TRAUMATIC BRAIN INJURIES

ARIZONA RESIDENTS 2014

Arizona Department of Health Services

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EXECUTIVE SUMMARY

ARIZONA RESIDENTS 2014

Traumatic brain injuries (TBI) were the cause of death for 1,233 Arizona residents in 2014. Males ages 85 years and older had the highest rate of TBI deaths with 208.1 deaths per 100,000 residents. TBI death rates were highest among American Indians (21.3 per 100,000 residents) and non-Hispanic Whites (19.2 per 100,000 residents). Forty-three percent of TBI deaths in 2014 were due to unintentional injuries (n=530); 46 percent were due to suicides (n=565); and six percent were due to homicides (n=67). The most common causes of TBI deaths were firearms (50 percent, n=621), falls (27 percent, n=328), and motor vehicle traffic crashes (11 percent, n=130).

In 2014, there were 6,581 non-fatal inpatient hospitalizations due to TBI. Adults 85 years and older had the highest rates of TBI inpatient hospitalizations. Males 85 years and older had a rate of 657.0 hospitalizations per 100,000 residents, and among females 85 years and older, the rate was 611.2 hospitalizations per 100,000 residents. Age-adjusted TBI inpatient hospitalization rates were highest among American Indians (184.2 per 100,000 residents) and African Americans (88.9 per 100,000 residents). Unintentional injuries accounted for 86 percent of TBI hospitalizations (n=5,684). Falls were the most common cause of TBI hospitalizations (48 percent, n=3,141), followed by motor vehicle traffic crashes (27 percent, n=1,793). Total hospital charges for non-fatal inpatient hospitalizations due to TBIs were more than $574 million, and Arizonans spent a total of 37,907 days hospitalized in 2014.

In 2014, there were 54,310 non-fatal TBI emergency department visits among Arizona residents. TBI emergency department visit rates were highest among children younger than one year of age for males and over 85 years of age for females. Males younger than one year of age had a rate of 2,872.3 visits per 100,000 residents, and females 85 years and older had a rate of 3,081.5 visits per 100,000 residents. Among children under one, 99 percent of the TBI-related emergency department visits were due to unintentional injuries. Age-adjusted TBI emergency department rates were highest among non-Hispanic Whites (900.8 per 100,000 residents) and African Americans (779.3 per 100,000 residents). Overall, unintentional injuries accounted for 91 percent of the TBI emergency department visits. The leading causes of TBI emergency department visits were falls (54 percent, n=29,244), struck by/against injuries (22 percent, n=11,792), and motor vehicle traffic crashes (14 percent, n=7,605). Total hospital charges for non-fatal emergency department visits due to TBIs were more than $355.1 million.

TBI: AT A GLANCE

For every TBI-related death in Arizona in 2014 there were:

5 Non-fatal inpatient hospitalizations and

44 Non-fatal emergency department visits

Resulting in over $929.6 million in hospital charges

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INTRODUCTION

Traumatic brain injury (TBI) is a major cause of death and disability in the United States contributing to approximately 30% of all injury deaths.[1] A TBI is caused by a bump, blow, or jolt to the head or by a penetrating head injury that disrupts brain function.[2] From the most recent information posted on the Center for Disease Controls website regarding TBI's, in 2010 approximately 2.5 million Americans sustained a traumatic brain injury, in which over 50,000 died as a result of the trauma.[3] TBI can cause cognitive function deficits, which can lead to depression and other adverse secondary outcomes including problems working and performing daily activities such as completing academic assignments, managing personal finances, or driving a vehicle.

The data presented in this report illustrates the public health burden associated with TBI in Arizona. Besides the obvious impacts TBI can have on overall health, traumatic brain injuries often result in considerable medical expenses, quality of life changes, and lost wages. TBI can occur throughout the life span, and the repercussions of these injuries may be experienced for many years. The consequences of TBI can extend beyond the injured individuals to their families and communities. For severe, but non-fatal TBI, families may be required to provide care, often resulting in time away from work, loss of income, and increases in stress. At the community level, the financial costs of TBI include medical expenses, rehabilitation, lost wages, and lost productivity. **Most TBI injuries are preventable.** Understanding the risk factors associated with TBI is an important step toward educating and empowering communities to implement effective prevention strategies.

[1,2] Faul M, Xu L, Wald MM, Coronado VG. Traumatic brain injury in the United States: emergency department visits, hospitalizations, and deaths. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.

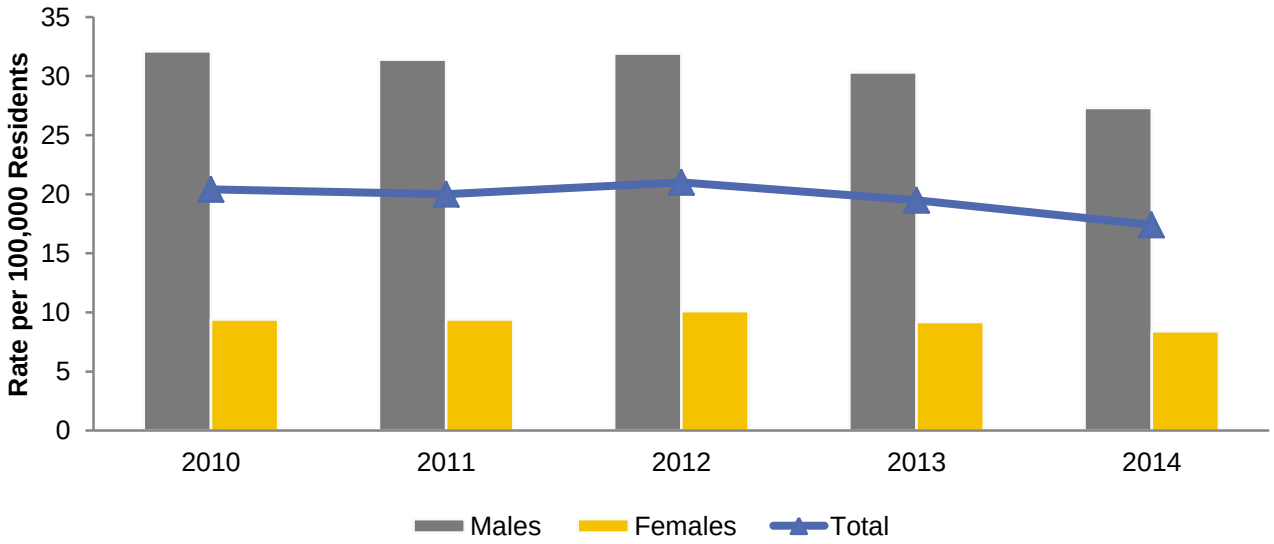
[3] National Vital Statistics System (NVSS), 2006–2010. Data source is maintained by the CDC National Center for Health Statistics.

TRENDS IN TRAUMATIC BRAIN INJURIES AMONG ARIZONA RESIDENTS 2010-2014

Mortality

Between 2010 and 2014, the age-adjusted mortality rate due to traumatic brain injuries decreased by 15 percent, from 20.4 deaths per 100,000 Arizona residents in 2010 to 17.4 deaths per 100,000 residents in 2014.The male mortality rates decreased by 15 percent while the female mortality rates decreased by 11 percent. The age-adjusted mortality rates among males were more than triple the rates of females. Figure 1 shows age-adjusted TBI mortality rates by sex from 2010 through 2014.

Figure 1. Age-Adjusted TBI Mortality Rates by Sex, Arizona 2010-2014



In 2014, all manners of TBI-related deaths decreased from the previous year and overall since 2010. The age-adjusted rate of unintentional TBI-related deaths decreased 16 percent from 2010 and 11 percent from 2013. Suicide mortality rates decreased four percent since 2010 and six percent since 2013. The age-adjusted rates of motor vehicle crash TBI-related deaths have decreased 41 percent since 2010 while fall-related deaths have only decreased by four percent. Firearm-related TBI deaths also decreased by over 13 percent since 2010. Figures 2 and 3 show the age-adjusted TBI mortality rates by manner of death and selected cause of injury.

Figure 2. Age-Adjusted TBI Mortality Rates by Manner of Death, Arizona 2010-2014

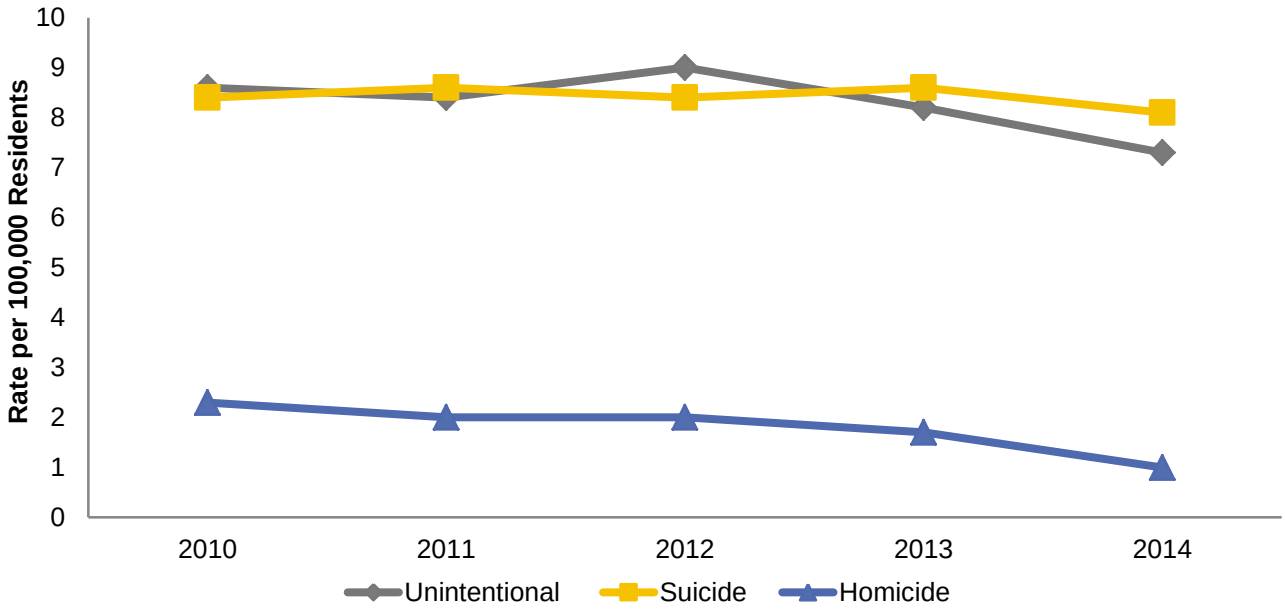
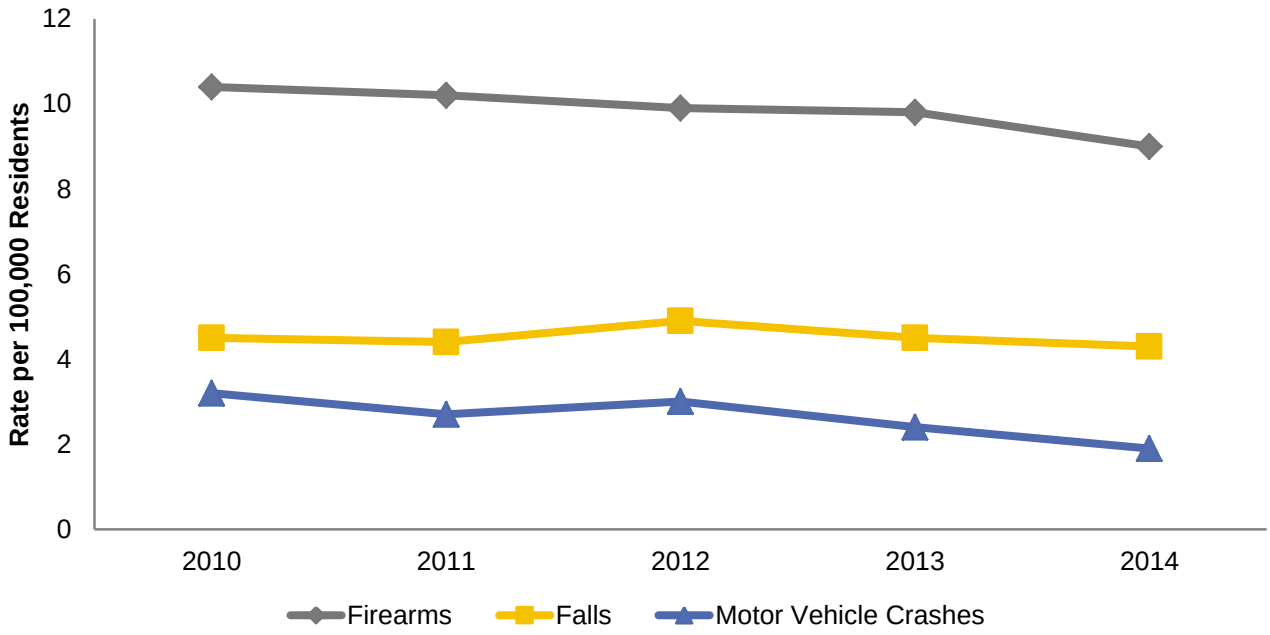


