

Traumatic Brain Injury

South Dakota

April 2022

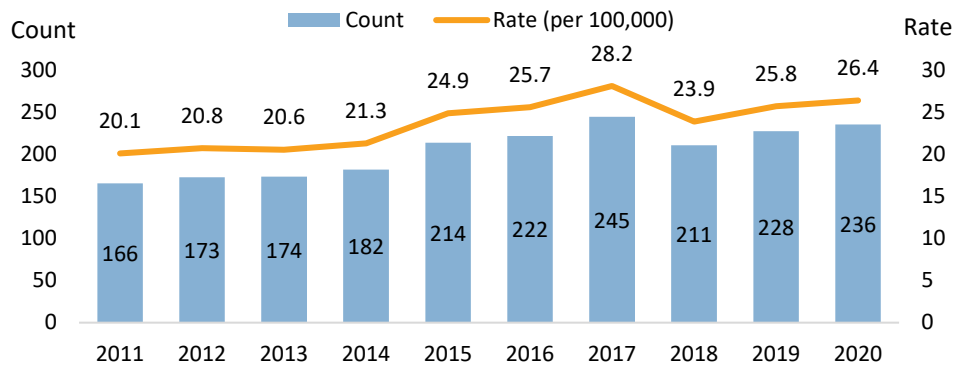
Background

Traumatic brain injury (TBI) is a head injury caused by an external force to the head or body resulting in disruption of normal brain function. TBI has multiple causes, including motor vehicle accidents, firearms, falls, etc., and there are multiple types of brain injury, such as fracture of skull, intracranial injury, etc. This report examines causes of TBI-related deaths and morbidity among South Dakota residents and which populations are at greater risk of getting a TBI.

TBI-Related Deaths in South Dakota

From 2011 to 2020, there were 2,051 TBI-related deaths among South Dakota residents. In 2020 there were 236 TBI-related deaths, which was a 42% increase from 166 deaths in 2011, see Figure 1. The rate of TBI-related deaths in the United States was 18.5 per 100,000 in 2019, and the South Dakota rate for the same year was 25.8 per 100,000.

Figure 1: TBI-Related Deaths by Year, 2011-2020

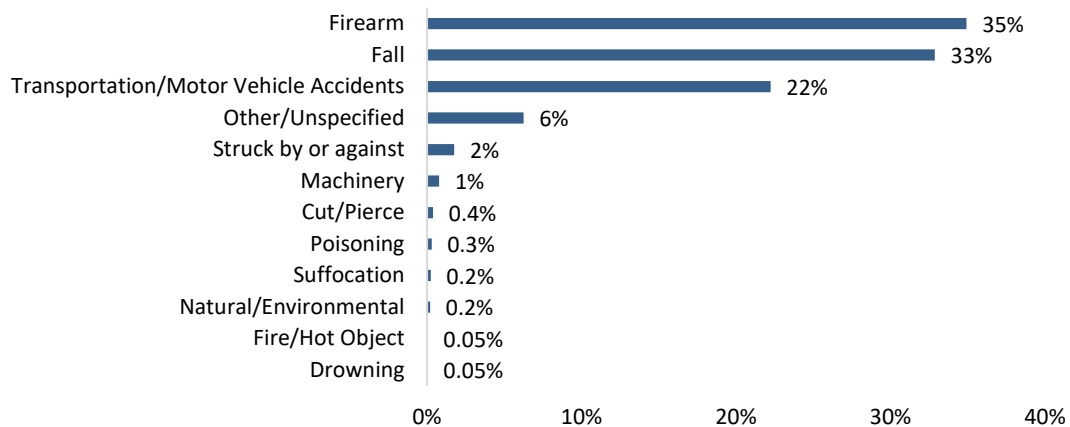


Causes of TBI-Related Deaths

35%
of TBI-related
deaths were
due to firearms

Most TBI-related deaths were unintentional (60%). Suicides accounted for 32% of TBI-related deaths, homicide 7%, undetermined intent 1%, and legal intervention <1%. Of the 2,051 TBI-related deaths, all had a cause other than TBI listed as the primary cause of death. The three top primary causes of death were firearms (35%), falls (33%), and transportation/motor vehicle accidents (22%), Figure 2.

