms, motor vehicle traffic, and struck by or against accounted for the majority of all TBI deaths by mechanism of injury from 2014–2023 (17,18).

Demographic groups and census regions

TBI death rates were calculated by sex, age group, race and Hispanic origin, and census region, as reported on the death certificate. Age group was defined as the age at death in years, categorized as: 0–14, 15–24, 25–44, 45–64, or 65 and older. Race and Hispanic origin were categorized based on the Office of Management and Budget's 1997 standards for federal statistical and administrative reporting (19). All race categories are single race, meaning that only one race was reported on the death certificate. Data shown for the Hispanic population include people of any race. Census region was derived from the decedent's residential address at the time of death, with each area of residence, including the District of Columbia, assigned to the Northeast, Midwest, South, or West census region according to the U.S. Census Bureau classification system (20).

Statistical analysis

Age-adjusted TBI death rates were calculated using the direct method and the 2000 standard U.S. population (21). Population estimates used for computing death rates for 2014 through 2024 are the yearly July 1 postcensal population estimates provided by the U.S. Census Bureau.

In addition to TBI death rates, the contribution of TBI deaths to total deaths and injury deaths, expressed as a percentage, is also described. Total deaths were defined as all deaths to U.S. residents from any cause. Total injury deaths were defined as all deaths to U.S. residents meeting the first condition listed in the definition of TBI deaths (an underlying cause-of-death ICD–10 code of V01–Y36, Y85–Y87, Y89, or *U01–*U03). These findings are presented by sex, age group, race and Hispanic origin, and census region.

Trends in death rates were evaluated using the Joinpoint Regression Program (Version 5.4.0.0) developed by the National Cancer Institute (22). Joinpoint software was used to fit weighted least-squares regression models to rates on a log-transformed scale (23,24). Allowing as few as one observed time point at the beginning and ending of the time series, as well as one data point between any two joinpoints, a maximum of three joinpoints were identified using the grid search algorithm and weighted Bayesian Information Criterion (BIC) tests with an overall alpha level of 0.05.

Pairwise comparisons of age group-specific death rates were conducted using two-sided *z* tests with an alpha level of 0.05, with significant differences between age-specific rates based on fewer than 100 deaths determined by comparing 95% confidence intervals of the rates calculated with the gamma method (25). Pairwise comparisons of age-adjusted death rates relied on comparing 95% confidence intervals calculated with the Fay–Feuer method (26).

To assess differences in TBI deaths as a percentage of total deaths and total injury deaths, two-sided confidence intervals were calculated using the Clopper–Pearson method, and absolute and relative confidence interval widths were reviewed to ensure they met presentation standards for proportions outlined by the National Center for Health Statistics (NCHS) (27). All counts and rates presented in this report were also reviewed to ensure they met NCHS standards for reporting vital statistics data (26).

Results

Death rate trends, 2014–2024

The overall age-adjusted TBI death rate for the United States increased from 16.3 deaths per 100,000 standard population in 2014 to 17.5 in 2017, declined to 17.0 in 2019, increased to 19.6 in 2021, and declined again to 18.0 in 2024 (Figure 1, Table 1). The rate for males increased from 25.5 in 2014 to 27.5 in 2017, did not statistically change through 2019 (26.7), increased to 30.6 in 2021, and decreased to 28.1 in 2024. The rate for females increased from 8.0 in 2014 to 8.4 in 2017, decreased to 8.1 in 2019, increased to 9.4 in 2021, and decreased to 8.6 in 2024. Death rates for males were consistently three or more times higher than rates for females from 2014 through 2024.

Death rate differences by sex and demographic groups and census regions, 2024

TBI death rates increased with age for both males and females in 2024 (Figure 2, Table 2). Death rates for males were lowest for those ages 0–14 (2.7), increased to 23.9 for ages 15–24, and were highest for age 65 and older (70.7). TBI death rates for females were lowest for ages 0–14 (1.5), increased to 5.2 for ages 15–24, and were highest for age 65 and older (31.0). Males had higher death rates compared with females across all age groups examined.