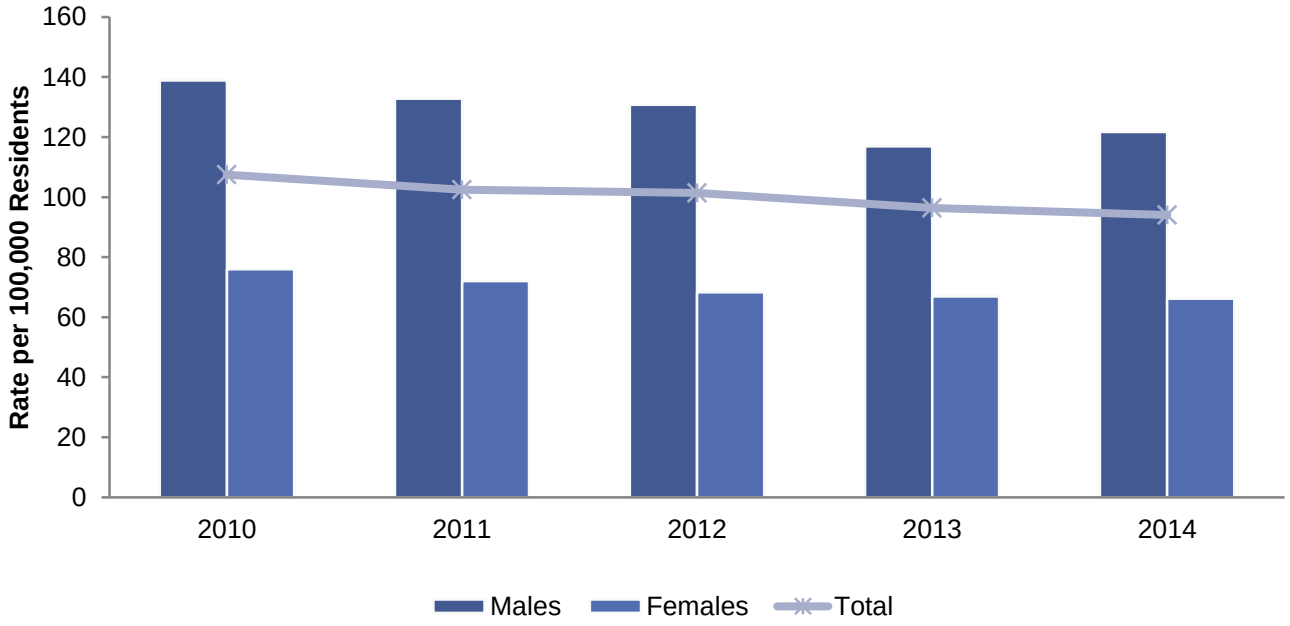
Figure 3. Age-Adjusted TBI Mortality Rates By Leading Cause of Death, Arizona 2010-2014



Non-Fatal Inpatient Hospitalizations

Between 2010 and 2014, the age-adjusted rate of TBI-related inpatient hospitalizations decreased 13 percent, from 107.5 hospitalizations per 100,000 Arizona residents in 2010 to 94.0 hospitalizations per 100,000 residents in 2014. On average, the age-adjusted hospitalization rates among males were 1.8 times higher than the rates of females during the same 5 year period. Rates for males decreased 12 percent from between 2010 and 2014, and rates for females decreased 13 percent. Figure 4 shows the age-adjusted non-fatal TBI-related inpatient hospitalization rates by sex from 2010 through 2014.

Figure 4. Age-Adjusted Non-Fatal TBI-Related Inpatient Hospitalization Rates by Sex, Arizona 2010-2014



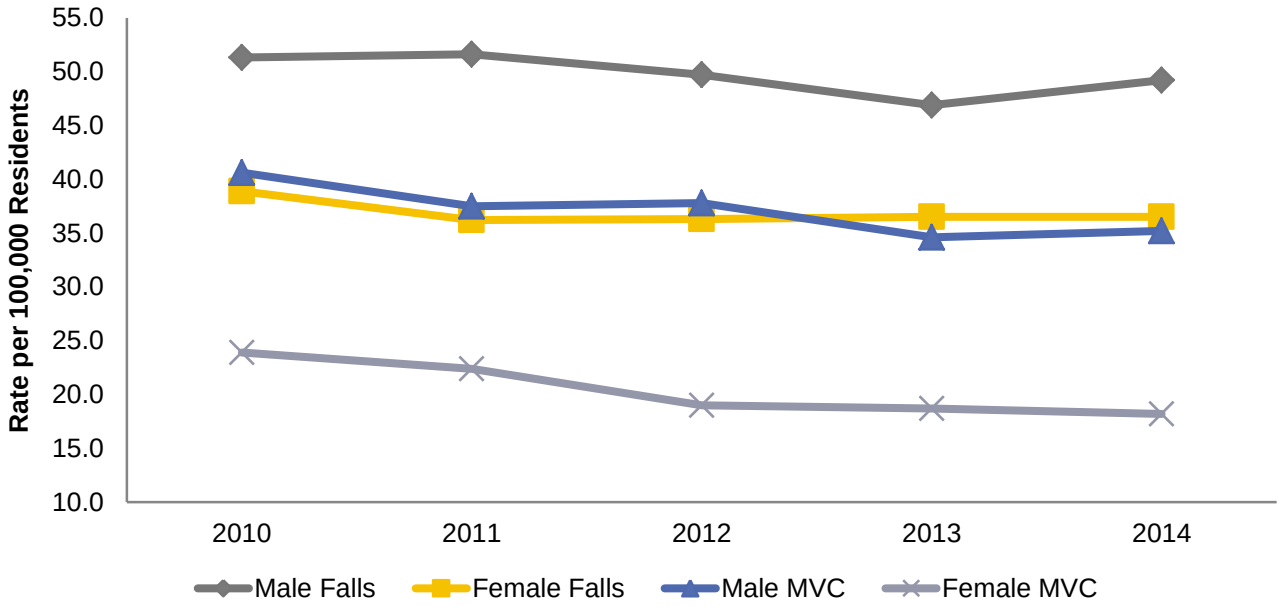
The total age-adjusted TBI-related inpatient hospitalization rate decreased 13 percent from 2010 through 2014. This is mainly due to the decrease in unintentional TBI's since they compose the majority of the injuries (86 percent). Unintentional injuries have decreased by 13 percent from 2010 to 2014 while assault-related TBI decreased by 19 percent. Figure 5 shows age-adjusted TBI hospitalization rates by manner of injury.

Figure 5. Age-Adjusted Non-Fatal TBI-Related Inpatient Hospitalization By Manner of Injury, Arizona 2010-2014

The rate of non-fatal inpatient hospitalizations due to fall-related traumatic brain injuries have decreased by five percent since 2010, from 45.1 hospitalizations per 100,000 residents in 2010 to 42.8 hospitalizations per 100,000 residents in 2014. Males consistently had a higher rate of fall-related TBI hospitalizations than females in each of the five years examined and can be seen in Figure 6 on the next page.

While the rate of fall-related TBI hospitalizations remained fairly stable since 2010, the rate of motor vehicle crash-related TBI hospitalizations decreased 17 percent in the past five years, from 32.2 crash-related hospitalizations in 2010 to 26.7 crash-related hospitalizations per 100,000 residents in 2014. As with falls, males had a higher rate of motor vehicle crash-related TBI hospitalizations than females in each of the years examined. Figure 6 shows the trend of fall and motor vehicle crash-related TBI hospitalizations by sex from 2010 through 2014 (on the next page).

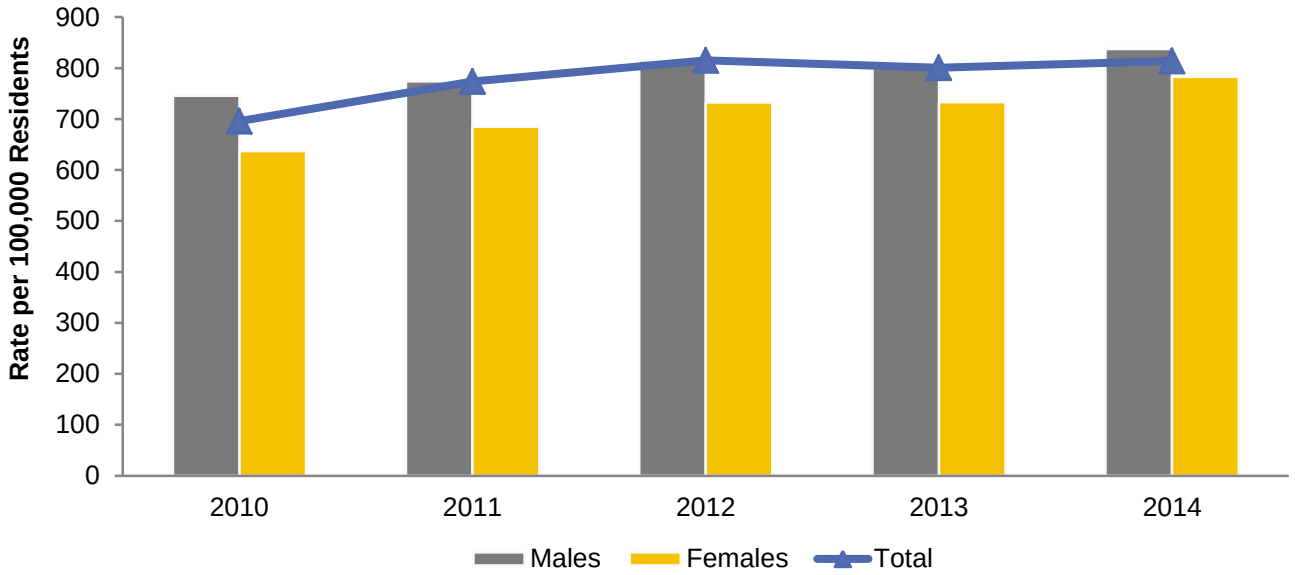
Figure 6. Age-Adjusted Non-Fatal TBI Inpatient Hospitalization Rates by Mechanism and Sex, Arizona 2010-2014



Non-Fatal Emergency Department Visits

From 2010 through 2014, the age-adjusted rate of non-fatal TBI-related emergency department visits increased by 17 percent overall, from 695.7 visits per 100,000 residents in 2010 to 813.8 visits in 2014.The rates among males and females have increased steadily since 2010. Among males, the rate increased 12 percent, from 745.8 visits per 100,000 residents in 2010 to 837.2 visits per 100,000 residents in 2014. Among females, the rate increased 17 percent, from 637.3 visits per 100,000 in 2010 to 782.7 visits per 100,000 residents in 2014. Age-adjusted emergency department visit rates among males were higher than rates among females for the last five years but the disparity between the genders has decreased over time. Figure 7 shows age-adjusted TBI-related emergency department visit rates by sex from 2010 to 2014.