Figure 2: TBI-Related Deaths by Cause, 2011-2020



TBI-Related Deaths by Type

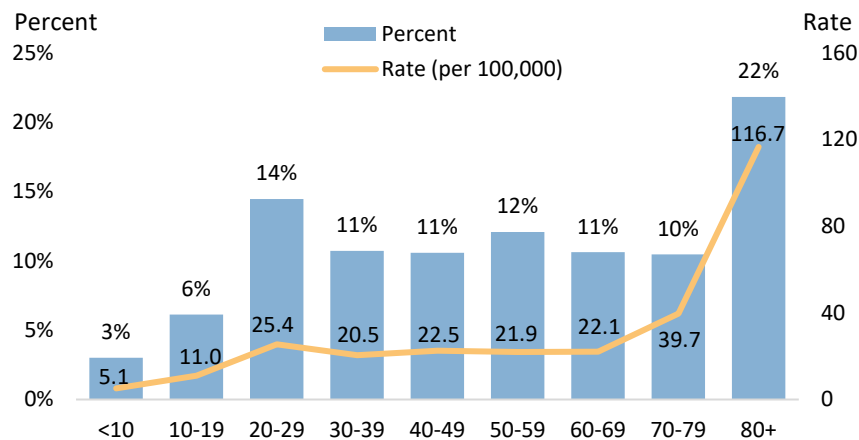
TBI-related deaths can also be categorized by injury type, which describes the head injury sustained. Intracranial injuries made up the largest proportion of TBI-related deaths at 34%. The second most common type was other and unspecified injuries of the head (33%), followed by open wounds of the head (29%), and other types of injuries (4%).

High Risk Populations

Age

Although TBI-related deaths can occur at any age, the likelihood of dying from a TBI-related cause increases with age. The highest percentage and rate of TBI-related deaths were among South Dakotans aged 80 years and older, Figure 3.

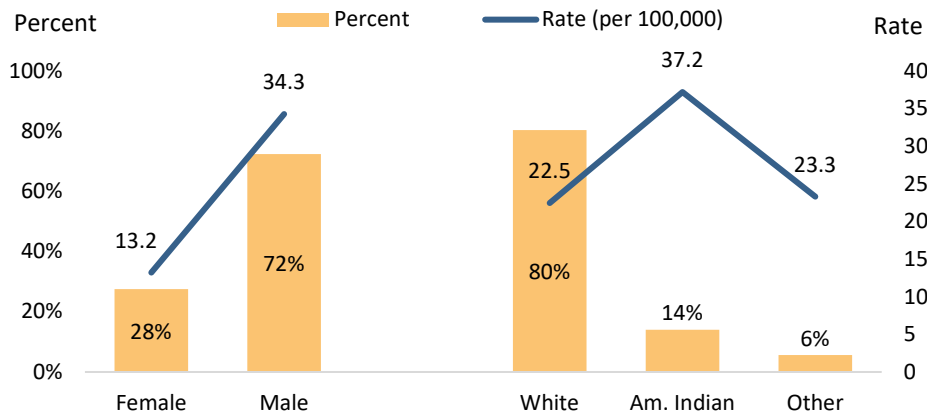
Figure 3: TBI-Related Deaths by Age Group, 2011-2020



Sex and Race

Overall, males were more likely to die from a TBI-related death than females. Males made up 72% of deaths and had a rate almost three times higher than the female rate (34.3 vs 13.2 per 100,000). The largest proportion of TBI-related deaths were among the White population (80%), but American Indians died from TBI-related causes at a higher rate (37.2 per 100,000), Figure 4.

Figure 4: TBI-Related Deaths by Sex and Race, 2011-2020

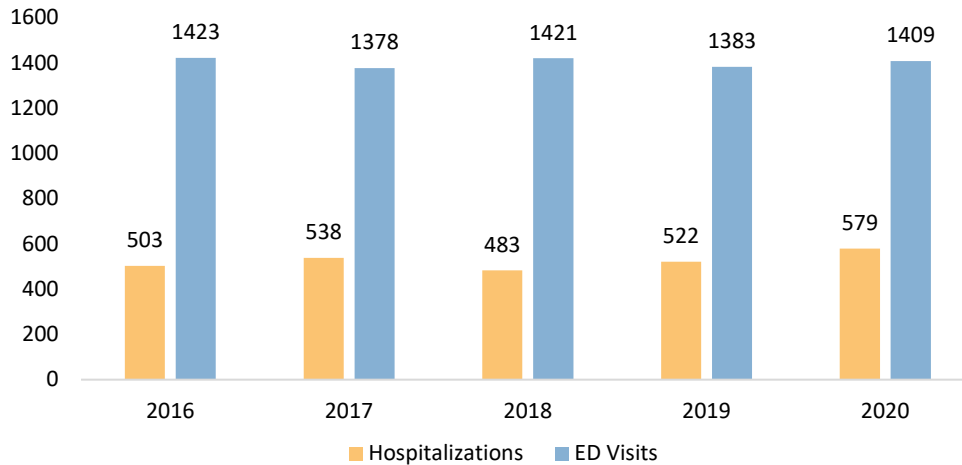


(Other race includes Asian, Black, Pacific Islander, Multiracial, and Hispanic)

TBI-Related Hospitalizations and Emergency Department Visits in South Dakota

Not all head injuries lead to death. From 2016 to 2020, there were 2,625 TBI-related hospitalizations and 7,014 emergency department (ED) visits among South Dakota residents, Figure 5.

