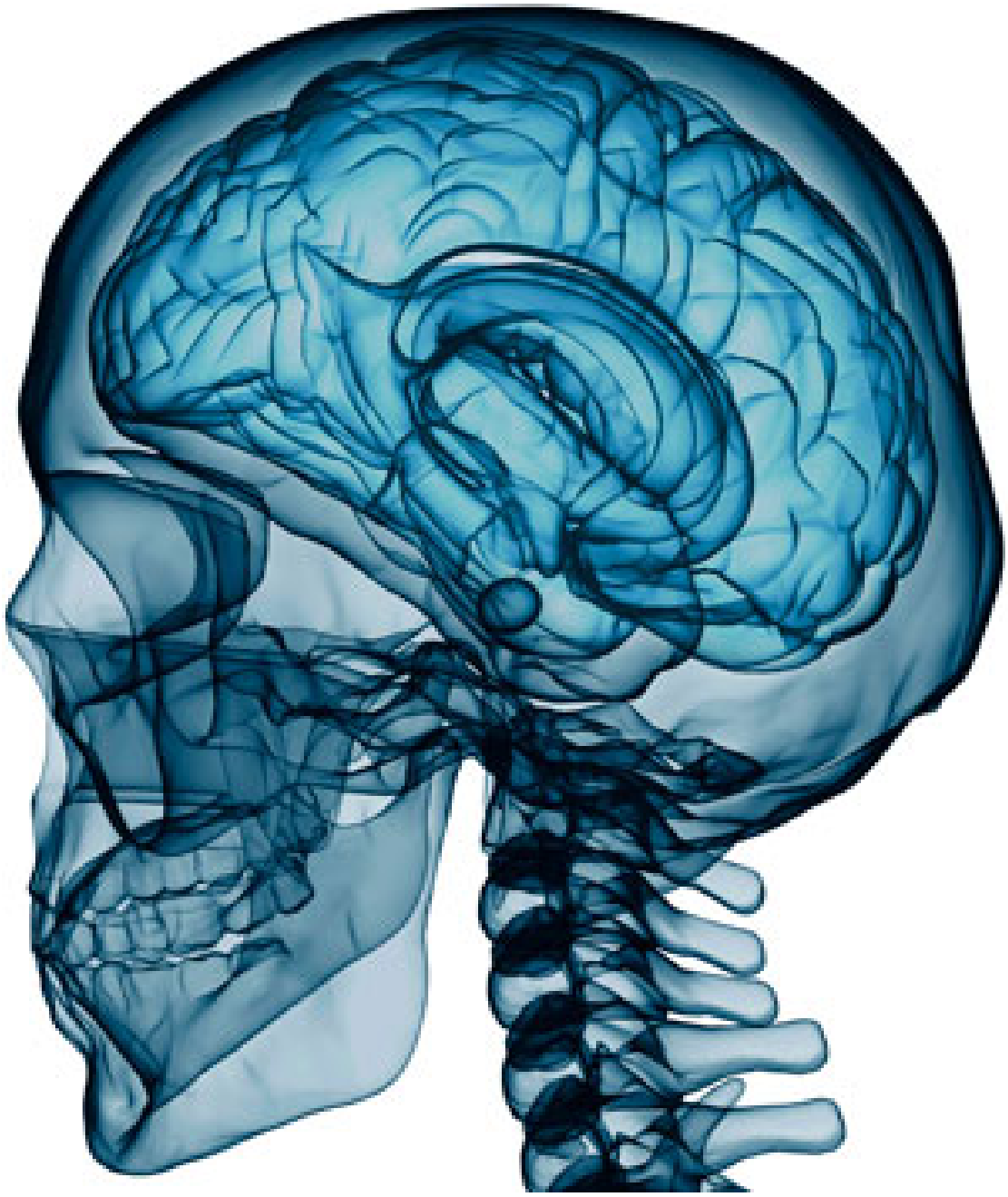

TRAUMATIC BRAIN INJURIES

ARIZONA RESIDENTS 2016

ARIZONA DEPARTMENT OF HEALTH SERVICES

Resources for the development of this report were provided through funding to the Arizona Department of Health Services from the Centers for Disease Control and Prevention, Cooperative Agreement 6NU17CE924850 Core State Violence and Injury Prevention Program.

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EXECUTIVE SUMMARY

ARIZONA RESIDENTS 2016

Traumatic Brain Injuries (TBI) was the cause of death for 1,605 Arizona residents in 2016. Males ages 85 years and older had the highest rate of TBI deaths with 236.3 deaths per 100,000 residents. TBI death age-adjusted rates were highest among American Indian or Alaska Native (34.8 deaths per 100,000 residents) and White non-Hispanic (23.4 deaths per 100,000 residents) residents. In 2016, forty-four percent of TBI deaths were due to unintentional injuries (n=709), forty-three percent were suicides (n=688), and eight percent were homicides (n=122). The most common causes of TBI deaths were firearms (49%, n=788), falls (27%, n=435), and motor vehicle traffic crashes (13%, n=201).

In 2016, there were 9,004 non-fatal TBI Inpatient Hospitalizations (IP). Adults 85 years and older had the highest rate of TBI IP (827.1 IP per 100,000 people). For this age group, Females had a rate of 828.2 IP per 100,000 residents, and males had a rate was 825.2 IP per 100,000 residents. The age-adjusted TBI IP rates for Race/Ethnicity groups were highest among American Indians or Alaska Native (258.3 IP per 100,000 residents). The age-adjusted TBI IP rates for other Race/Ethnicity groups except White non-Hispanic were below the total age-adjusted rate (123.5 IP per 100,000 residents). Unintentional injuries accounted for eighty-four percent of TBI IP (n=7,952). Falls were the most common cause of TBI IP (47%, n=4,236), followed by motor vehicle traffic crashes (28%, n=2,554). Total hospital charges for non-fatal IP due to TBIs were more than $911.1 million, and Arizonans spent a total of 56,294 days hospitalized in 2016.

In 2016, there were 97,982 non-fatal TBI Emergency Department Visits (EDV). TBI EDV rates were highest among adults 85 years and older (4,377.4 EDV per 100,000 residents), then among children 1-4 years of age (4,174.1 EDV per 100,000 residents), and infants less than 1 years (3,151.1 EDV per 100,000 residents). Within the children 1-4 years of age and infants less than 1 year age groups, males (5,008.3 and 3,381.3 EDV per 100,000 residents respectively) had higher rates than females (3,300.6 and 2,910.1 EDV per 100,000 residents respectively). Females (4,719.8 EDV per 100,000 residents) had a higher rate than males (3,851.1 EDV per 100,000 residents) for the 85 and older age group. The age-adjusted TBI EDV rates were highest among African American and White non-Hispanic (1,666.3 and 1,585.6 EDV per 100,000 residents respectively). Overall, unintentional injuries accounted for 91% of the TBI EDV. The leading causes of TBI EDV were falls (50%, n=48,631), struck by/against injuries (25%, n=24,871), and motor vehicle traffic crashes (12%, n=11,327). Total hospital charges for non-fatal emergency department visits due to TBIs were more than $655 million.