Figure 7. Age-Adjusted Non-Fatal TBI-Related Emergency Department Visit Rates by Sex, Arizona, 2010-2014



While total age-adjusted TBI-related emergency department visit rates increased from 2010 through 2014, changes in rates varied by manner and mechanism of injury. Unintentional injuries have increased by 19 percent since 2010, while injuries related to assaults decreased by three percent. TBI-related hospitalizations due to self-harm are relatively low and are therefore not included in the figure.

Unlike deaths and hospitalizations, motor vehicle crash-related traumatic brain injury emergency department visits have increased since 2010 by 33 percent, from 87.7 visits per 100,000 residents in 2010 to 116.1 visits per 100,000 residents in 2014. The emergency department visit rates due to falls also increased by 23 percent since 2010 as shown in Figure 9.

Figure 8 shows age-adjusted TBI emergency department visit rates by manner of injury, and Figure 9 shows age-adjusted rates for non-fatal TBI-related emergency department visits by leading causes of injury.

Figure 8. Age-Adjusted Non-Fatal TBI-Related Emergency Department Visit Rates By Manner Of Injury, Arizona 2010-2014

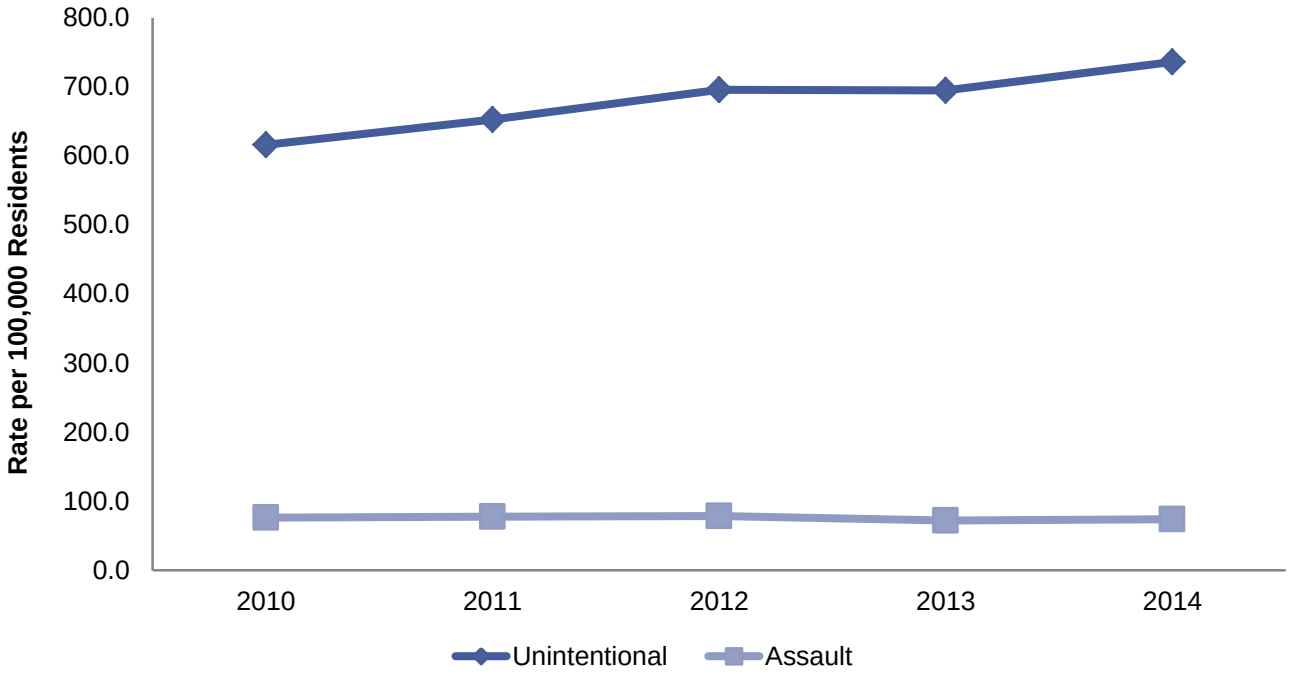
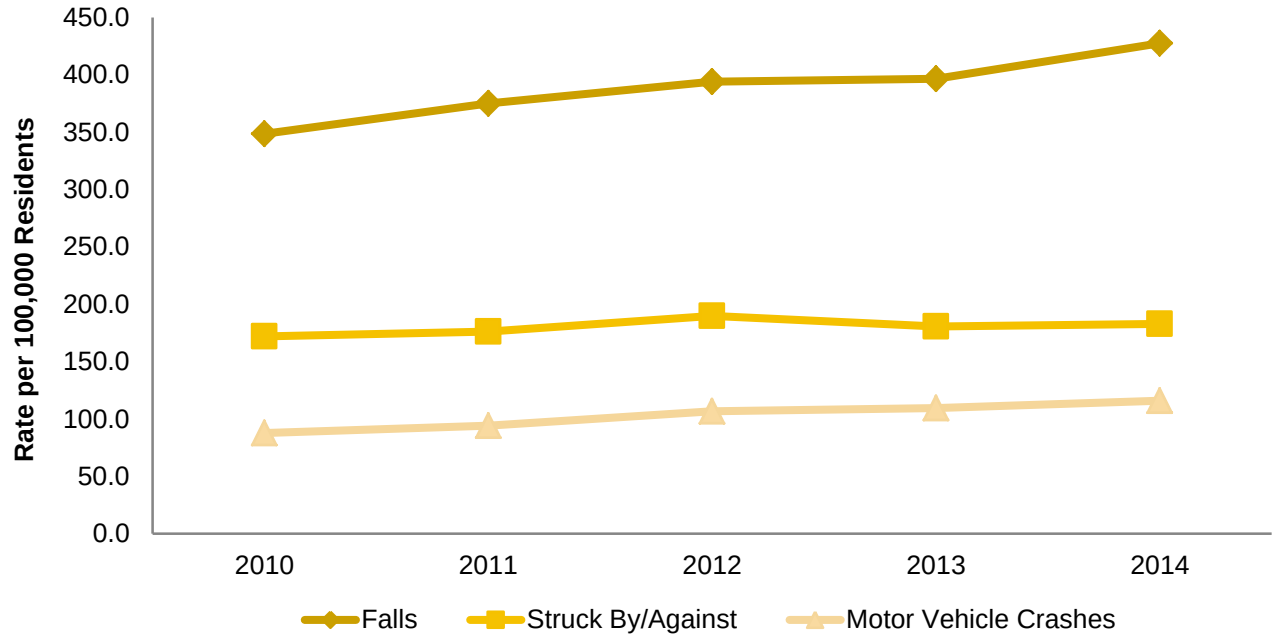


Figure 9. Age-Adjusted Non-Fatal TBI-Related Emergency Department Visit By Selected Cause Of Injury, Arizona 2010-2014

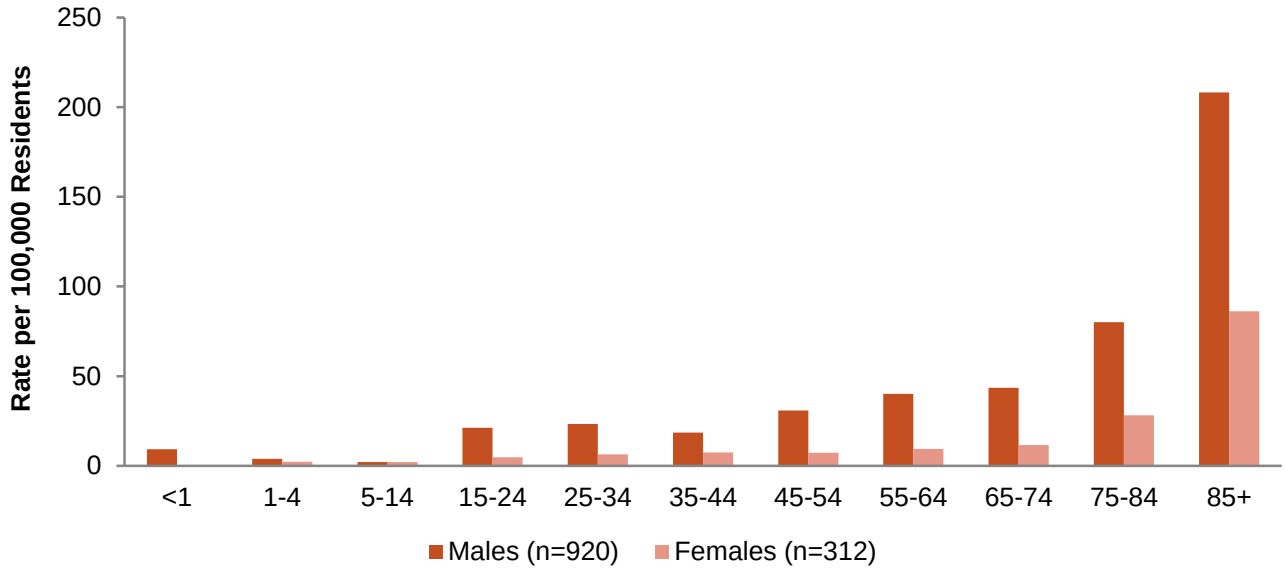


DEATHS AMONG ARIZONA RESIDENTS DURING 2014

In 2014, 1,233 Arizona residents died as a result of a TBI. The majority of deaths were among males (75 percent, n=920), while females accounted for 25 percent of TBI deaths (n=312). Males had higher rates of TBI-related mortality across all age groups.

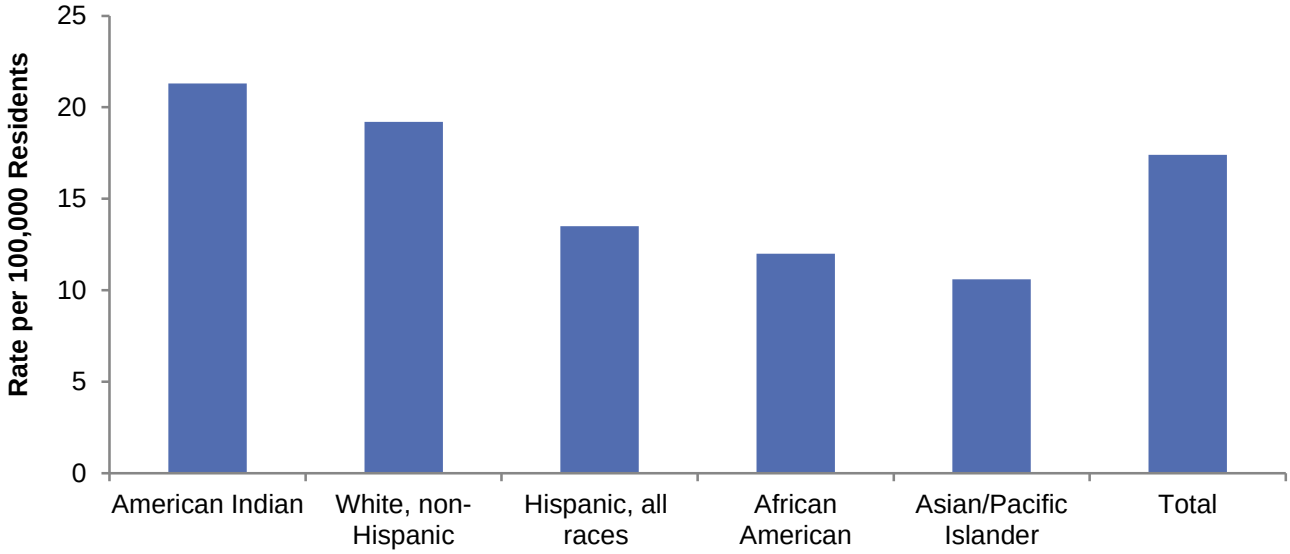
Males 85 years and older accounted for 95 deaths and had the highest rate of TBI deaths in 2014 (208.1 per 100,000 residents). Among the 159 deaths in those 85 years and older, 70 percent were due to unintentional falls (n=112). Figure 10 shows the 2014 TBI death rates by age group and sex for Arizona residents.