Figure 5: TBI-Related Hospitalizations and ED Visits, 2016-2020

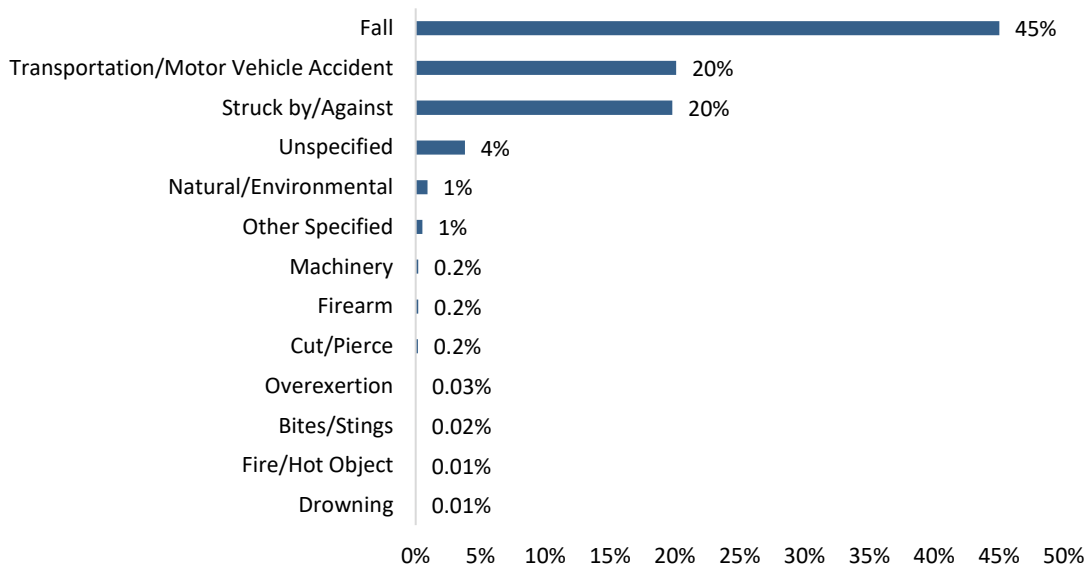


Causes of TBI-Related Hospitalizations and ED Visits

45%
of TBI-related
hospitalizations &
ED visits were due
to falls

Nearly all (91%) TBI-related hospitalizations and ED visits had an external cause of injury listed. External cause of injury refers to the intent and mechanism by which an individual sustained their injury, sometimes this information is unknown (about 9% of hospitalizations and ED visits). Of the records with a valid external cause of injury listed, 80% were unintentional, and 10% were due to assault. By mechanism, 45% were due to falls, 20% were due to transportation/motor vehicle accidents, and 20% were due to being struck by/against, see Figure 6.

Figure 6: TBI-Related Hospitalizations and ED Visits by Cause, 2016-2020



TBI-Related Hospitalizations and ED Visits by Type

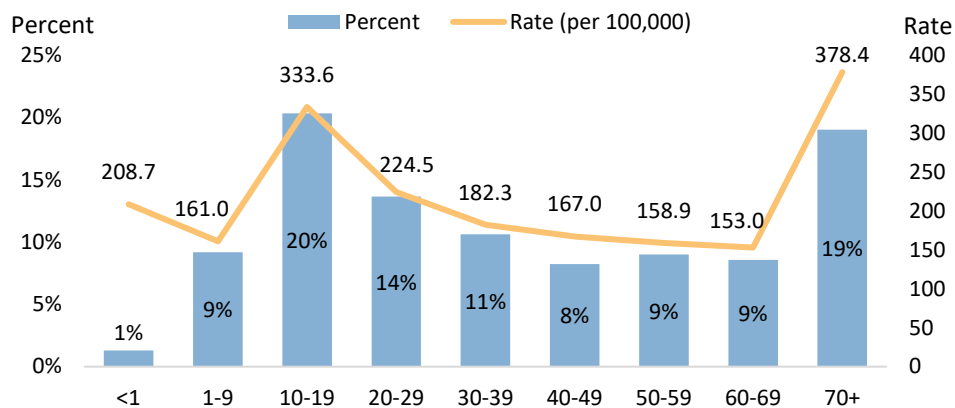
Every patient record has a principal diagnosis that provides the reason for the visit. For TBI-related visits, the principal diagnosis describes the type of head injury sustained. The most common head injury type sustained was an intracranial injury, which accounted for 92% of visits. Fractures of the skull accounted for 5% of visits, and fractures of other specified skull and facial bones/unspecified fractures accounted for 3% of visits.