TBI: AT A GLANCE

For every TBI-related death in Arizona in 2016 there were:

6 Non-fatal inpatient hospitalizations and

57 Non-fatal emergency department visits

Resulting in over 1 billion in hospital charges

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August 2017

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.

Data Notes

All rates were calculated using the 2016 Arizona Vital Statistics population estimates. Age-adjusted rates were standardized to the 2000 U.S. standard population. Mortality data were tabulated from death certificates for Arizona residents who died where TBI was reported as the main cause of death alone or in combination with other injuries in 2016. Inpatient hospitalization and emergency department visit data were compiled from the 2016 Arizona Hospital Discharge Database for residents who were hospitalized or treated from emergency departments due to TBI diagnosis alone or in combination with other injuries or conditions.

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 (ICD), Version 9, clinical modification (ICD-9-CM) were used for determining TBI cases among hospital and emergency department data for the first three quarters of 2015 (January-September). In October 2015, the federal government's new mandate for ICD, the conversion of ICD-9-CM diagnostic and procedural codes to the implementation and use of ICD-10-CM codes, went into effect. This new mandate provides health providers a wider and more detail range for diagnosing diseases for the last quarter year of 2015 (October-December) and all of 2016. This mandate will cause significant changes in annual injury surveillance, reporting, and may not be comparable to previous years.

[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.

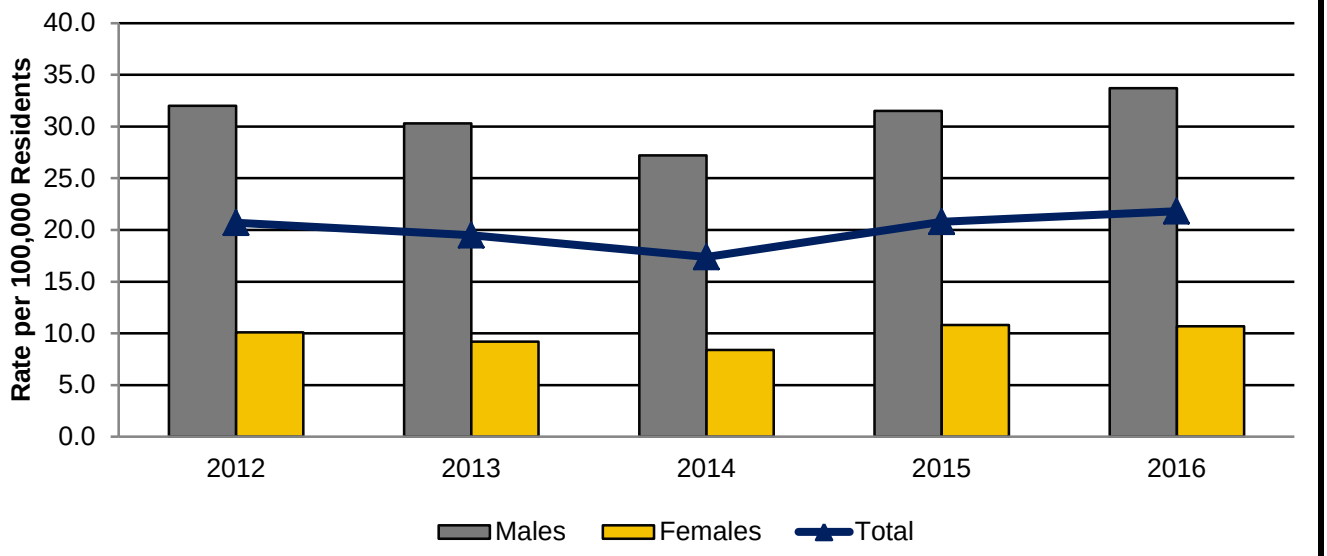
[3] National Vital Statistics System (NVSS), 2006–2010. Data source is maintained by the CDC National Center for Health Statistics.

TRENDS IN TRAUMATIC BRAIN INJURIES AMONG ARIZONA RESIDENTS 2012-2016

Mortality

Between 2012 and 2016, the age-adjusted mortality rate due to traumatic brain injuries increased by five percent, from 20.7 deaths per 100,000 Arizona residents in 2012 to 21.8 deaths per 100,000 residents in 2016. During this time period, the Age-Adjusted TBI mortality rates for males and females increased by 5%. The age-adjusted TBI mortality rates among males were three times higher than the rates of females. Figure 1 shows age-adjusted TBI mortality rates by sex from 2012 through 2016.

Figure 1. Age-Adjusted TBI Mortality Rates by Sex, Arizona 2012-2016



In 2016, all manners of TBI-related deaths increased from the previous year. The age-adjusted rate of unintentional TBI-related deaths increased one percent, while suicide TBI-related deaths increased nine percent from previous year. From 2012-2016, the age-adjusted rates of motor vehicle crash TBI-related deaths remained the same, while fall TBI-related deaths increased by ten percent. Firearm-related TBI deaths increased eleven percent since 2012. 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 2012-2016