Figure 10. Age-Specific TBI-Related Mortality Rates by Sex, Arizona 2014



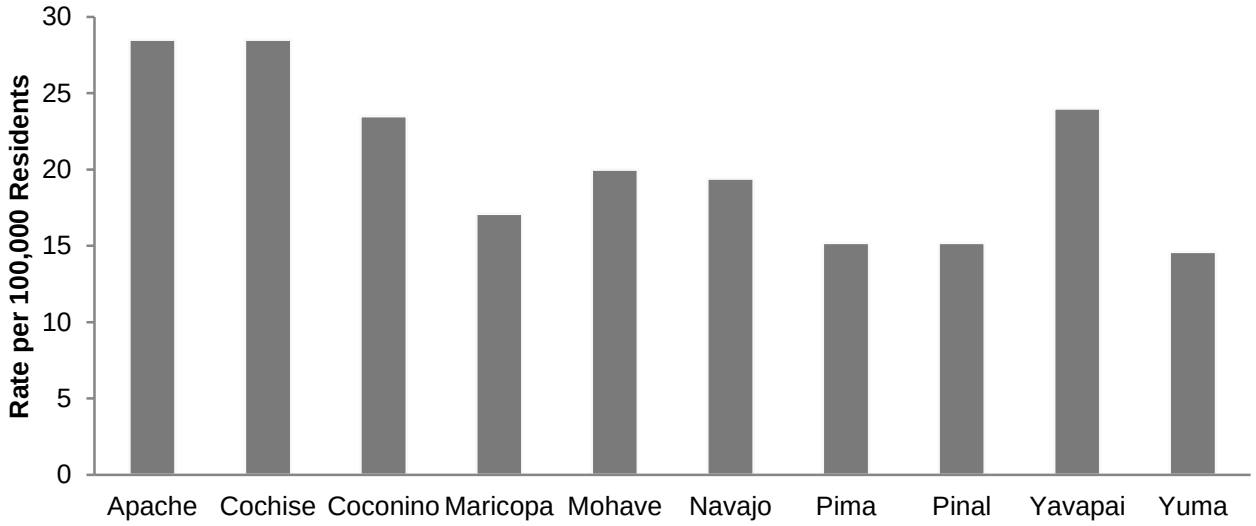
Age-adjusted TBI death rates were highest among American Indians (21.3 deaths per 100,000 residents) and non-Hispanic Whites (19.2 deaths per 100,000 residents). Rates were lowest among Asian/Pacific Islanders. Figure 11 shows the 2014 age-adjusted TBI death rates by race/ethnicity in Arizona.

Figure 11. Age-AdjustedTBI-Related Mortality Rates by Race/Ethnicity, Arizona 2014



Apache and Cochise Counties had the highest age-adjusted TBI mortality rates in 2014 (28.5 deaths per 100,000 residents respectively). The next highest TBI mortality rate was in Yavapai County with 24.0 deaths per 100,000 residents. Figure 12 shows the TBI mortality rate by county for 2014 in Arizona.

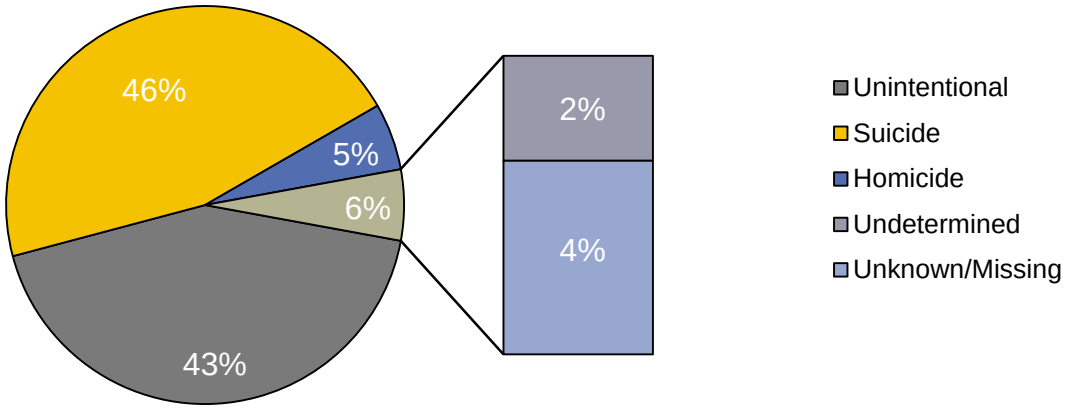
Figure 12. Age-Adjusted TBI-Related Mortality Rates by County, Arizona 2014*



*Only Counties with 20 or more records were included in graph

Forty-three percent of the TBI deaths in 2014 were due to unintentional injuries (n=530); 46 percent were due to suicides (n=565); and five percent were due to homicides (n=67). Figure 13 shows TBI deaths by manner of injury during 2014 in Arizona.

Figure 13. Percentage of TBI-related Deaths by Manner, Arizona 2014



The most common causes of TBI deaths were firearms (50 percent, n=621), falls (27 percent, n=328), and motor vehicle traffic crashes (11 percent, n=130). Causes of TBI deaths during 2014 in Arizona are shown in Table 1. Descriptions of these causes are given in Appendix A.

The causes and manners of TBI-related mortality varied greatly by race/ethnicity. Suicides, due primarily to firearms, were highest among White, non-Hispanics, while unintentional injuries, specifically due to motor vehicle crashes, were the leading cause and manner of TBI-related death among American Indian residents. Figures 14 and 15 show the percentages of TBI-related deaths for each race/ethnicity by cause and manner of death. The cause of death refers to the injury that resulted in death, whereas the manner of death refers to the intentionality of the death.

Table 1. Number and Percentage of TBI Deaths by Cause, Arizona 2014

Cause	Number	Percentage
Firearm	621	50%
Fall	328	27%
Motor vehicle traffic	130	11%
Other/unspecified/unknown	128	11%
Other land transport	14	1%
Other pedestrian/bicycle	6	<1%
Struck By/Against	6	<1%
Total	**1,233**	**100%**

Source: Arizona Vital Statistics

Figure 14. TBI-Related Deaths by Manner and Race/Ethnicity, Arizona 2014

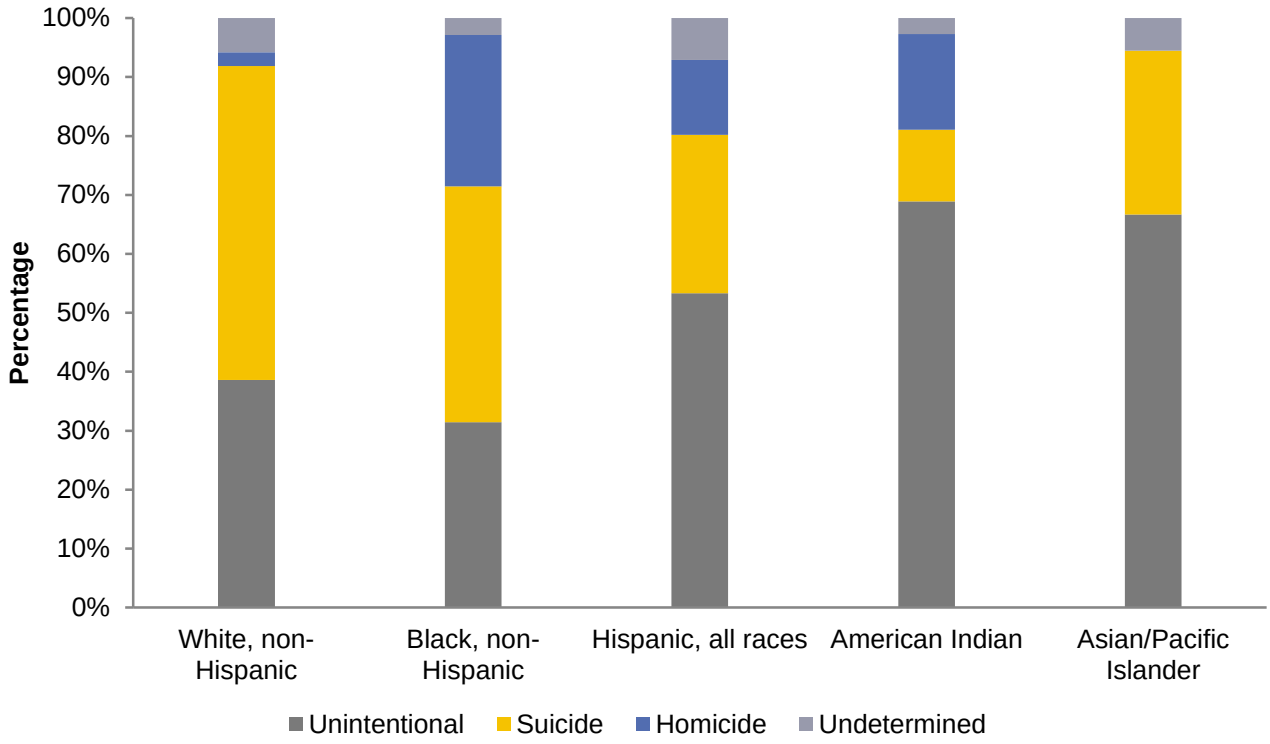
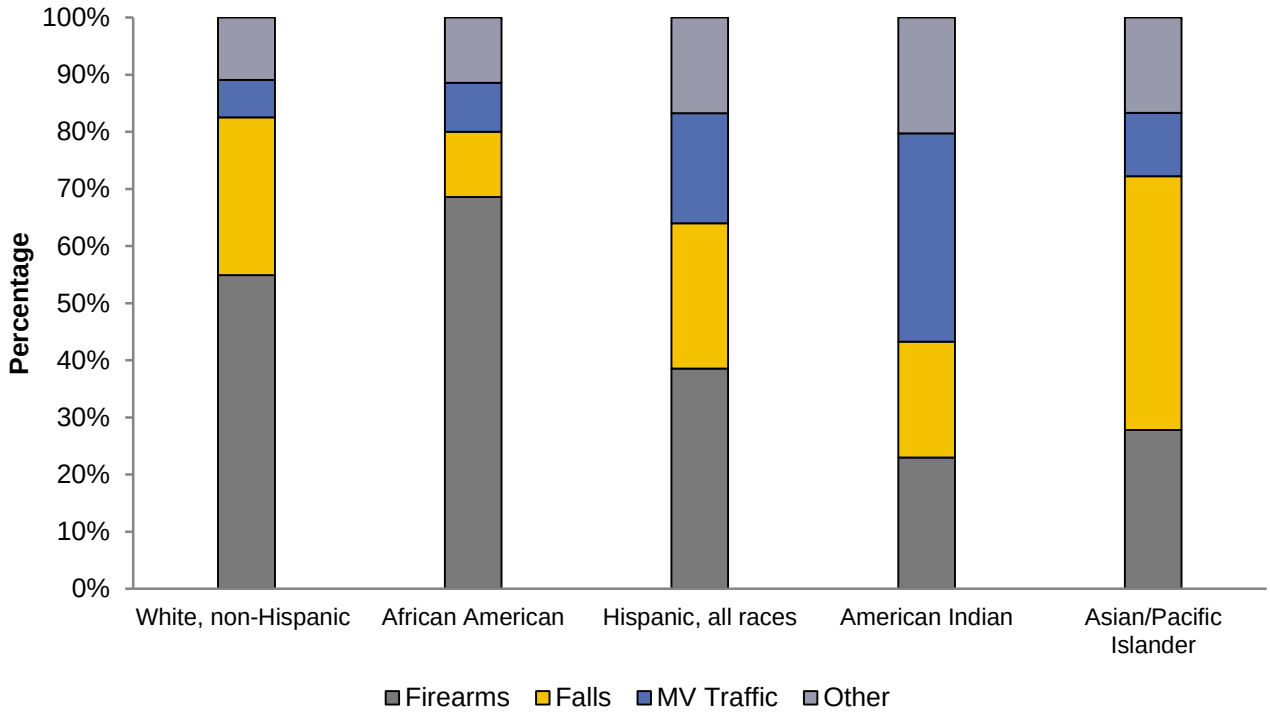