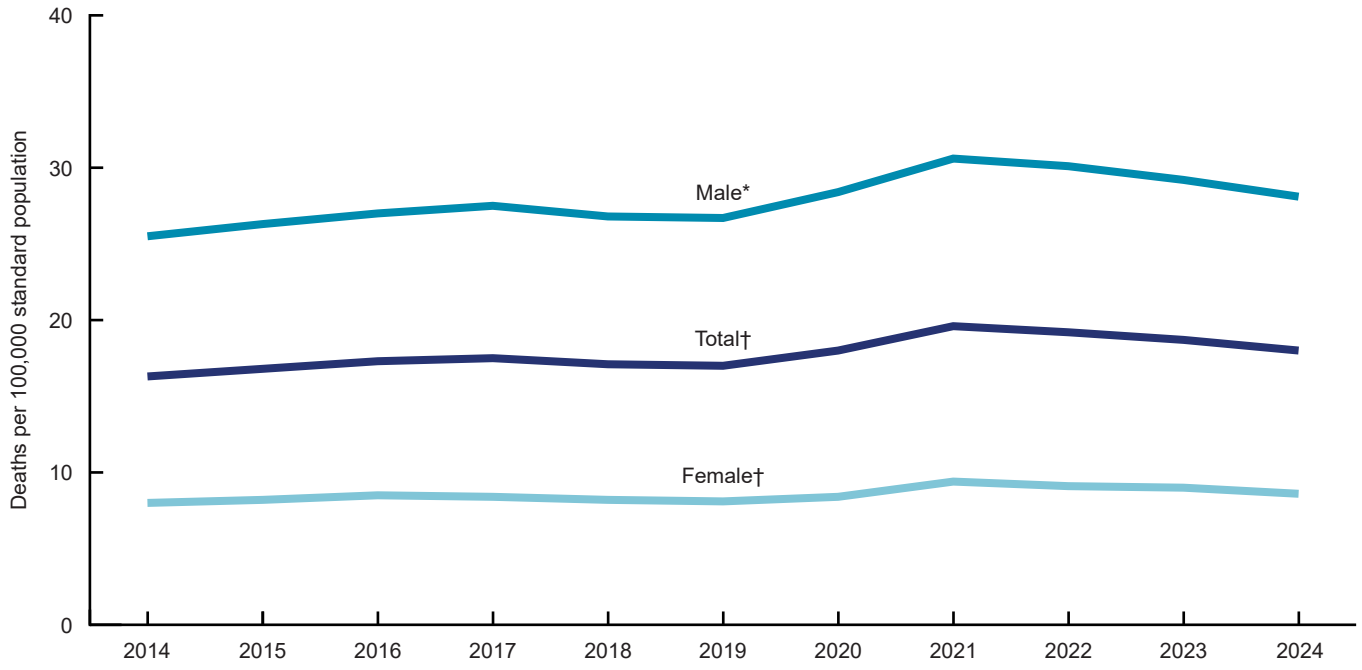
Among males, the age-adjusted TBI death rate for American Indian and Alaska Native non-Hispanic (subsequently, American Indian and Alaska Native) people (40.4) was higher than for other race and Hispanic-origin groups (Figure 3, Table 2). The rates for White non-Hispanic (subsequently, White) (30.9) and Black non-Hispanic (subsequently, Black) (30.7) males were higher than rates for Hispanic (19.0) and Native Hawaiian and Other Pacific Islander non-Hispanic (subsequently, Native Hawaiian and Other Pacific Islander) (18.7) males. The rate for Asian non-Hispanic (subsequently, Asian) males (12.0) was lowest.

TBI death rates among females were highest for American Indian and Alaska Native people (15.8). The death rate for White females (9.6) was higher than the rates for Black (8.0), Hispanic (5.5), and Asian (5.0) females, and the rate for Black females was also higher compared with Hispanic females and Asian females. Across all race and Hispanic-origin groups, death rates were higher among males than females.

The TBI death rate varied by census region for males and females (Figure 4, Table 2). For males, the age-adjusted rate was highest in the South (31.7), and lower across the Midwest (30.2), West (26.2), and Northeast (20.1). For females, rates in the South (9.5) and Midwest (9.4) were similar and higher than in the West (7.8), followed by the Northeast (6.5). Rates for males were higher than for females in all census regions.