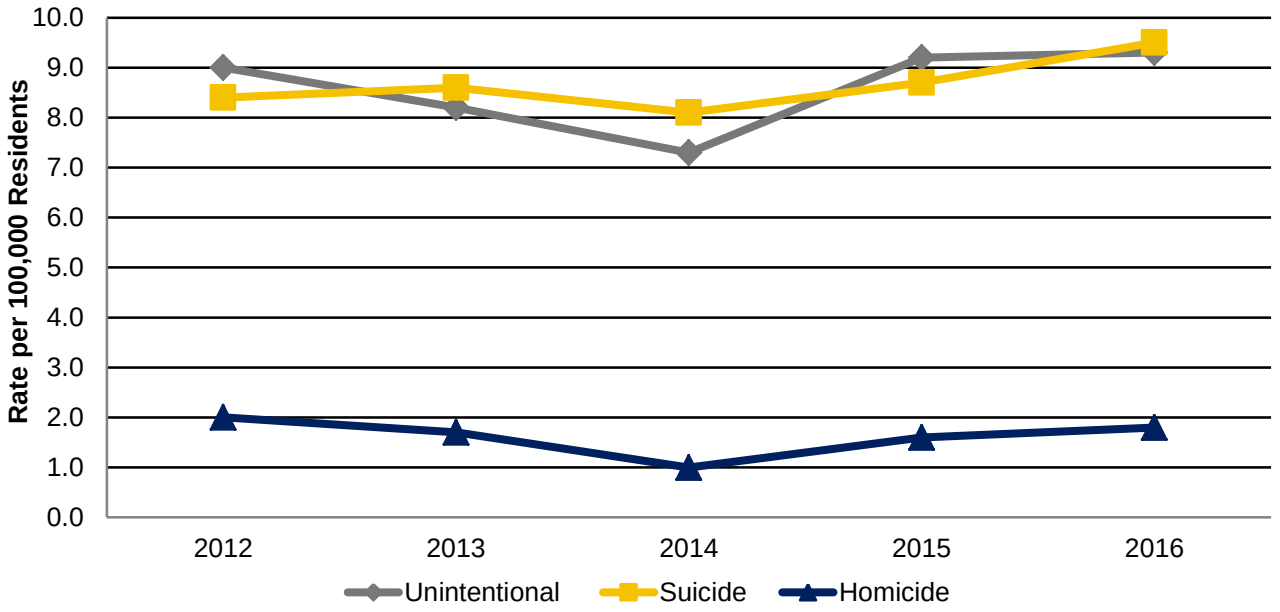
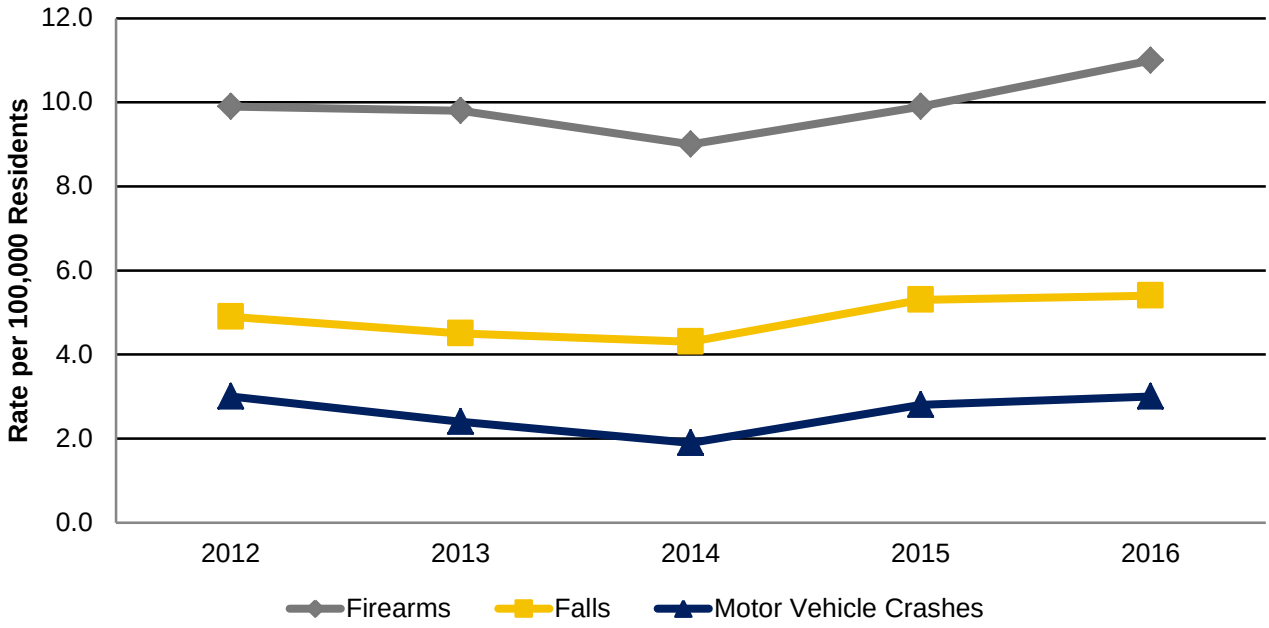


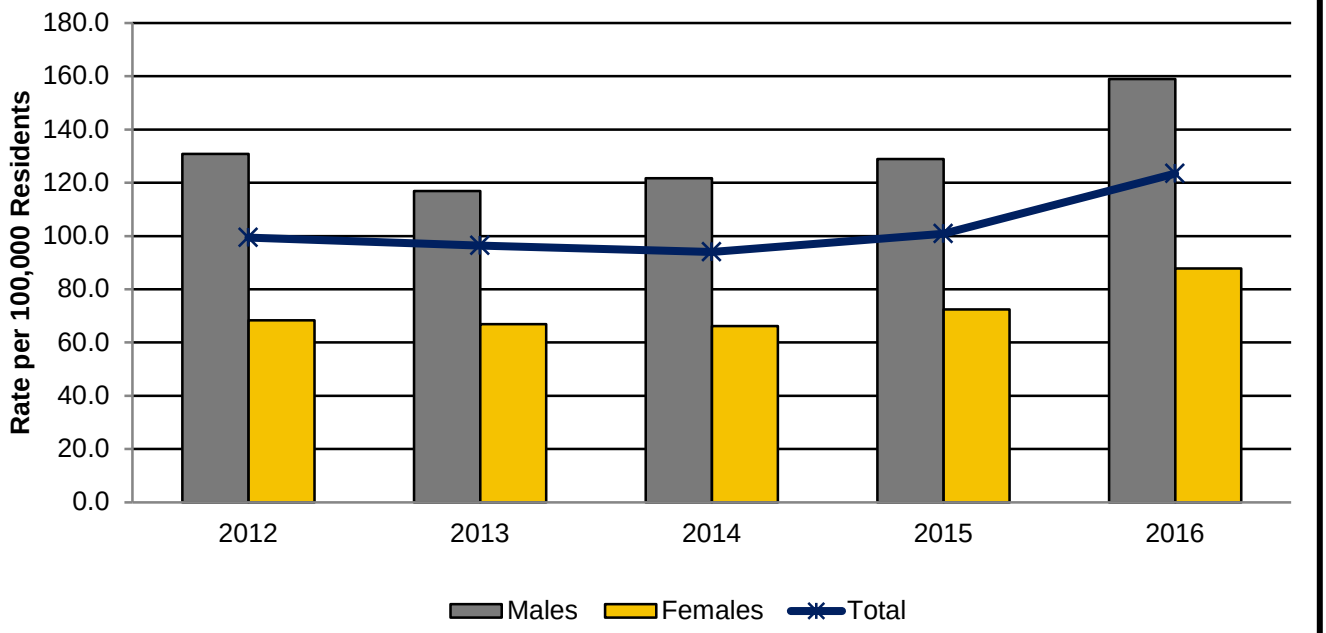
Figure 3. Age-Adjusted TBI Mortality Rates By Lead Cause of Death, Arizona 2012-2016



Non-Fatal Inpatient Hospitalizations (IP)