Figure 15. TBI-Related Deaths by Cause and Race/Ethnicity, Arizona 2014



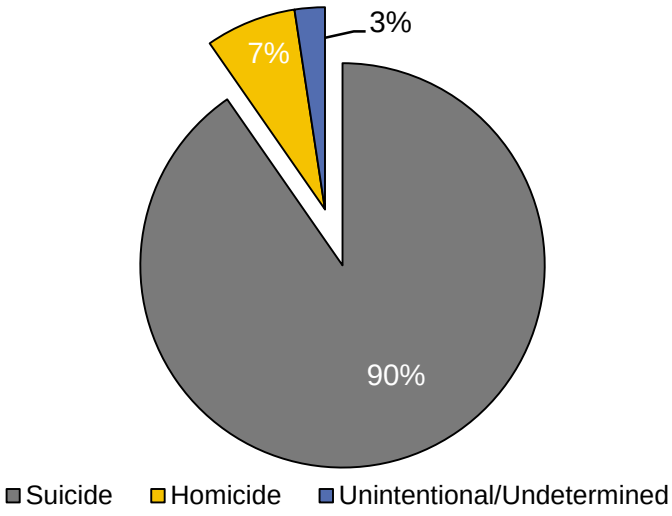
Firearm-Related TBI Mortality

Among the 621 Arizona residents who died as a result of a firearm-related TBI, the majority were male (82 percent, n=508) and 18 percent were female (n=113).

The highest age-adjusted rate of firearm-related TBI deaths was among White non-Hispanics (15.3 deaths per 100,000 residents, n=409). The second highest rate was among African Americans (6.9 per 100,000 residents, n=24) followed by Native Americans with 4.3 deaths per 100,000 residents. Hispanics had the second highest count of firearm-related TBI (n=76) however the rate for this group was low, 4.2 per 100,000 residents.

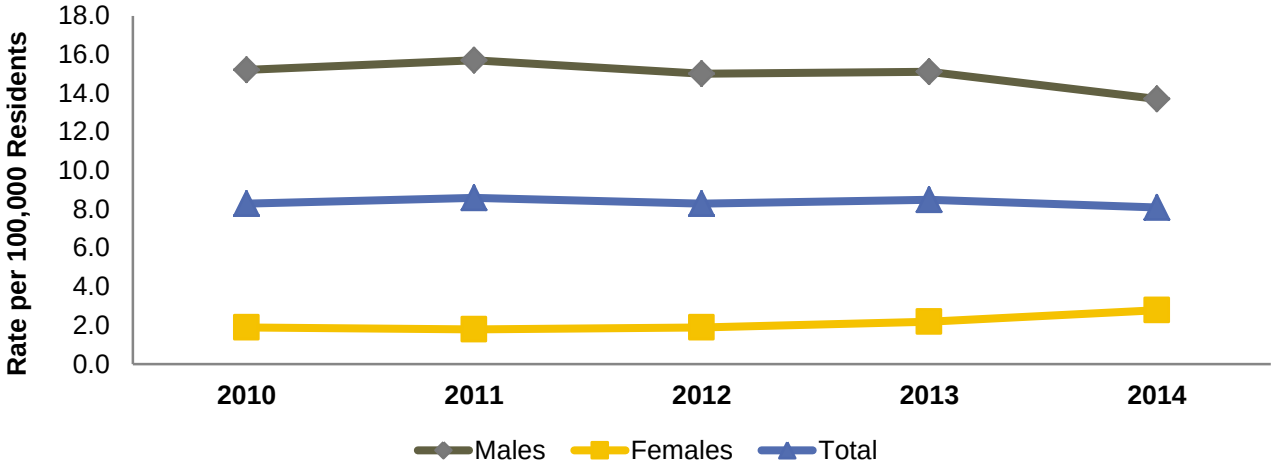
The majority of firearm-related TBI deaths were suicides (90 percent, n=561). Seven percent of the deaths were due to homicides (n=45) and one percent were due to undetermined intent (n=7). Figure 16 shows the percentage of TBI deaths due to firearms by manner of injury.

Figure 16. Percentage of Firearm-Related TBI Deaths by Manner, Arizona 2014



Among the 561 TBI deaths resulting from firearm-related suicides, 81 percent were among males (n=466) and 19 percent were among females (n=95). The age-adjusted rate of TBI deaths resulting from firearm-related suicides was 8.1 deaths per 100,000 residents, a five percent decrease since 2013. The highest age-specific rates were among adult males, particularly among those 85 years and older (46.0 per 100,000). Age-adjusted rates were substantially higher among males than among females over each of the years from 2010-2014 but female suicide rates have increased 47 percent since 2010. Figure 17 shows the age-adjusted rate of TBI deaths resulting from firearm-related suicides by sex and year.

Figure 17. Age-Adjusted TBI Mortality Rates Due To Firearm Suicides by Sex And Year, Arizona 2010-2014

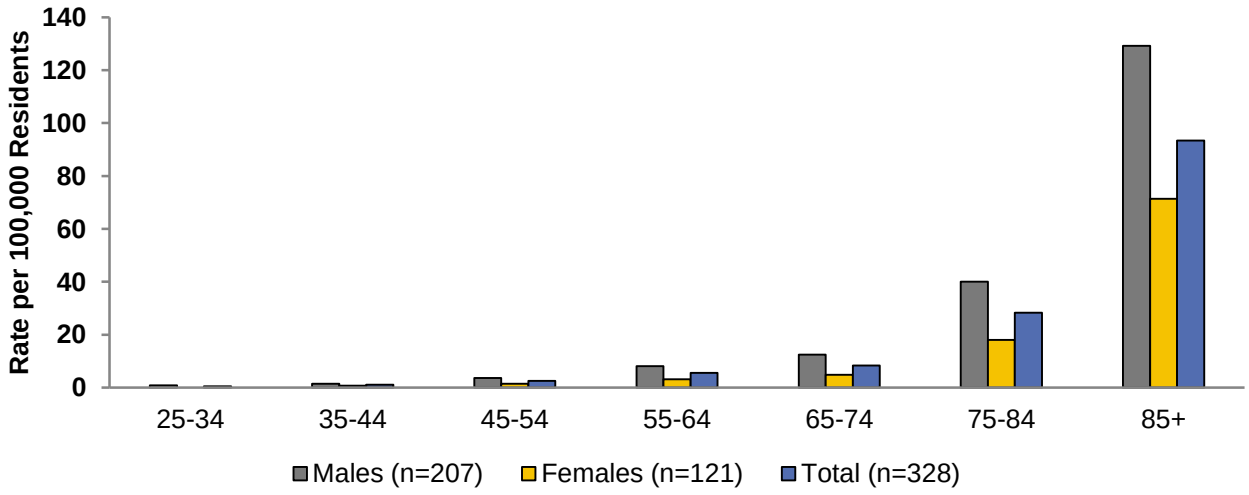


The highest age-adjusted rate of firearm-related TBI suicides was among White non-Hispanics (11.1 per 100,000 residents, n=480). This high race-specific mortality rate coupled with the large population propelled the age-adjusted mortality rate for all Arizonans. The age-adjusted rate among Hispanics was 3.1 deaths per 100,000 residents. For all other races, the total number of firearm-related suicides was too low to calculate a stable rate (n<20).

Fall-Related TBI Mortality

Among the 328 TBI deaths due to falls, 63 percent were among males (n=207) and 37 percent were among females (n=121). Almost 100 percent of the falls were unintentional and among adults over the age of 25. Twenty-three percent of the deaths were among adults ages 25 through 64 years (n=77); and 77 percent were among adults 65 years and older (n=250). The age-adjusted rate of all fall-related TBI deaths in Arizona for 2013 was 4.3 deaths per 100,000 residents, however the highest age-specific mortality rate was among adults 85 years and older (93.4 per 100,000 residents) followed by adults 75 through 84 years of age (28.3 per 100,000 residents).

Figure 18. Age-Specific Fall-Related TBI Mortality Rates by Age and Sex, Arizona 2014

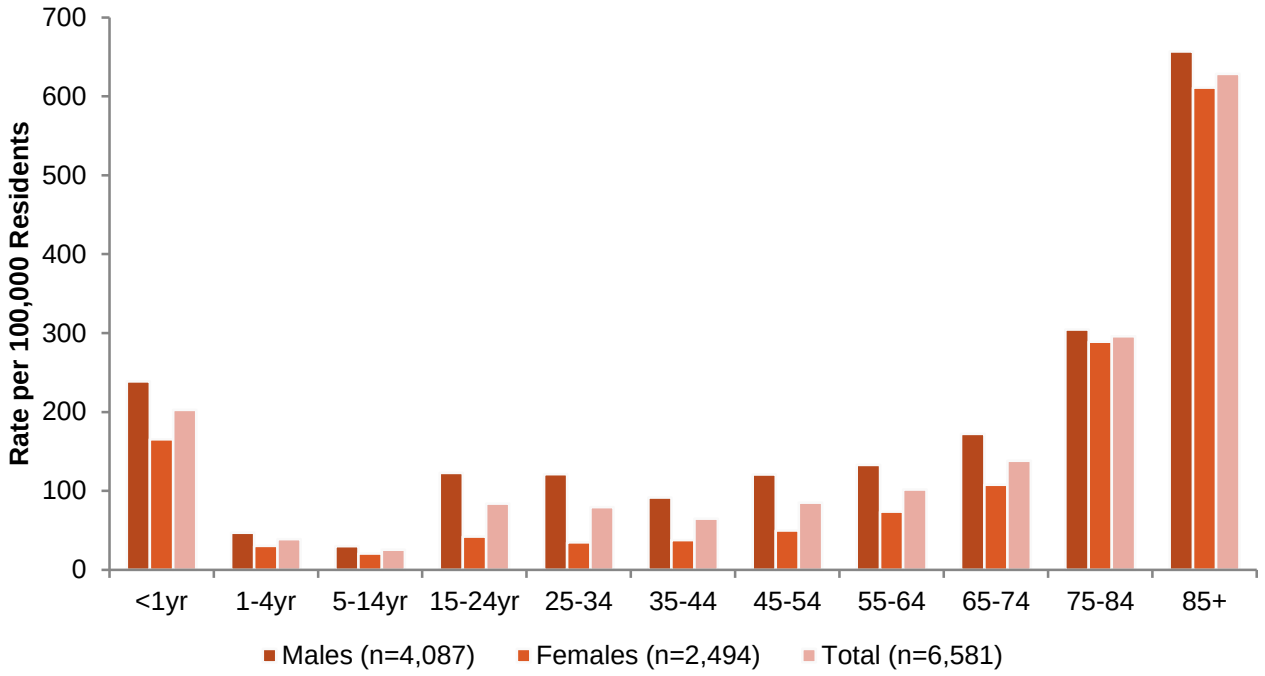


Non-Fatal Inpatient Hospitalizations among Arizona Residents During 2014

In 2014, 6,581 Arizona residents were hospitalized due to non-fatal TBI. Continuing the trend over the years, males comprised 62 percent of the total TBI hospitalizations (n=4,087) and females accounted for 38 percent (n=2,494).