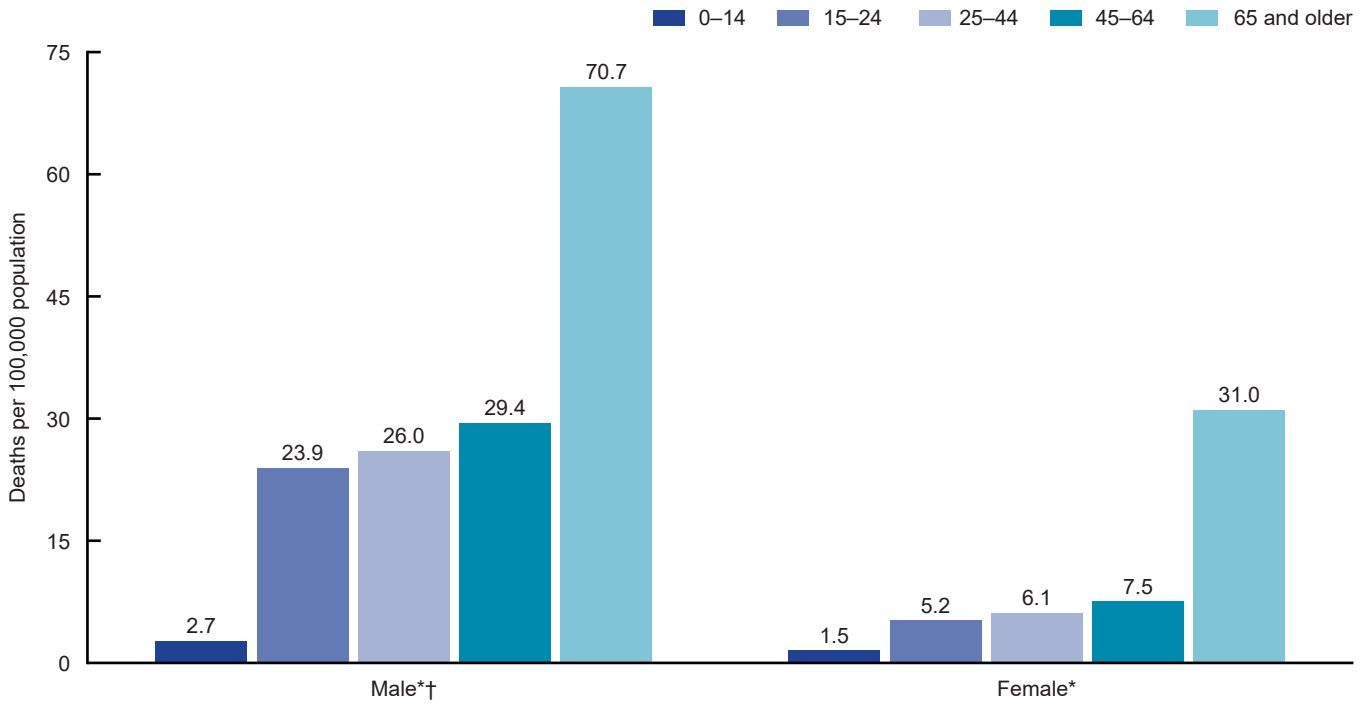
Death rates for males and females varied by injury intent, but both sexes had the same ranking by intent (Figure 5, Table 2). For males, the unintentional TBI death rate was 13.0, followed by suicide (12.3), homicide (2.4), undetermined intent (0.3), and legal intervention or war (0.1). For females,

Figure 1. Age-adjusted traumatic brain injury death rates, by sex and year: United States, 2014–2024



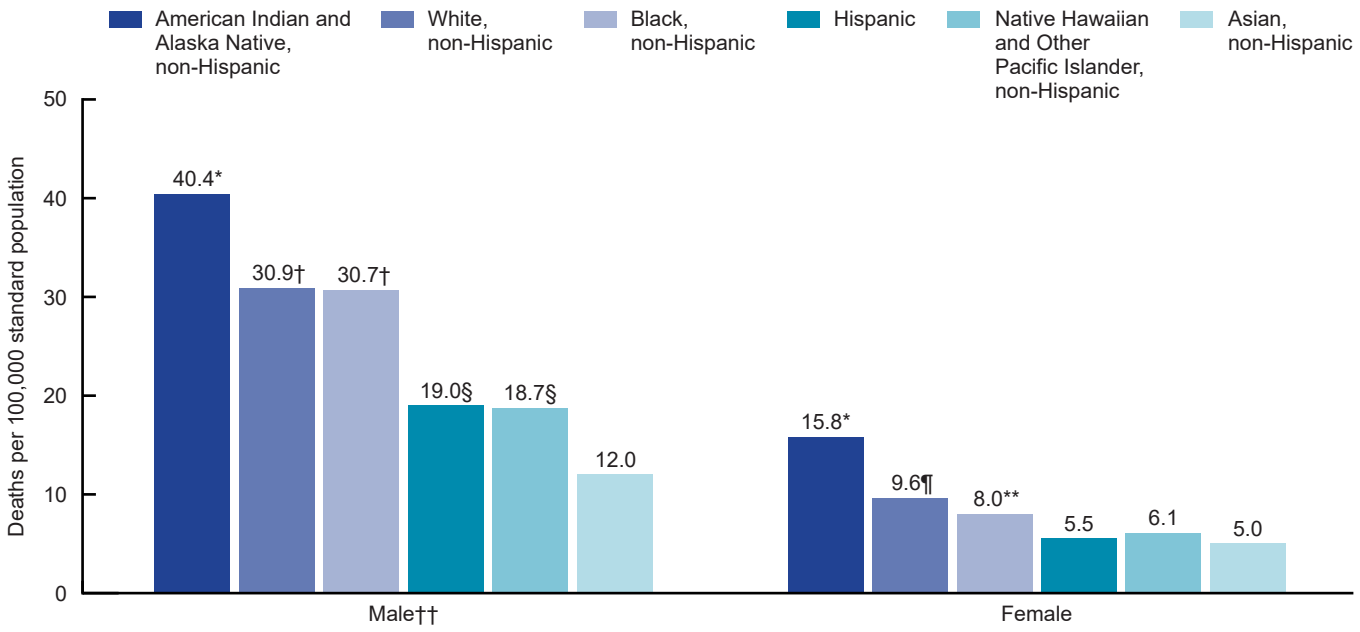
* Increasing trend for 2014–2017, no significant trend for 2017–2019, increasing trend for 2019–2021, and decreasing trend for 2021–2024 ($p < 0.05$). Higher than for females in all years ($p < 0.05$).
† Increasing trend for 2014–2017, decreasing trend for 2017–2019, increasing trend for 2019–2021, and decreasing trend for 2021–2024 ($p < 0.05$).
NOTE: Age-adjusted death rates were calculated using the direct method and the 2000 standard population.
SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