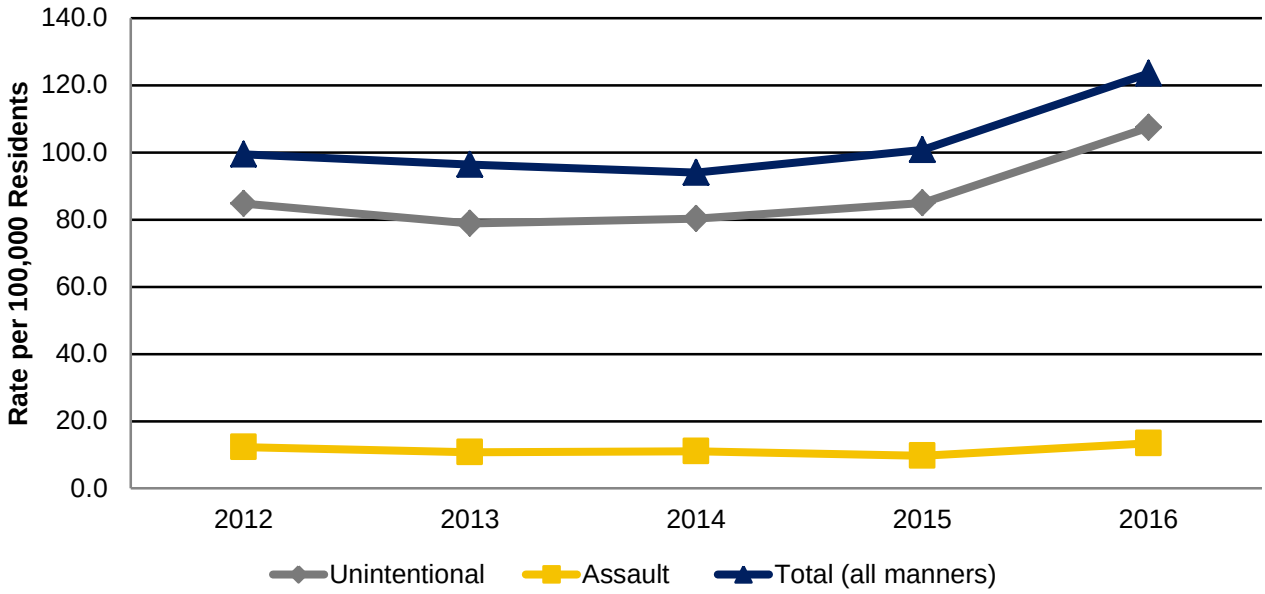
Between 2012 and 2016, the age-adjusted rate of TBI-related Inpatient Hospitalizations (IP) increased 24.2%, from 99.4 IP per 100,000 residents in 2012 to 123.5 IP per 100,000 residents in 2016. On average, the age-adjusted hospitalization rates among males were 1.8 times higher than the rates of females during the same 5 year period. Rates for males increased 22% from between 2012 and 2016, and rates for females the rate increased by 29%. Figure 4 shows the age-adjusted non-fatal TBI-related inpatient hospitalization rates by sex from 2012 through 2016.

Figure 4. Age-Adjusted Non-Fatal TBI-Related Inpatient Hospitalization Rates by Sex, Arizona 2012-2016



Overall the age-adjusted rate of TBI-related IP by all manners has increased since 2012. From 2012 to 2016 there was a 26% increase in unintentional injuries and 8.9% increase in assault-related TBI. Figure 5 shows age-adjusted TBI hospitalization rates by manner of injury.

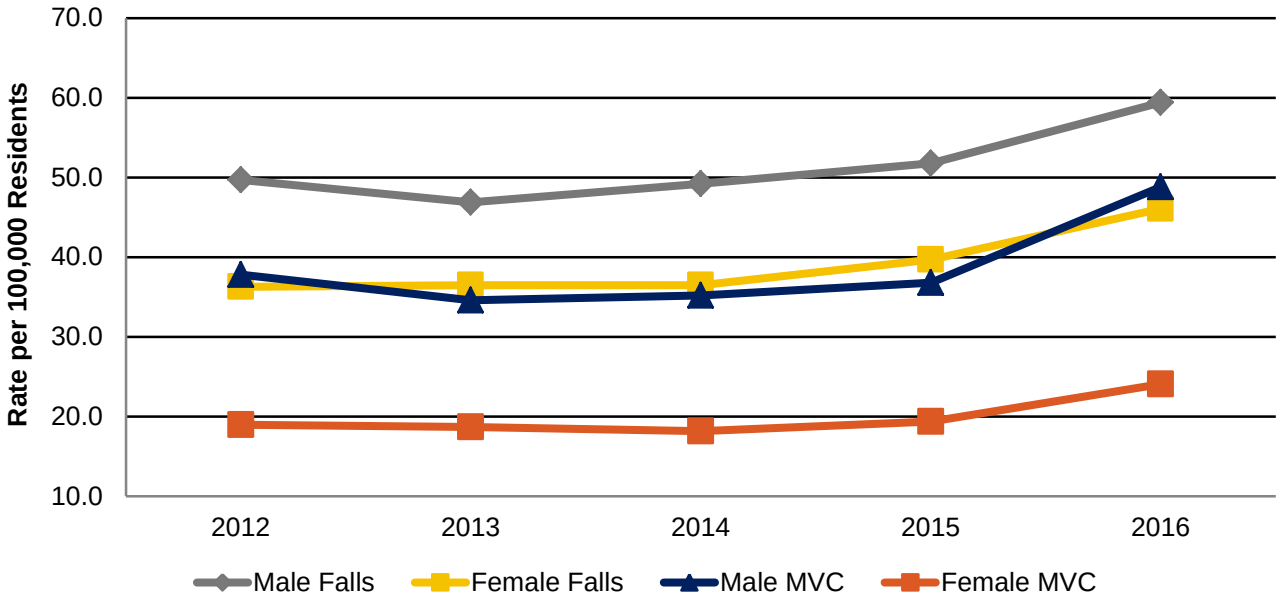
Figure 5. Age-Adjusted Non-Fatal TBI-Related Inpatient Hospitalization By Manner of Injury, Arizona 2012-2016



The most common non-fatal inpatient hospitalizations TBI injuries are due to falls and motor vehicle crashes. The rate of non-fatal IP due to fall-related traumatic brain injuries in 2016 was 53.8 IP per 100,000 residents and represents a 17.7% increase from the previous year (45.7 IP per 100,000 residents). 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.

In 2016, the rate of motor vehicle crash (MVC)-related TBI hospitalizations was 36.9 IP per 100,000 residents. The MVC crash-related TBI IP rate increased 32.6% for males and 24.2% for females from the previous year. 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 2012 through 2016.