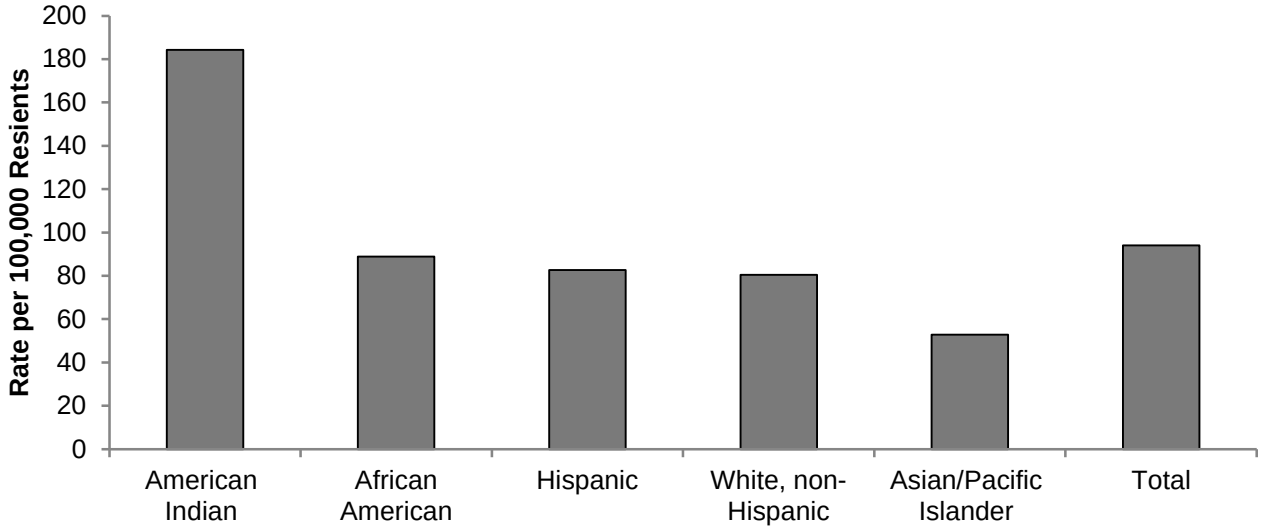
Adults 85 years and older had the highest rates of TBI inpatient hospitalizations in 2014. Males 85 years and older had the highest age-adjusted rate of hospitalizations with 657.0 per 100,000 residents (n=300), an increase of 13 percent from 2013. The rate for females 85 years and older was 611.2 hospitalizations per 100,000 residents (n=454), a three percent decrease from the 2013 rate. For adults 85 years and older, 98 percent of TBI hospitalizations were due to unintentional falls (n=737). Figure 19 shows the 2014 TBI inpatient hospitalization rates by age group and sex for Arizona residents.

Figure 19. Age-Specific TBI-Related Non-Fatal Inpatient Hospitalization Rates by Age Group and Sex, Arizona 2014



Age-adjusted TBI inpatient hospitalization rates were highest among American Indians (184.2 hospitalizations per 100,000 residents), this represents a 15 percent decrease from 2013, when the rate for this group was 215.9 hospitalizations per 100,000 residents. African Americans had the second highest hospitalization rate (88.9 hospitalizations per 100,000 residents), representing a 13 percent increase since 2013, when the rate was 78.8 hospitalizations per 100,000 residents. Figure 20 shows the 2014 age-adjusted TBI inpatient hospitalization rates by race/ethnicity in Arizona.

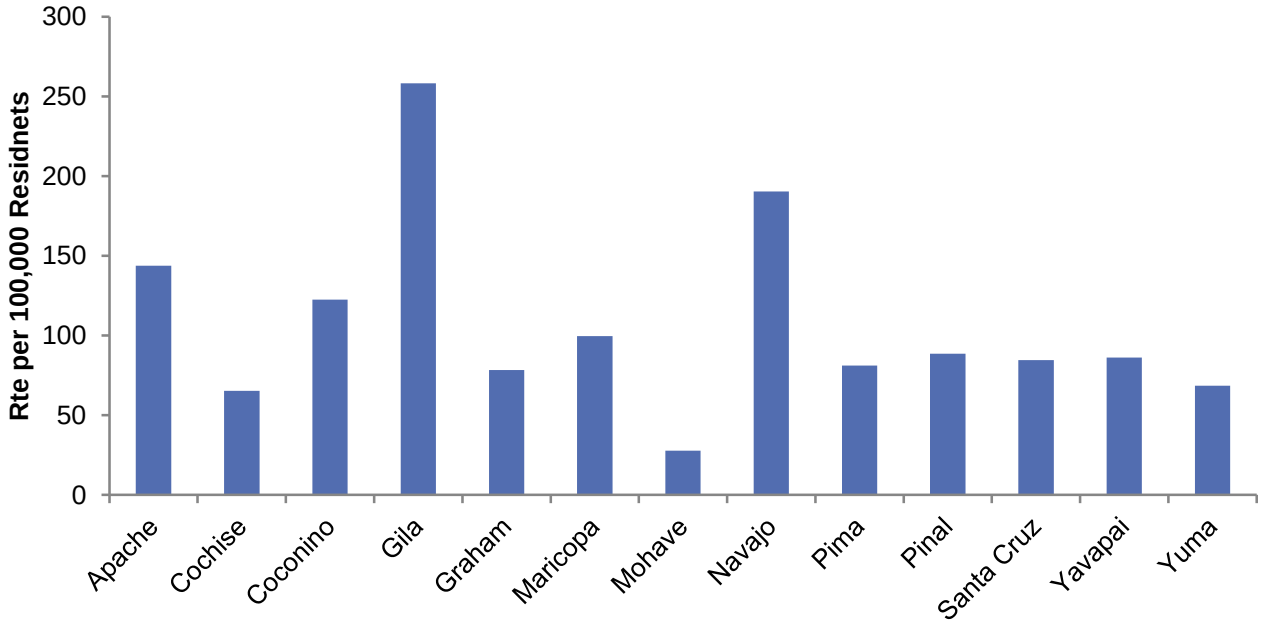
Figure 20. Age-Adjusted TBI-Related Non-Fatal Inpatient Hospitalization Rates by Race/Ethnicity, Arizona 2014*



*128 hospitalizations were among individuals of other or unknown race/ethnicity.

Gila County had the highest non-fatal TBI-related inpatient hospitalization rate in 2014 with 258.1 hospitalizations per 100,000 residents and Navajo County had the second highest rate (190.3 per 100,000 residents. Figure 21 shows the age-adjusted non-fatal TBI-related inpatient hospitalizations by county for Arizona in 2014.

Figure 21. Age-Adjusted TBI-Related Non-Fatal Inpatient Hospitalization Rates, by County, Arizona 2014*



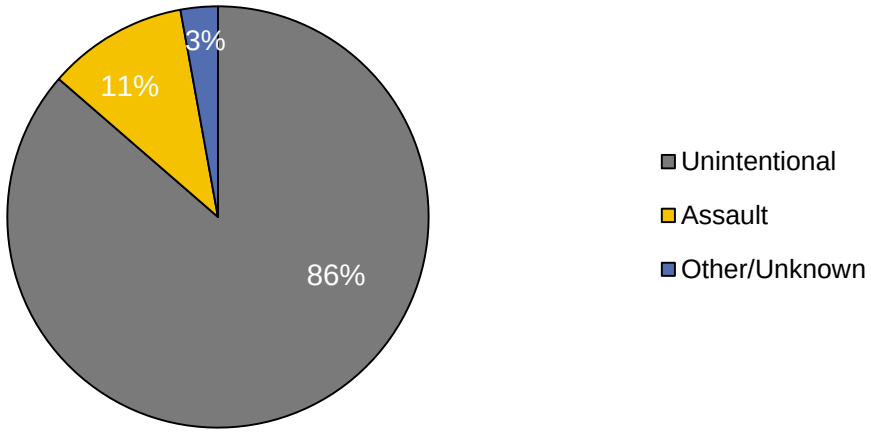
*Only Counties with 20 or more records were included in graph.

For TBI inpatient hospitalizations, the average length of stay was six days (median=3 days), and hospital stays due to TBI ranged from less than one full day to 309 days. In total, Arizonans spent 37,907 days hospitalized for TBI in 2014.

TBI inpatient hospitalization charges in 2014 totaled more than $574.5 million, with 55 percent paid by the Arizona Health Care Cost Containment System (AHCCCS)/Medicaid and Medicare (n=3,638 cases, over $307.7 million). This total does not include costs related to physician care, rehabilitation, lost wages, or long-term costs of disability.

Unintentional injuries accounted for 86 percent of TBI hospitalizations (n=5,684). There were 59 hospitalizations due to self-inflicted TBI (less than one percent) and 709 due to assaults (11 percent). Figure 22 shows the TBI inpatient hospitalizations by manner of injury for Arizona in 2014.

Figure 22. TBI-related Non-Fatal Inpatient Hospitalizations by Manner, Arizona 2014



Fall-related injuries were the most common cause of TBI hospitalizations (48 percent, n=3,141), followed by motor vehicle traffic injuries (27 percent, n=1,793). Table 2 shows causes of TBI inpatient hospitalizations in Arizona during 2014.

Table 2. Number and Percentage of TBI Inpatient Hospitalizations by Cause, Arizona 2014

Cause	Number	Percentage
Fall	3,141	48%
Motor vehicle traffic	1,793	27%
Struck by/against	610	9%
Other/unspecified	531	8%
Transport	273	4%
Other pedal cycle	145	2%
Firearm	51	<1%
Cut/pierce	36	<1%
Total	**6,581**	**100**

Source: Arizona Hospital Discharge Database

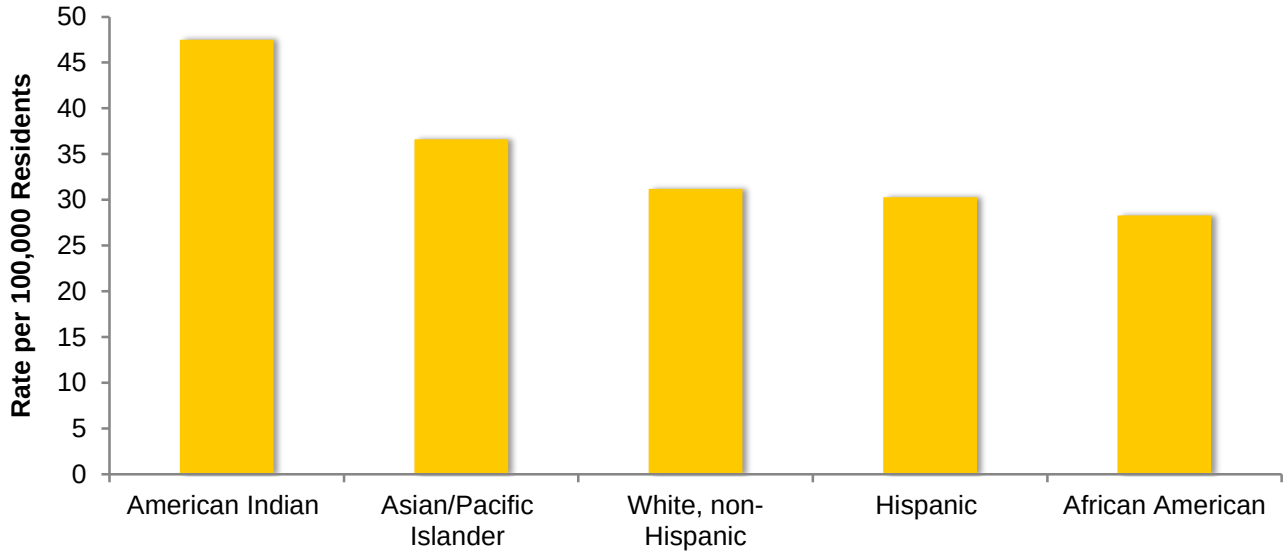
Non-Fatal Fall-Related TBI Inpatient Hospitalizations

There were 3,141 inpatient hospitalizations due to fall-related TBI. Fifty-three percent were among males (n=1,660) and 47 percent were among females (n=1,481). Falls were unintentional more than 99 percent of the time (n=3,129), with only 12 cases in which another manner was identified.