High Risk Populations

Age

South Dakotans are at risk for a TBI at any age, but there are certain age groups that are at an increased risk for TBI-related hospitalizations and ED visits. South Dakotans aged 10-19 years and 70+ years make up the largest proportion and have some of the highest rates of TBI-related visits, Figure 7.

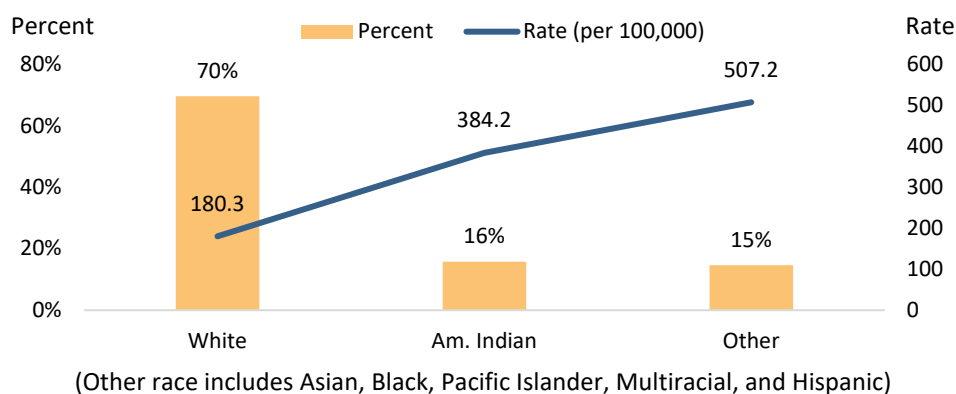
Figure 7: TBI-Related Hospitalizations and ED Visits by Age Group, 2016-2020



Sex and Race

Overall, males are more likely to suffer from a TBI and seek medical care. Males made up 63% of TBI-related hospitalizations and 55% of ED visits. The largest proportion of TBI-related hospitalizations and ED visits were among the White population (70%). However, American Indians were seen for TBI-related medical care at a rate almost two times higher than the White rate (384.2 per 100,000 vs. 180.3 per 100,000), Figure 8.

Figure 8: TBI-Related Hospitalizations and ED Visits by Race, 2016-2020



Conclusion

Traumatic brain injury contributes to a substantial proportion of death and disability in South Dakota. This report identified falls and transportation/motor vehicle accidents as some of the top causes of TBI-related mortality and morbidity. This report also identified persons in the 10-19 and 70+ year age group to be at highest risk of TBI hospitalizations/ED visits, but persons in the 80+ year age group at highest risk of TBI mortality. The higher rate of TBI hospitalization/ED visits and death among American Indians is an opportunity for health equity-focused prevention through awareness and risk mitigation. The findings in this report emphasizes the continued need for injury prevention resources.

Injury Resources

DOH Injury Surveillance and Prevention: <https://doh.sd.gov/statistics/InjurySurveillance.aspx>

DOH Injury Prevention Resources:

<https://doh.sd.gov/providers/ruralhealth/trauma/injuryprevention.aspx>

Case Definitions and Data Sources

Case Definitions & Methods

Deaths

Mortality data sets were created following guidance from the State Injury Indicators report. From this data set, a subset was created based on deaths having one of the following ICD-10 codes in any of the multiple causes of death fields: 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.

Nonfatal Hospitalizations and Emergency Department Visits

Nonfatal Hospital and Emergency Department discharge data sets were created following guidance from the State Injury Indicators Report. From these data sets, subsets were created based on cases having any of the following ICD-10-CM codes in any field: S02.0, S02.1, S02.8X, S02.80, S02.81, S02.82, S02.91, S04.02, S04.03, S04.04, S06, S07.1, T74.4.

Data Methods Resources

State Injury Indicators Report:

https://www.cdc.gov/injury/pdfs/2019_state_injury_indicator_instructions-508.pdf

Data Sources

South Dakota Department of Health (DOH) Vital Statistics

South Dakota Association of Healthcare Organizations (SDAHO)