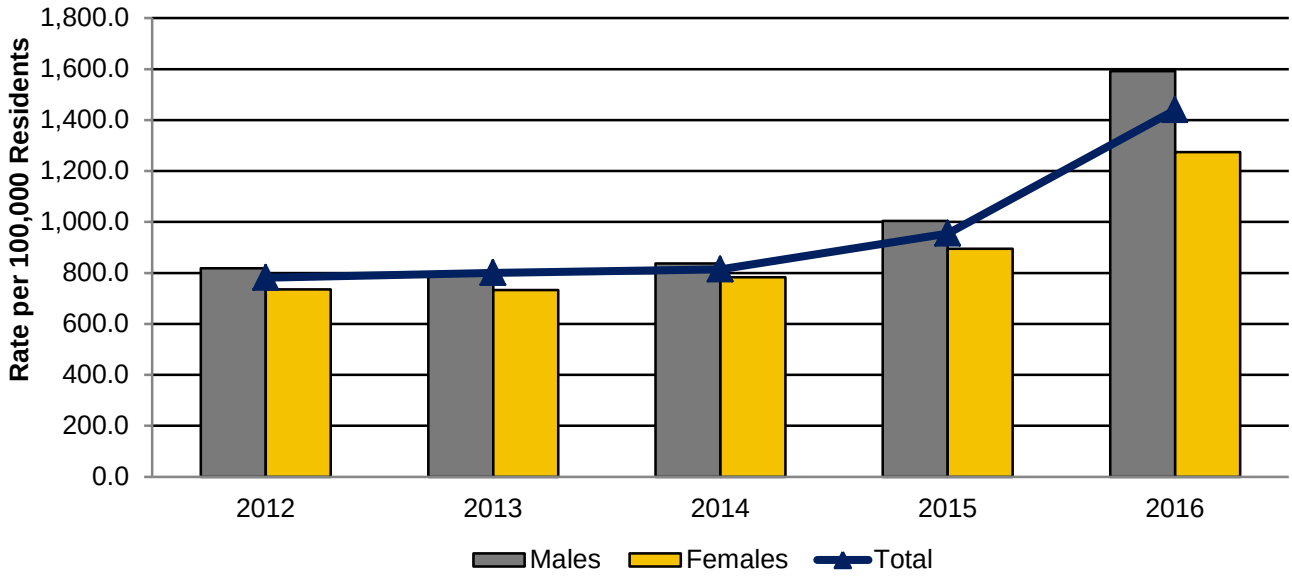
Figure 6. Age-Adjusted Non-Fatal TBI Inpatient Hospitalization Rates by Mechanism and Sex, Arizona 2012-2016



Non-Fatal Emergency Department Visits (EDV)

From 2012 through 2016, the age-adjusted rate of non-fatal TBI-related emergency department visits (EDV) increased by 84% overall, from 781.1 EDV per 100,000 residents in 2012 to 1,439.9 EDV per 100,000 residents in 2016.The rates among males and females have increased gradually since 2012. Among males, the rate increased 95%, from 818.4 EDV per 100,000 people in 2012 to 1,509.4 EDV per 100,000 residents in 2016. Among females, the rate increased 73%, from 735.3 EDV per 100,000 residents in 2012 to 1,164.6 EDV per 100,000 people in 2016. The age-adjusted EDV rates among males were higher than rates among females for the last five years. Figure 7 shows age-adjusted TBI-related emergency department visit rates by sex from 2012 to 2016.

Figure 7. Age-Adjusted Non-Fatal TBI-Related Emergency Department Visit Rates by Sex, Arizona, 2012-2016



The total age-adjusted TBI-related emergency department visit rates by manner and mechanism of injury have increased from 2012 to 2016. Unintentional injuries have increased by 87.1% while assault injuries have increased by 56.2% since 2012.

The most common non-fatal emergency department visit TBI injuries are falls, being struck by/against an object and motor vehicle crashes. From 2012 to 2016, there has been a 75.2% increase in falls (393.9 to 690.2 EDV per 100,000 residents), 100.7% increase in being struck by/against an object (189.8 to 380.6 EDV per 100,000 residents), and 59.6% increase in motor vehicle crashes (106.7 to 170.3 EDV per 100,000 residents).

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 2012-2016

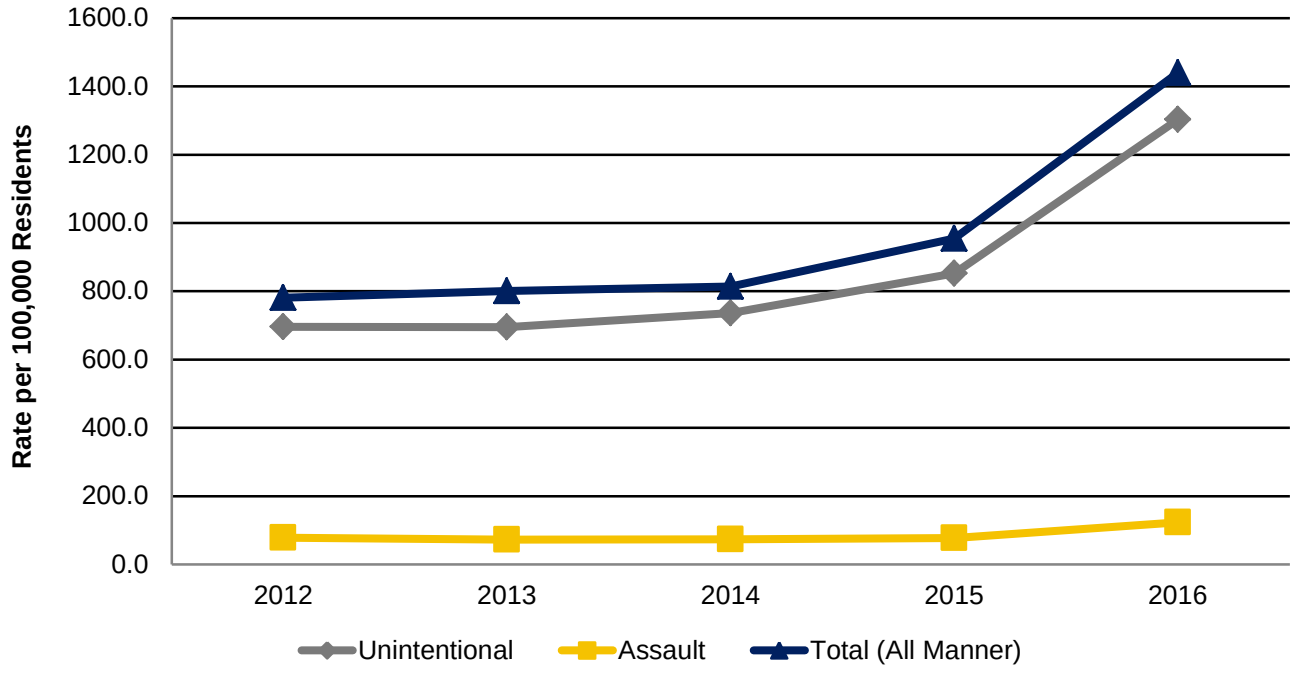
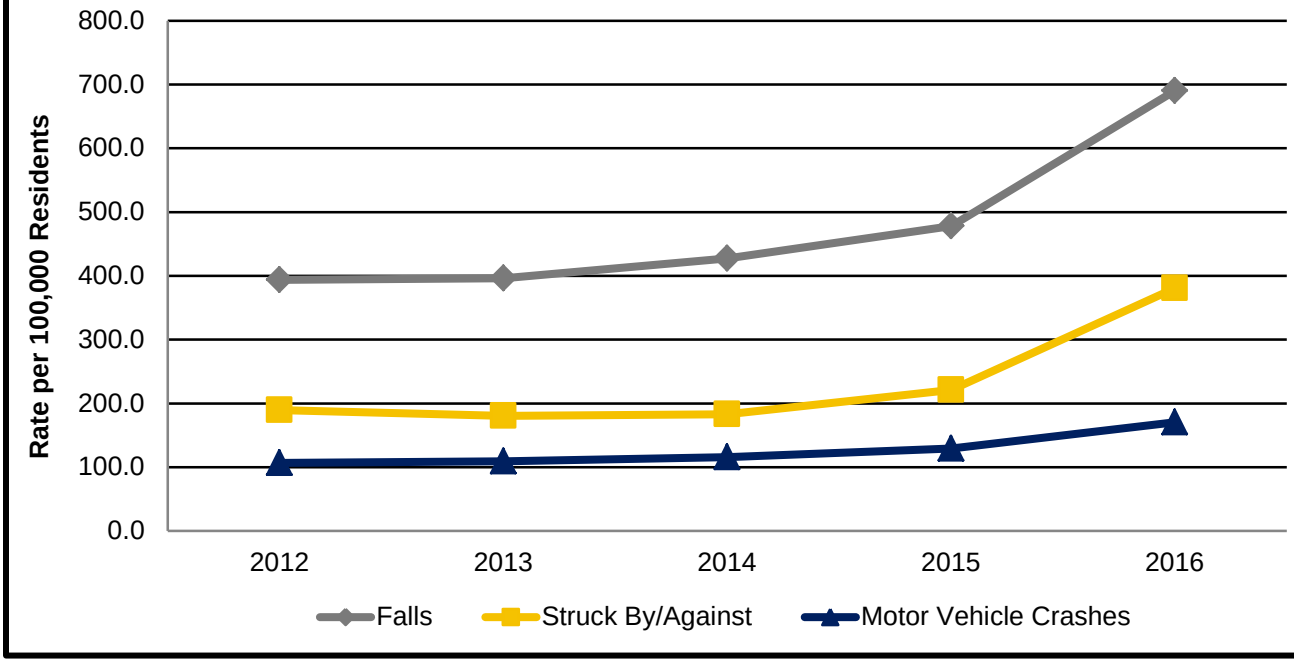