American Indians had the highest age-adjusted rate of fall-related TBI hospitalizations with 60.4 hospitalizations per 100,000 residents (n=159). The second highest rate was among White, non-Hispanics (36.6 hospitalizations per 100,000 residents; n=66). The age-adjusted rate for non-fatal fall-related inpatient hospitalizations among all Arizonans was 42.8 hospitalizations per 100,000 residents.

Despite the relationship between age-adjusted rates by race/ethnicity, the differences in age specific rates for adults 65 years of age and older paint a different picture of fall-related TBI. Among adults 65 years of age and older, the rate of fall-related TBI hospitalization is still highest among American Indians but is followed by Asian residents with 36.6 hospitalizations per 100,000 residents. Figure 23 shows the age-specific hospitalization rates for fall-related TBI among Arizonan seniors 65 years of age and older, by race/ethnicity.

Figure 23. Elder Fall-Related Non-Fatal TBI Inpatient Hospitalization Rates 65 Years Of Age And Older, By Race/Ethnicity, Arizona 2014*



*Does not include 49 cases in which race/ethnicity information is unknown.

Non-Fatal Motor Vehicle Traffic Crash-Related TBI Inpatient Hospitalizations

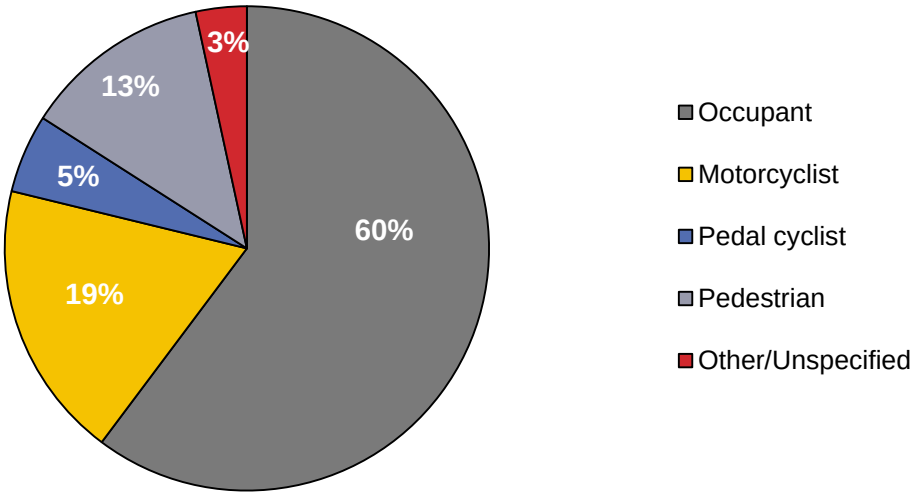
Of the 1,793 TBI hospitalizations due to motor vehicle traffic crashes, 66 percent were among males (n=1,184) and 34 percent were among females (n=609). As with falls, over 99 percent of the motor vehicle traffic crashes resulting in a hospitalization were unintentional. The highest hospitalization rates for motor vehicle-related TBI were among teens and young adults 15 through 24 years of age (45.4 hospitalizations per 100,000 residents), for both males (61.1 hospitalizations per 100,000 residents) and females (28.5 hospitalizations per 100,000 residents).

American Indians had the highest rate of TBI hospitalizations for motor vehicle traffic crashes with 43.0 hospitalizations per 100,000 residents (n=162), representing a 21 percent decrease since 2013.

With 26.7 hospitalizations per 100,000 residents, non-Hispanic Whites had the second highest rate (n=1,043). The age-adjusted rate for non-fatal motor vehicle traffic-related inpatient hospitalizations among all Arizonans was 26.7 hospitalizations per 100,000 residents, a six percent decrease since 2013.

The majority of TBI inpatient hospitalizations due to motor vehicle traffic crashes were among occupants of motor vehicles (60 percent, n=1,080). Nineteen percent were motorcyclists (n=333); 13 percent were pedestrians (n=225); and five percent were pedal cyclists (n=94). This distribution is consistent with data from previous years. Figure 24 shows TBI inpatient hospitalizations due to motor vehicle traffic crashes by injured person.

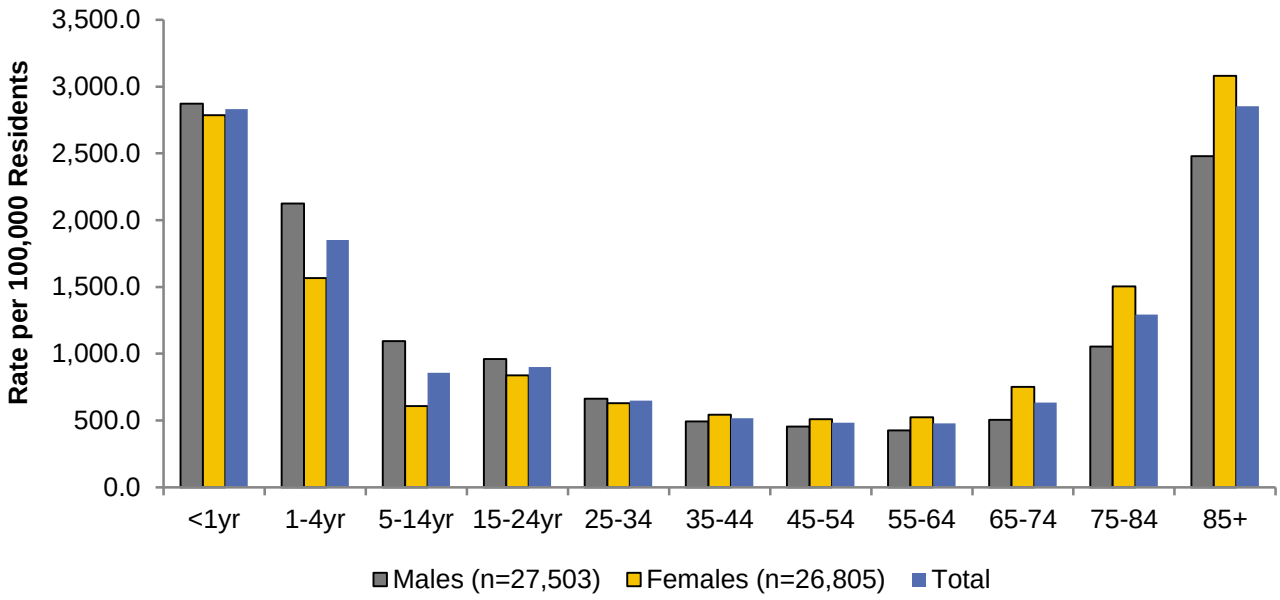
Figure 24. Non-Fatal Motor Vehicle Crash-Related TBI Inpatient Hospitalizations by Injured Person, Arizona 2014



Non-Fatal Emergency Department Visits among Arizona Residents During 2014

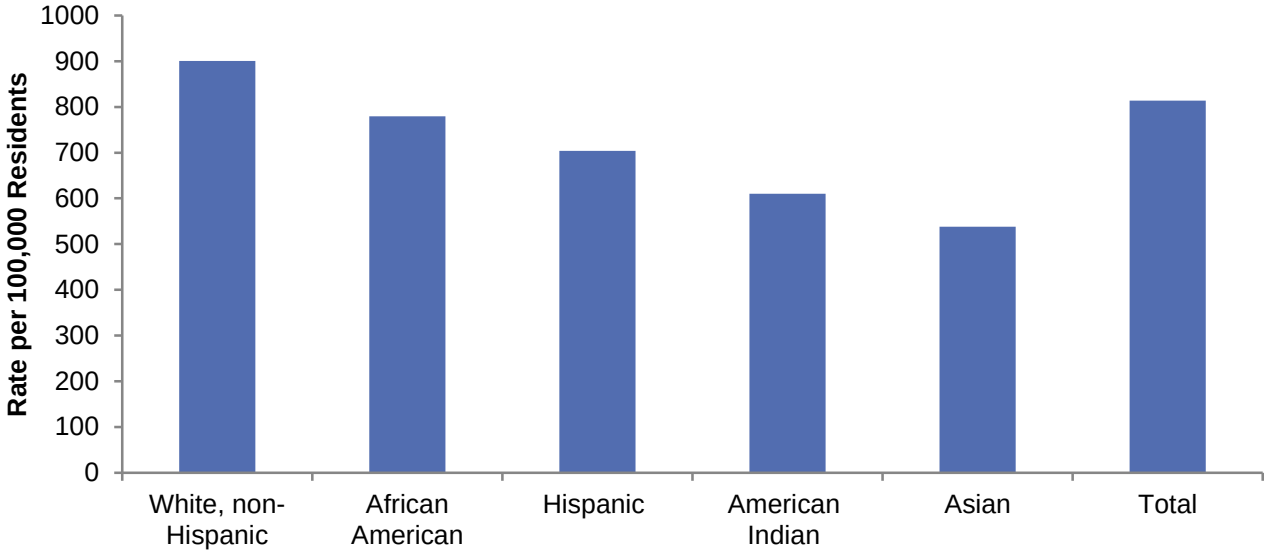
In 2014, there were 54,310 TBI emergency department visits among Arizona residents. Males accounted for just over half of TBI emergency department visits (51 percent, n=27,503), while females accounted for 49 percent of visits (n=26,805). TBI emergency department visit rates were highest among adults 85 years and older followed by those less than one year of age. There were 2,289 emergency department visits among females 85 years and older (a rate of 3,081.5 visits per 100,000 residents), and 1,132 visits among males 85 and older (a rate of 2,479.2 visits per 100,000 residents). For all children younger than one year of age, 88 percent of TBI emergency department visits were due to unintentional falls (n=2,053). Figure 25 shows the 2014 TBI emergency department visit rates for Arizona residents.

Figure 25. Age-Specific TBI Emergency Department Visit Rates by Sex, Arizona 2014



Age-adjusted TBI emergency department visits were highest among Non-Hispanic Whites (900.8 hospitalizations per 100,000 residents). African Americans had the second highest emergency department visit rate with 779.3 visits per 100,000 residents. The age-adjusted rate for non-fatal TBI-related emergency department visits among all Arizonans was 813.8 hospitalizations per 100,000 residents an almost six percent increase since 2013. Figure 26 shows the age-adjusted emergency department rates by race/ethnicity.