Figure 2. Traumatic brain injury death rates, by sex and age group: United States, 2024



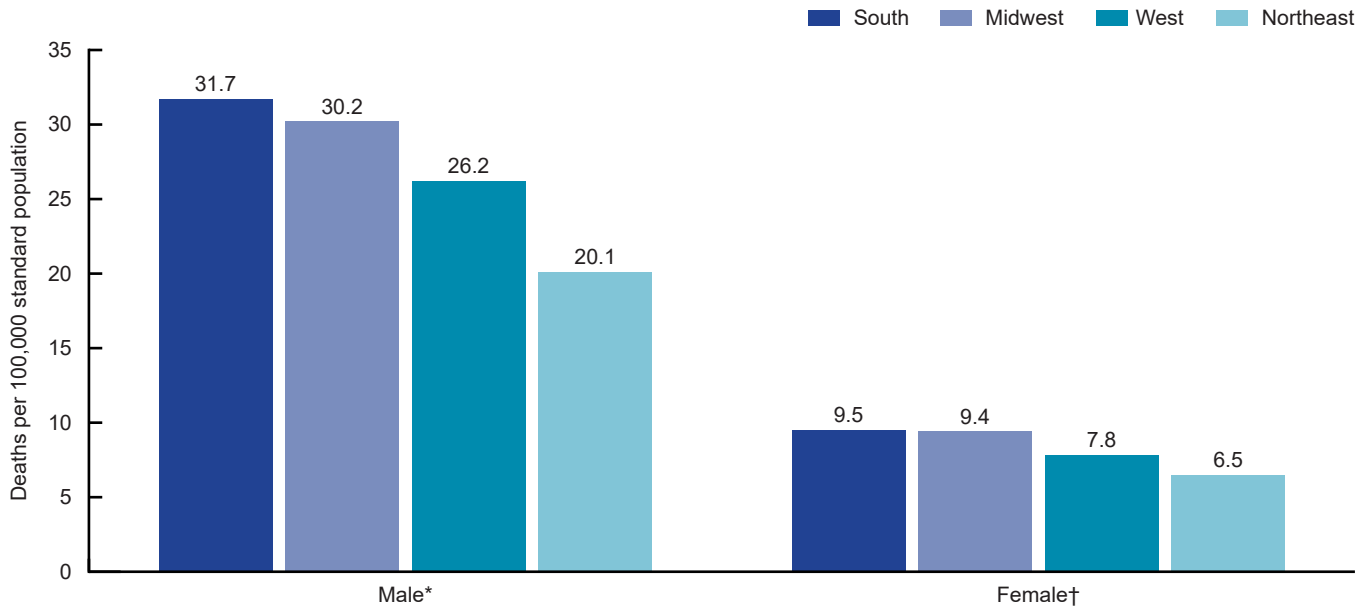
* Within each sex group, all age group rates were statistically different ($p < 0.05$).
† Rates were higher than for females within each age group ($p < 0.05$).
SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

Figure 3. Age-adjusted traumatic brain injury death rates, by sex and race and Hispanic origin: United States, 2024