Figure 9. Age-Adjusted Non-Fatal TBI-Related Emergency Department Visit By Selected Cause Of Injury, Arizona 2012-2016

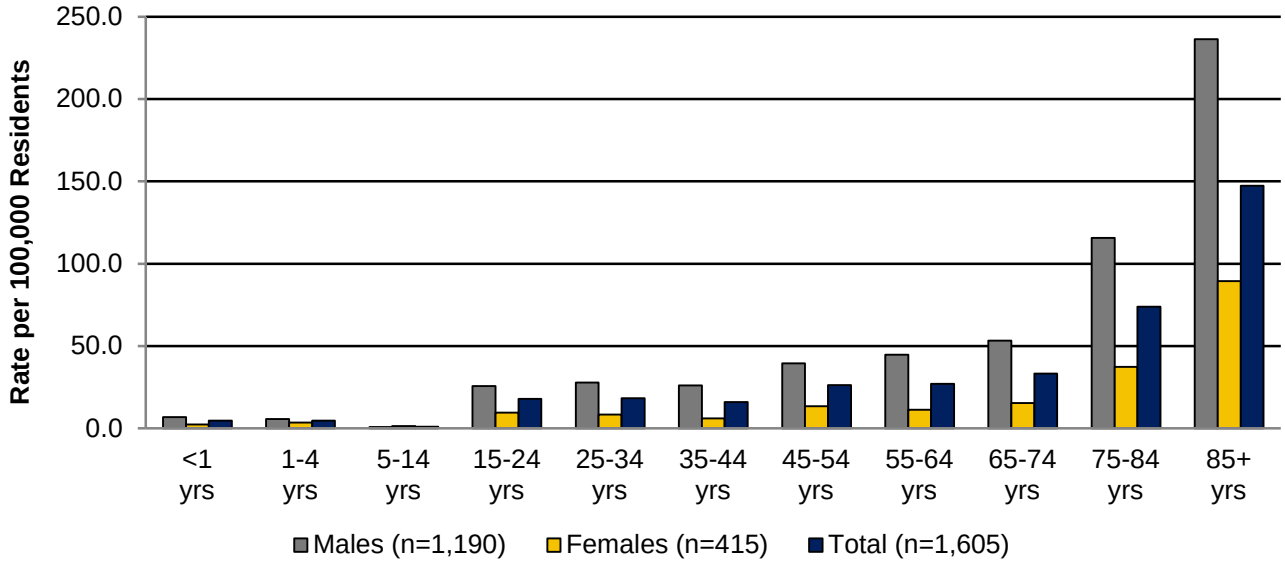


DEATHS AMONG ARIZONA RESIDENTS DURING 2016

In 2016, 1,605 Arizona residents died as a result of a TBI. Seven-four percent of TBI deaths were among males (n=1,190), while females accounted for twenty-six percent of TBI deaths (n=415). Males had higher rates of TBI-related mortality across all age groups.

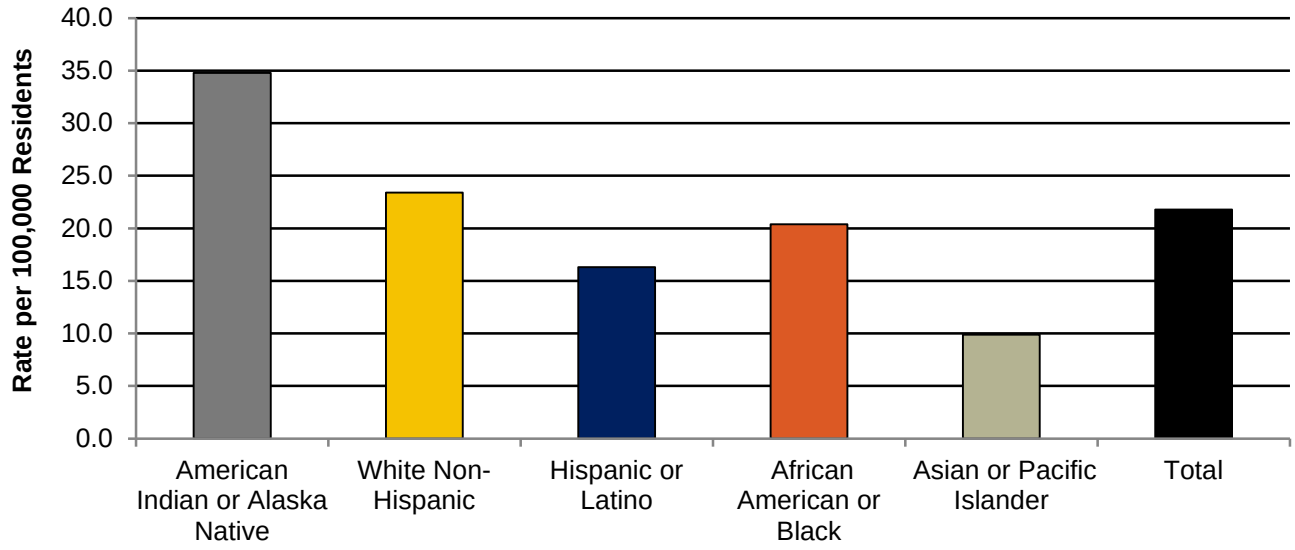
Males 85 years and older had the highest rate of TBI deaths at 236.3 deaths per 100,000 residents in 2016. Among the 193 deaths in those 85 years and older, 71.5% were due to unintentional falls (n=138). Figure 10 shows the 2016 TBI death rates by age group and sex for Arizona residents.