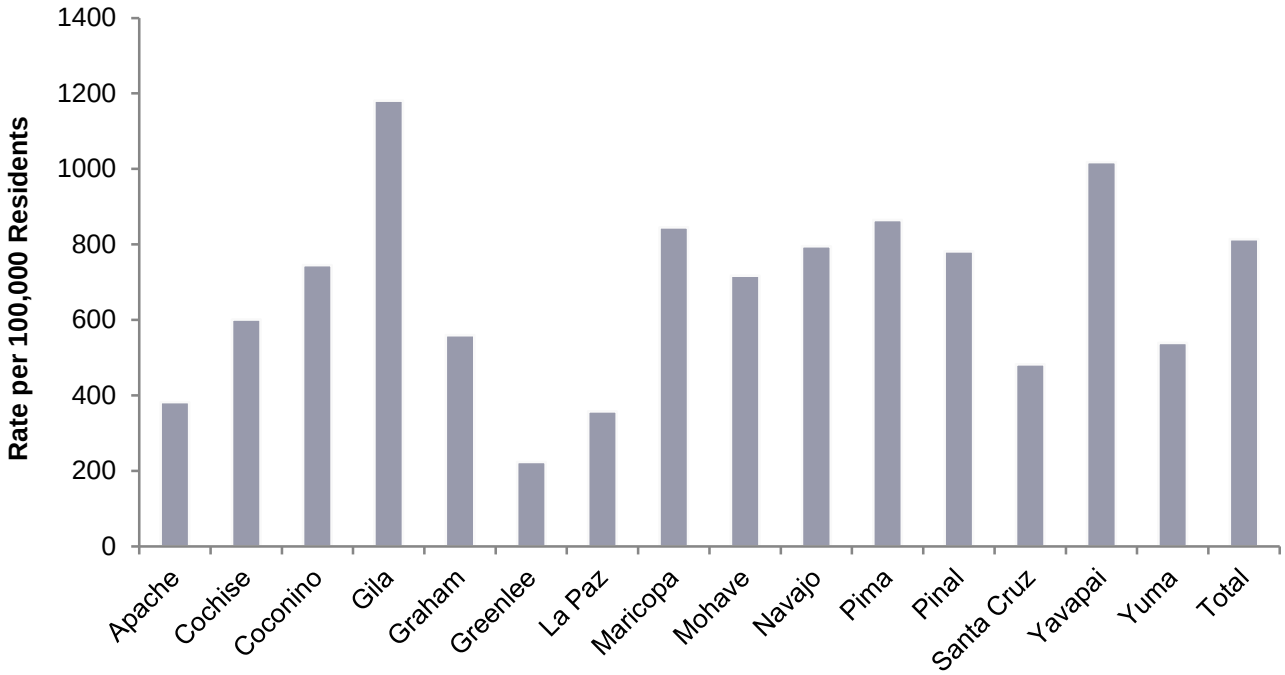
Figure 26. Age-Adjusted TBI-Related Non-Fatal Emergency Department Rates by Race/Ethnicity, Arizona 2014



Does not include 713 cases in which race/ethnicity information is unknown.

Similar to hospitalizations, Gila County had the highest non-fatal TBI-related emergency department visits in 2014 (1181.2 visits per 100,000 residents). Yavapai County had the second highest rate with 1018.3 visits per 100,000 residents (in 2012 and 2013 Yavapai County had the highest rates). Figure 27 shows the age-adjusted TBI-related non-fatal emergency department visits by county.

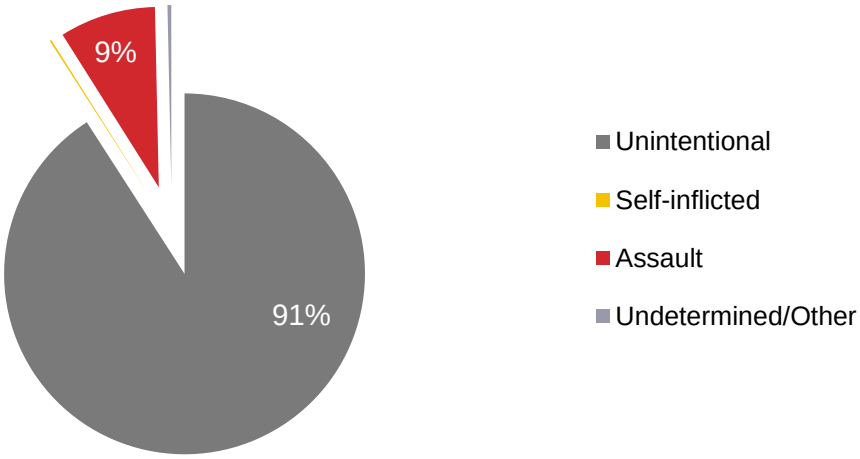
Figure 27. Age-Adjusted TBI-Related Non-Fatal Emergency Department Rates by County, Arizona 2014



TBI emergency department charges in 2014 totaled more than $355.1 million, with 47 percent paid by the Arizona Health Care Cost Containment System (AHCCCS)/Medicaid and Medicare (n=26,241, over $166.7 million). This total does not include costs related to physician care, rehabilitation, lost wages, or long-term costs of disability.

The majority of TBI emergency department visits were due to unintentional injuries (91 percent, n=49,360), and nine percent were assaults (n=4,678). Figure 28 shows TBI emergency department visits by intent during 2014 in Arizona.

Figure 28. Percentage of TBI Emergency Department Visits by Manner of Injury, Arizona 2014



The leading causes of TBI emergency department visits were falls (54 percent, n=29,232), struck by/against injuries (22 percent, n=9,029), and motor vehicle traffic crashes (14 percent, n=7,590). Table 3 shows TBI emergency department visits by cause for Arizona in 2014. Descriptions of all causes are given in Appendix A.

Table 3. Number and Percentage of TBI Emergency Department Visits by Cause, Arizona 2014

Cause	Number	Percentage
Fall	29,232	54
Struck by/against	9,029	22
Motor vehicle traffic	7,590	14
Other/unspecified	6,178	6
Other pedal cycle	1,155	2
Transport	1,126	2
Total	**54,310**	**100%**

Source: Arizona Hospital Discharge Database

Non-Fatal Fall-Related Emergency Department Visits

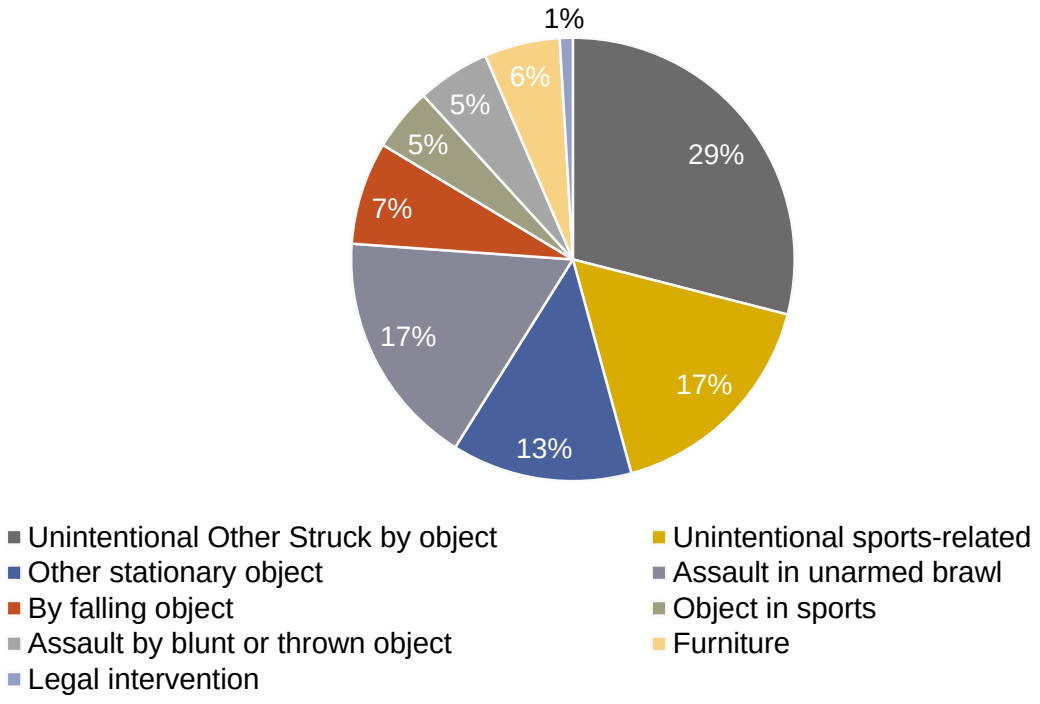
There were 29,244 emergency department visits due to fall-related TBI. Forty-six percent were among males (n=13,392) and 54 percent were among females (n=15,851). Over 99 percent of these falls were unintentional (n=29,232). As with all TBI emergency department visits, those due to falls are most common among the oldest and youngest members of the population. Among children under one year of age, the rate of fall-related TBI was 2,434.1 visits per 100,000 residents; among adults 85 and older, the rate was 2,696.3 visits per 100,000 residents.

Non-Fatal Struck By/Against-Related TBI Emergency Department Visits

Struck by/against injuries include being struck by an object (such as falling furniture), striking against an object (such as the edge of a bathtub), or being struck by other people (such as when playing sports). Of the 11,782 TBI emergency department visits due to struck by/against injuries, 60 percent were among males (n=7,099) and 40 percent were among females (n=4,693). Seventy-seven percent of these injuries were unintentional (n=9,029), and 22 percent were assaults (n=2,647). Fifty percent of TBI emergency department visits from struck by/against injuries were among individuals five and 24 years of age (n=5,873).

The emergency department discharge database did not include specific information regarding contributing event for 30 percent of the struck by/against injuries. The most frequently specified contributing events were assaults in unarmed brawls (17 percent of specified events, n=2,024) and unintentional blows while playing sports (17 percent of specified events, n=1,968). Figure 29 shows TBI emergency department visits due to struck by/against injuries by specified contributing event.

Figure 29. TBI Emergency Department Visits due to Struck by/Against by Specified Contributing Event, Arizona 2014



Data Notes

All rates were calculated using the 2014 Arizona Vital Statistics population estimates, available on the internet from the AZ Vital Statistics website. Age-adjusted rates were standardized to the 2000 U.S. standard population using the direct standardization method. Age-adjusted rates have been presented when possible, as age-adjusting controls for the effects of age differences in populations (e.g., a large proportion of older adults or young children) and allows for more accurate rate comparisons.

Mortality data were tabulated from death certificates for Arizona residents who died in 2014. Inpatient hospitalization and emergency department visit data were compiled from the 2014 Arizona Hospital Discharge Database.

The discharge databases contain information from private, acute-care facilities in the state of Arizona, and do not include visits to federal facilities, such as Veterans' Affairs Hospitals or Indian Health Services facilities. The discharge databases do not contain data from urgent care facilities, private physician practices, or medical clinics. Additionally, discharge data include hospital transfers and readmissions. Therefore, a single injured individual may be counted more than once. These data should be interpreted as episodes of medical treatment, not individual injuries.

Codes from the International Classification of Diseases, Version 9, clinical modification (ICD-9-CM) were used for determining TBI cases among hospital and emergency department data. ICD-10 codes were used for mortality data. The specific codes used are described in *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths*, published in 2006 by the U.S. Centers for Disease Control and Prevention (CDC). Traumatic brain injury-related inpatient hospitalizations and emergency department visits resulting from medical misadventures have been excluded from this report.

Appendix A: Definitions of Mechanisms of Injury

Cause of Injury	Definition
Fall	Includes falls from furniture, stairs, playground equipment, and those that occur while playing sports.
Firearm	Includes injuries from handguns, shotguns, BB guns, etc.
Motor vehicle traffic	Includes collisions that occur on public highways and streets. These collisions may include pedestrians, pedal cyclists, motorcyclists, and occupants of motor vehicles.
Other land transport	Includes collisions involving railway transport or all-terrain vehicles operating off-road. This cause only applies to deaths and is not used in hospitalization or emergency department databases.
Other pedal cycle	Includes injured pedal cyclists struck by pedestrians, pedal cycles, or non-motorized vehicles.
Other pedestrian	Includes injured pedestrians struck by pedal cycles, non-motorized vehicles, or other pedestrians.
Other/unspecified	Unspecified events or other rare events.
Struck by/against	Includes being struck by furniture, struck by other people while playing sports, or hit by objects while playing sports.
Transport	Other non-motorized, off-road vehicle, or rail transport. This cause only applies to hospitalization and emergency department
Unknown cause	Cause not listed.