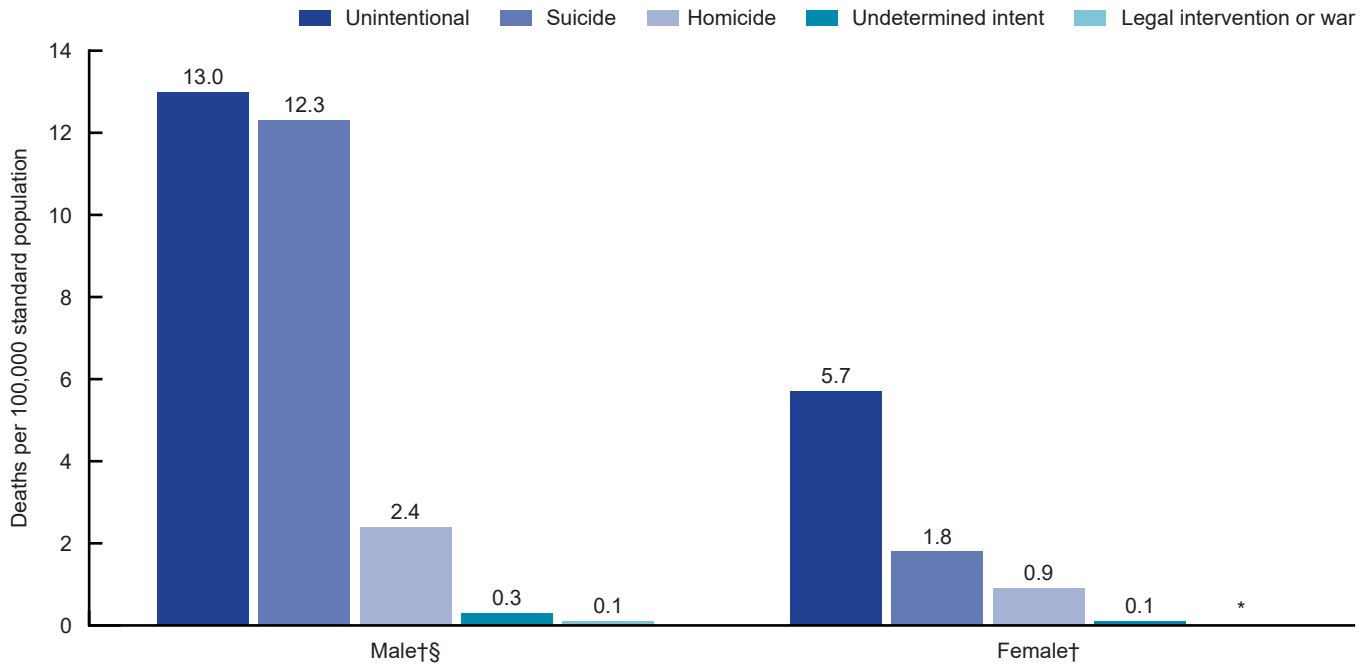
* Rate higher than all other race and Hispanic-origin groups for both males and females ($p < 0.05$).
† Rate higher than for Hispanic, Native Hawaiian and Other Pacific Islander non-Hispanic, and Asian non-Hispanic males ($p < 0.05$).
§ Rate higher than for Asian non-Hispanic males ($p < 0.05$).
¶ Rate higher than for Black non-Hispanic, Hispanic, and Asian non-Hispanic females ($p < 0.05$).
** Rate higher than for Hispanic and Asian non-Hispanic females ($p < 0.05$).
†† Rates higher than for females within each race and Hispanic-origin group ($p < 0.05$).
NOTES: Age-adjusted death rates were calculated using the direct method and the 2000 standard population. Hispanic people may be of any race or combination of races.
SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

Figure 4. Age-adjusted traumatic brain injury death rates, by sex and census region: United States, 2024



* All pairwise comparisons are significantly different ($p < 0.05$). Rates higher than for females within each census region ($p < 0.05$).
† All pairwise comparisons are significantly different ($p < 0.05$) except for comparison between South and Midwest.
NOTES: Age-adjusted death rates were calculated using the direct method and the 2000 standard population. The South census region includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; Midwest includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; West includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; and Northeast includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.
SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

Figure 5. Age-adjusted traumatic brain injury death rates, by sex and injury intent: United States, 2024



* Rate was lower than 0.1 deaths per 100,000 standard population and higher than zero. Estimate meets National Center for Health Statistics standards of reliability.
† All pairwise comparisons are statistically different ($p < 0.05$).
§ Rates were higher than for females within each injury intent ($p < 0.05$).
NOTE: Age-adjusted death rates were calculated using the direct method and the 2000 standard population.
SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

the unintentional TBI death rate was 5.7, followed by suicide (1.8), homicide (0.9), undetermined intent (0.1), and legal intervention or war (less than 0.1). Males had higher death rates compared with females across all injury intents.

Firearms, falls, motor vehicle traffic, and struck by or against accounted for more than 90.0% of TBI deaths for males and females (Figure 6, Table 2). For males, the leading mechanism of death was firearms (14.2), followed by falls (7.2), motor vehicle traffic (4.1), and struck by or against (0.3). For females, the leading mechanism of death was falls (3.7), followed by firearms (2.4), motor vehicle traffic (1.4), and struck by or against (less than 0.1).

Percentage of deaths attributable to TBI, 2024

TBIs accounted for 2.2% of total deaths and 25.0% of total injury deaths in the United States in 2024, and these percentages varied by sex, age group, race and Hispanic origin, and census region (Table). TBIs accounted for 3.1% of total deaths for males compared with 1.2% for females. TBIs accounted for 26.5% of total injury deaths among males compared with 21.5% among females.

TBIs accounted for 22.1% of total deaths among people ages 15–24, followed by those ages 25–44 (9.6%), 0–14 (4.3%), 45–64 (2.9%), and 65 and older (1.3%). TBIs accounted for 33.9% of total injury deaths among people age 65 and older, followed by people ages 15–24 (29.0%), 0–14 (22.3%), 45–64 (20.1%), and 25–44 (18.7%).

TBIs comprised 3.3% of total deaths for American Indian and Alaska Native people and 2.9% for Hispanic people, the highest and second-highest percentages among race and Hispanic-origin groups, respectively. Percentages for Asian (2.2%), White (2.1%), Black (2.1%), and Native Hawaiian and Other Pacific Islander (1.9%) people were statistically similar. In contrast, TBIs comprised 31.3% of total injury deaths for Asian people and 27.6% for White people, the highest and second-highest percentages, respectively, among race and Hispanic-origin groups. Percentages for Hispanic (20.7%), American Indian and Alaska Native (18.9%), Black (18.4%), and Native Hawaiian and Other Pacific Islander (18.4%) people were statistically similar.