Figure 10. Age-Specific TBI-Related Mortality Rates by Sex and age Group, Arizona 2016



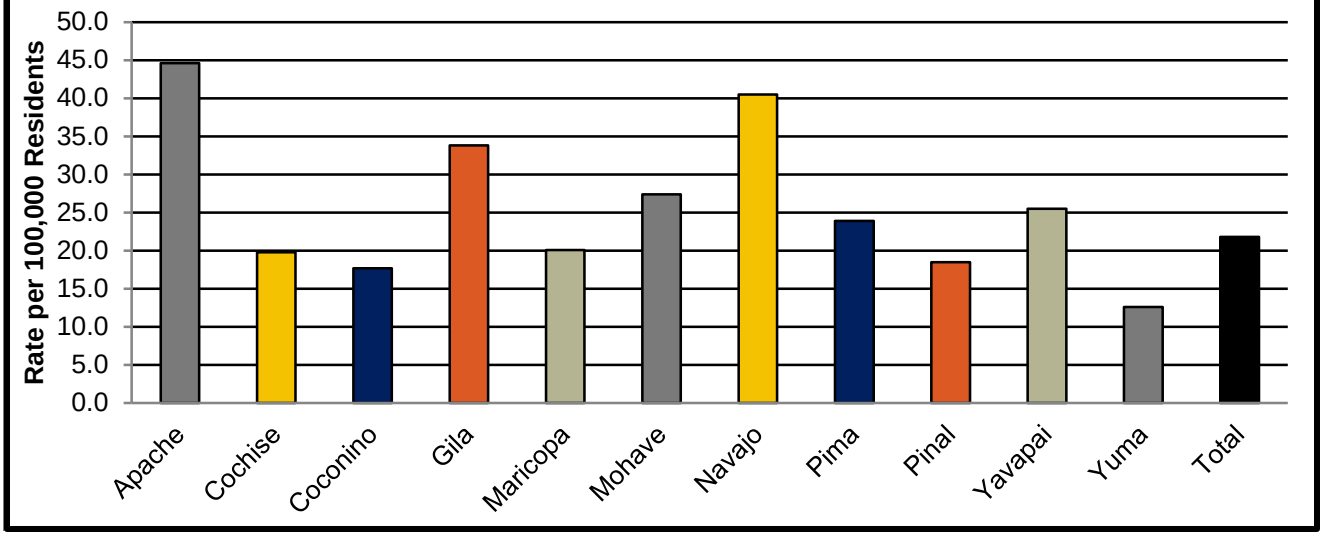
Age-adjusted TBI death rates were highest among American Indian or Alaska Native (34.8 deaths per 100,000 residents) and White non-Hispanics (23.4 deaths per 100,000 residents). Rates were lowest among Asian or Pacific Islanders (9.9 deaths per 100,000 residents). Figure 11 shows the 2016 age-adjusted TBI death rates by race/ethnicity in Arizona.

Figure 11. Age-AdjustedTBI-Related Mortality Rates by Race/Ethnicity, Arizona 2016



There were six counties that had age-adjusted TBI mortality rates higher than the state rate (21.8 deaths per 100,000 residents) in 2016. Apache (44.6) and Navajo (40.5) had the highest age-adjusted TBI mortality rates per 100,000 residents. Figure 12 shows the TBI mortality rate by county in Arizona.

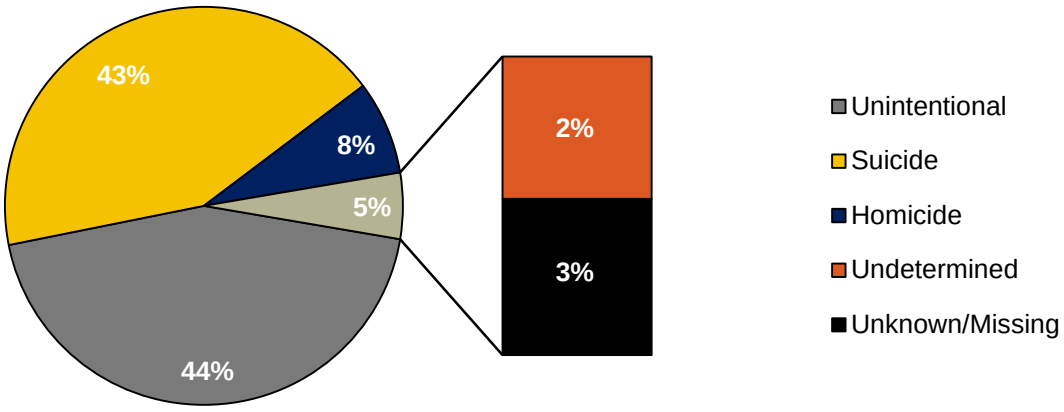
Figure 12. Age-Adjusted TBI-Related Mortality Rates by County, Arizona 2016*



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

Forty-four percent of the TBI deaths in 2016 were due to unintentional injuries (n=709); forty-three percent were due to suicides (n=688); and eight percent were due to homicides (n=122). Figure 13 shows TBI deaths by manner of injury during 2016 in Arizona.

Figure 13. Percentage of TBI-related Deaths by Manner, Arizona 2016



The most common causes of TBI deaths were firearms (49%, n=788), falls (27%, n=435), and motor vehicle traffic crashes (13%, n=201). Causes of TBI deaths during 2016 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 or Alaska Native residents. Figures 14 and 15 show the percentages breakdown 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 2016

Cause	Number	Percentage
Firearm	788	49%
Fall	435	27%
Motor vehicle traffic	201	13%
Other/unspecified/unknown	129	8%
Other specified	23	1%
Other land transport	17	<1%
Other pedestrian/pedal cycle	12	<1%
Total	**1,605**	**100%**