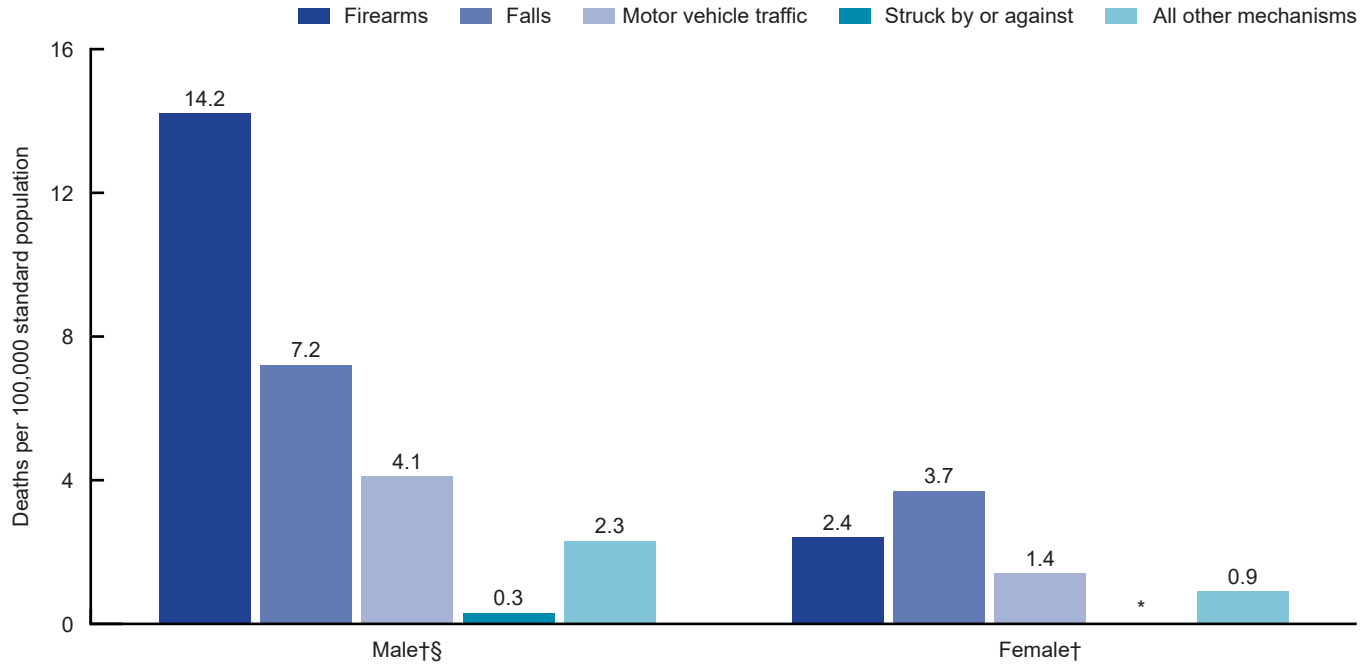
By census region, TBIs accounted for the lowest percentage of total deaths in the Northeast (1.7%) followed by the Midwest (2.2%). The South (2.3%) and West (2.3%) had statistically similar rates that were higher than the other regions. TBI deaths accounted for lower and statistically similar percentages of total injury deaths in the Northeast (22.8%) and West (23.1%) compared with the South (26.1.%) and Midwest (26.3%).

Discussion

Summary of key findings

This report shows changes in age-adjusted TBI death rates across time and describes death rate differences across demographic groups and census regions. Between 2014 and

Figure 6. Age-adjusted traumatic brain injury death rates, by sex and injury mechanism: United States, 2024



* Rate was lower than 0.1 deaths per 100,000 standard population and higher than zero. Estimate meets National Center for Health Statistics standards of reliability.
† All pairwise comparisons are significantly different ($p < 0.05$).
§ Rates were higher than for females within each injury mechanism ($p < 0.05$).
NOTE: Age-adjusted death rates were calculated using the direct method and the 2000 standard population.
SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

Table. Traumatic brain injury deaths, number and percentage of total deaths, and total injury deaths, by sex, age group, race and Hispanic origin, and census region: United States, 2024

Characteristic	Total deaths	Total injury deaths	Total traumatic brain injury deaths		
			Number	Percent of total deaths	Percent of total injury deaths
Total	3,072,666	271,729	67,842	2.2	25.0
Sex*					
Female	1,473,226	83,229	17,890	1.2	21.5
Male	1,599,440	188,500	49,952	3.1	26.5
Age group†§					
0–14	29,833	5,707	1,272	4.3	22.3
15–24	29,953	22,877	6,623	22.1	29.0
25–44	155,257	79,721	14,886	9.6	18.7
45–64	515,966	75,089	15,091	2.9	20.1
65 and older	2,341,600	88,320	29,968	1.3	33.9
Race and Hispanic origin¶**					
American Indian and Alaska Native, non-Hispanic	20,924	3,693	699	3.3	18.9
Asian, non-Hispanic	87,728	6,117	1,912	2.2	31.3
Black, non-Hispanic	380,945	43,865	8,088	2.1	18.4
Hispanic	260,799	35,984	7,466	2.9	20.7
Native Hawaiian and Other Pacific Islander, non-Hispanic	4,431	457	84	1.9	18.4
White, non-Hispanic	2,290,348	176,859	48,730	2.1	27.6
Census region††§§					
South	1,245,473	111,369	29,054	2.3	26.1
Midwest	680,466	57,299	15,092	2.2	26.3
West	636,315	63,998	14,774	2.3	23.1
Northeast	510,412	39,063	8,922	1.7	22.8

* Percentages of total deaths and total injury deaths were higher for males than females ($p < 0.05$).
† Percentage of total deaths were highest for ages 15–24. All pairwise comparisons are statistically different ($p < 0.05$).
§ Percentage of total injury deaths were highest for age 65 and older. All pairwise comparisons are statistically different ($p < 0.05$).
¶ Percentage of total deaths were highest for American Indian and Alaska Native non-Hispanic people, followed by Hispanic people ($p < 0.05$). Percentages of total deaths for other race and Hispanic-origin groups were statistically similar.
** Percentage of total injury deaths were highest for Asian non-Hispanic people followed by White non-Hispanic people ($p < 0.05$). Percentages of total injury deaths for other race and Hispanic-origin groups were statistically similar.
†† Percentages of total deaths were higher in the South and West regions (tie) and lowest in the Northeast ($p < 0.05$).
§§ Percentages of total injury deaths were higher in the Midwest and South regions (tie) and lower in the West and Northeast (tie) ($p < 0.05$).

NOTES: Hispanic people may be of any race or combination of races. The South census region includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; Midwest includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; West includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; and Northeast includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

2024, periods of both increasing and decreasing rate trends were seen. For example, rates increased from 2014 to 2017 and from 2019 to 2021 and decreased from 2021 to 2024, overall and for both females and males. Overall and for females, but not males, rates decreased from 2017 to 2019.

This report is consistent with research that examined previous years of TBI mortality (3–14). As in previous years, in 2024 higher rates were seen among males compared with females regardless of age group, race and Hispanic origin, census region, injury intent, or injury mechanism. TBI death rates also increased with age for both sexes. Death rates were highest for American Indian and Alaska Native people for both males and females, compared with other race and Hispanic-origin groups. The most common intent categories for TBI death were unintentional injuries and suicide, and the most common mechanisms included falls, firearms, and motor vehicle traffic for both sexes.

In addition to TBI mortality rates, this report describes TBI deaths as a percentage of total deaths and total injury deaths. In 2024, TBIs accounted for 2.2% of total deaths and 25.0% of total injury deaths nationally. These percentages varied across demographic groups and census regions. For some population groups with low TBI death rates, TBIs accounted for a larger proportion of all deaths or all injury deaths. For example, people ages 15–24 had the second-lowest TBI death rate, but for this age group TBIs accounted for the highest percentage of total deaths and the second-highest percentage of total injury deaths of any age group. Asian people had the lowest TBI death rate in 2024 and TBIs accounted for the lowest percentage of total deaths. However, Asian people also had the second-highest percentage of injury deaths attributable to TBIs compared with all other groups (sex, age group, race and Hispanic origin, and census region).

Data considerations and study limitations

This report focuses on TBI deaths where the underlying cause was an injury. TBI-related ICD–10 codes appeared in one or more multiple-cause fields for 0.8% of deaths not due to injury in 2024 (18). These cases were not included in this report as the scientific understanding of when and how nonfatal TBIs contribute to later life mortality is still emerging (28,29). Findings reported in this analysis of injury-related TBI deaths therefore cannot be generalized to cases where a TBI contributed to the death and the underlying cause of death was not injury-related. Additionally, trends and patterns described in this report cannot be extrapolated to nonfatal TBIs.

Estimates of death counts and rates in this report are based on death certificate data collected by individual state and local jurisdictions (30). Death investigation and reporting practices are known to vary between the different medicolegal death investigation systems across the United States, and those variations may affect the completeness and accuracy of death certificates in cases of fatal injuries (31,32).

TBI deaths are presented in this report by census region of residence (place of residence), not the location where the death occurred (place of occurrence). Findings on the geographic differences in TBI death rates by census region therefore may not fully characterize geographic patterns in TBI deaths occurring away from home, such as while traveling or working. This analysis also does not include TBI deaths for residents of U.S. territories or for nonresident deaths that occur within the United States.

Data on TBI deaths by race and Hispanic origin may be impacted by misclassification of race and Hispanic origin on death certificates. While information on the misclassification of race and Hispanic origin for TBI deaths is not available, previous studies of race and Hispanic-origin reporting on death certificates have found that such misclassification results in the underestimation of death rates by as much as 3% for Asian and Hispanic people and 34% for American Indian and Alaska Native people (33,34).

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Table 1. Number of traumatic brain injury deaths and age-adjusted death rates, by sex and year: United States, 2014–2024

Year of death	Total*		Female*		Male†	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
2014	54,948	16.3	14,746	8.0	40,202	25.5
2015	57,253	16.8	15,359	8.2	41,894	26.3
2016	59,540	17.3	16,009	8.5	43,531	27.0
2017	61,134	17.5	16,170	8.4	44,964	27.5
2018	60,565	17.1	16,069	8.2	44,496	26.8
2019	60,611	17.0	16,001	8.1	44,610	26.7
2020	64,362	18.0	16,694	8.4	47,668	28.4
2021	69,473	19.6	18,152	9.4	51,321	30.6
2022	70,187	19.2	18,401	9.1	51,786	30.1
2023	68,663	18.7	18,134	9.0	50,529	29.2
2024	67,842	18.0	17,890	8.6	49,952	28.1

* Increasing trend for 2014–2017, decreasing trend for 2017–2019, increasing trend for 2019–2021, and decreasing trend for 2021–2024 ($p < 0.05$).
† Increasing trend for 2014–2017, no significant trend for 2017–2019, increasing trend for 2019–2021, and decreasing trend for 2021–2024 ($p < 0.05$). Rates higher than for females in all years ($p < 0.05$).

NOTE: Age-adjusted death rates were calculated using the direct method and the 2000 standard population.

SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

Table 2. Number of traumatic brain injury deaths and age-adjusted death rates, by sex and age group, race and Hispanic origin, census region, injury intent, and injury mechanism: United States, 2024

Characteristic	Male*		Female	
	Deaths	Rate	Deaths	Rate
Age group†				
0–14	820	2.7	452	1.5
15–24	5,487	23.9	1,145	5.2
25–44	12,097	26.0	2,789	6.1
45–64	11,974	29.4	3,117	7.5
65 and older	19,582	70.7	10,386	31.0
Race and Hispanic origin				
American Indian and Alaska Native, non-Hispanic§	501	40.4	198	15.8
Asian, non-Hispanic	1,260	12.0	652	5.0
Black, non-Hispanic	6,264	30.7¶	1,824	8.0**
Hispanic	5,828	19.0††	1,638	5.5
Native Hawaiian and Other Pacific Islander, non-Hispanic	64	18.7††	20	6.1
White, non-Hispanic	35,356	30.9¶	13,374	9.6§§
Census region¶¶				
South	21,579	31.7	7,475	9.5
Midwest	11,005	30.2	4,087	9.4
West	11,091	26.2	3,683	7.8
Northeast	6,277	20.1	2,645	6.5
Injury intent†				
Unintentional	23,474	13.0	13,000	5.7
Suicide	21,776	12.3	3,113	1.8
Homicide	3,984	2.4	1,542	0.9
Undetermined intent	576	0.3	225	0.1
Legal Intervention or war	142	0.1	10	***
Injury mechanism†				
Firearms	24,896	14.2	4,256	2.4
Falls	13,223	7.2	9,279	3.7
Motor vehicle traffic	7,132	4.1	2,487	1.4
Struck by or against	483	0.3	103	***
All other mechanisms	4,218	2.3	1,765	0.9

* Rates higher than for females within each age, race and Hispanic origin, census region, injury intent, and injury mechanism group ($p < 0.05$).
† All pairwise comparisons are statistically different ($p < 0.05$).
§ Rates higher than all other race and Hispanic-origin groups for both males and females ($p < 0.05$).
¶ Rate higher than for Hispanic, Native Hawaiian and Other Pacific Islander non-Hispanic, and Asian non-Hispanic males ($p < 0.05$).
** Rate higher than for Hispanic and Asian non-Hispanic females ($p < 0.05$).
†† Rate higher than for Asian non-Hispanic males ($p < 0.05$).
§§ Rate higher than for Black non-Hispanic, Hispanic, and Asian non-Hispanic females ($p < 0.05$).
¶¶ For males, all pairwise comparisons are significantly different ($p < 0.05$). For females, all pairwise comparisons are significantly different ($p < 0.05$) except for comparison between the South and Midwest regions.
*** Rate was lower than 0.1 deaths per 100,000 standard population and higher than zero. Estimate meets National Center for Health Statistics standards of reliability.

NOTES: Death rates by age group are reported as the number of deaths per 100,000 population. All other death rates are age-adjusted and per 100,000 standard population, directly standardized based on the 2000 standard population. Hispanic people may be of any race or combination of races. The South census region includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; Midwest includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; West includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; and Northeast includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

SOURCE: National Center for Health Statistics, National Vital Statistics System, mortality data file.

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