Source: Arizona Vital Statistics

Figure 14. TBI-Related Deaths by Manner and Race/Ethnicity, Arizona 2016

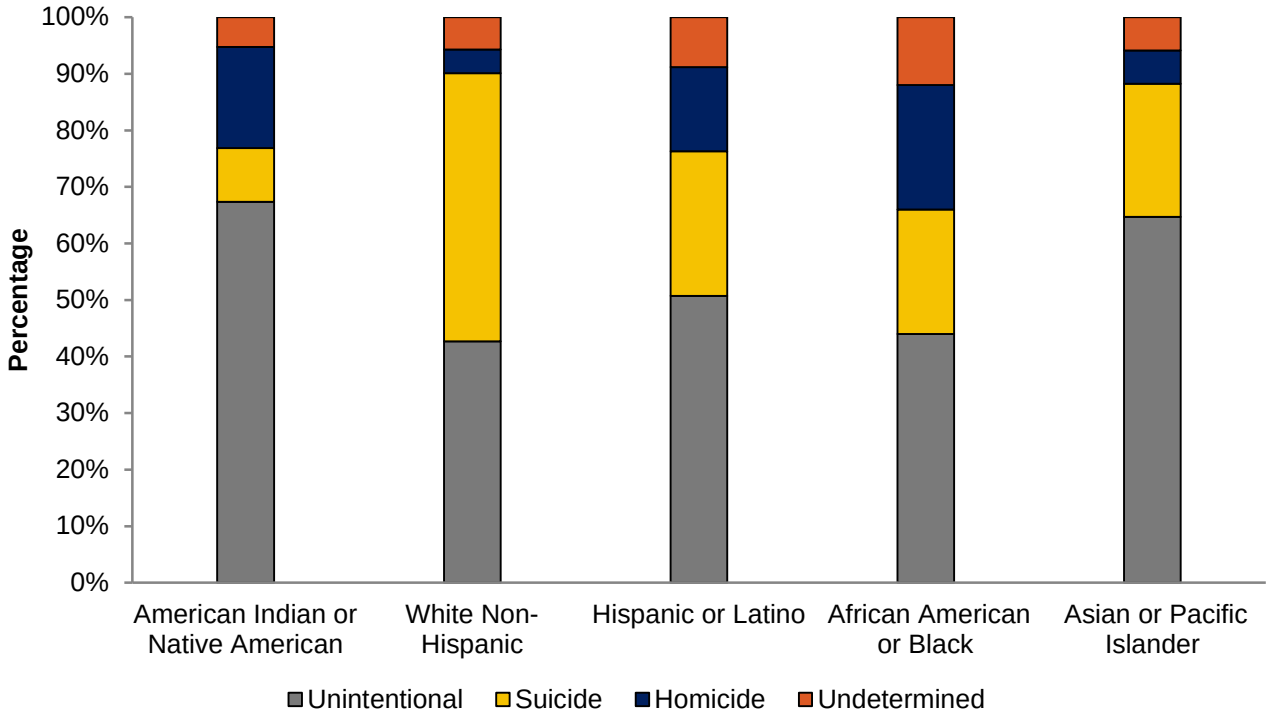
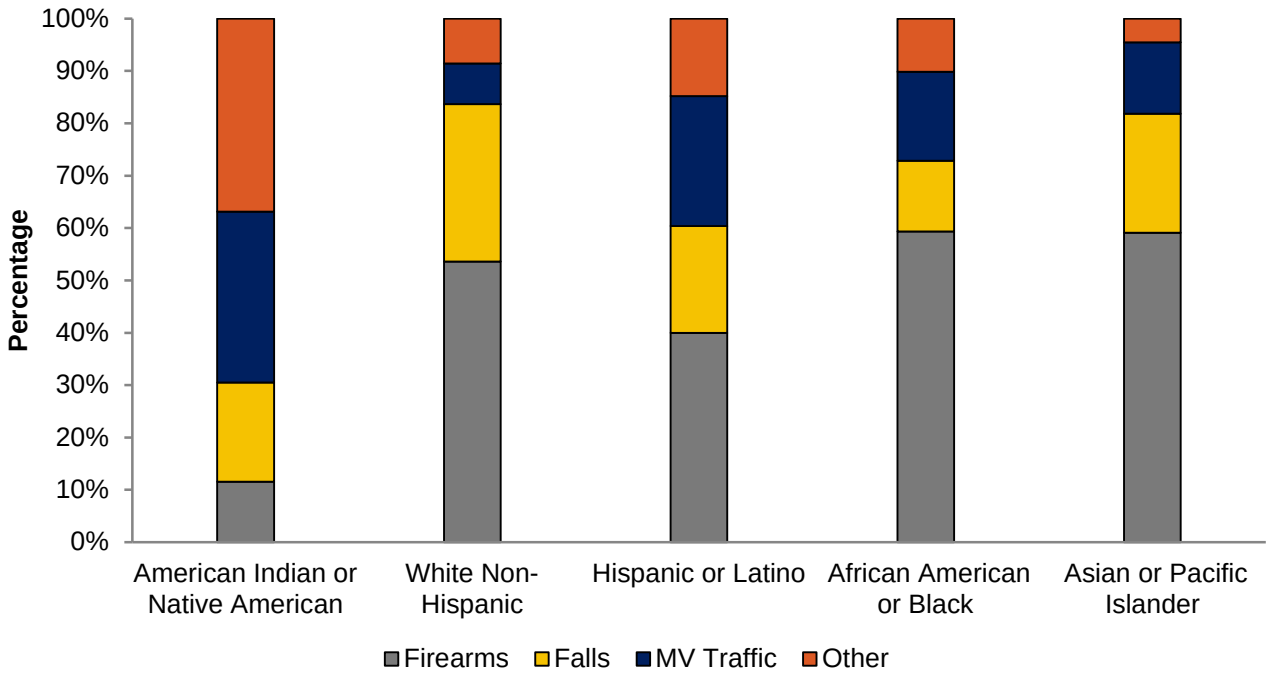


Figure 15. TBI-Related Deaths by Cause and Race/Ethnicity, Arizona 2016



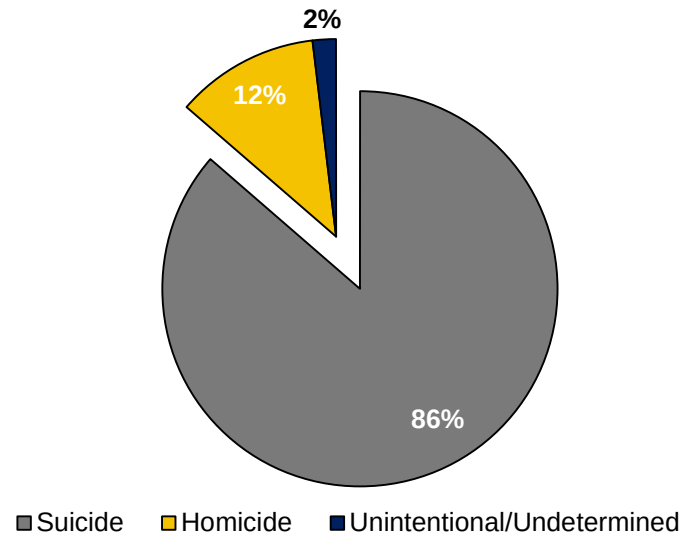
Firearm-Related TBI Mortality

Among the 788 Arizona residents who died as a result of a firearm-related TBI (10.9 deaths per 100,000 residents), the majority were male (83%, n=658) and 17% were female (n=130).

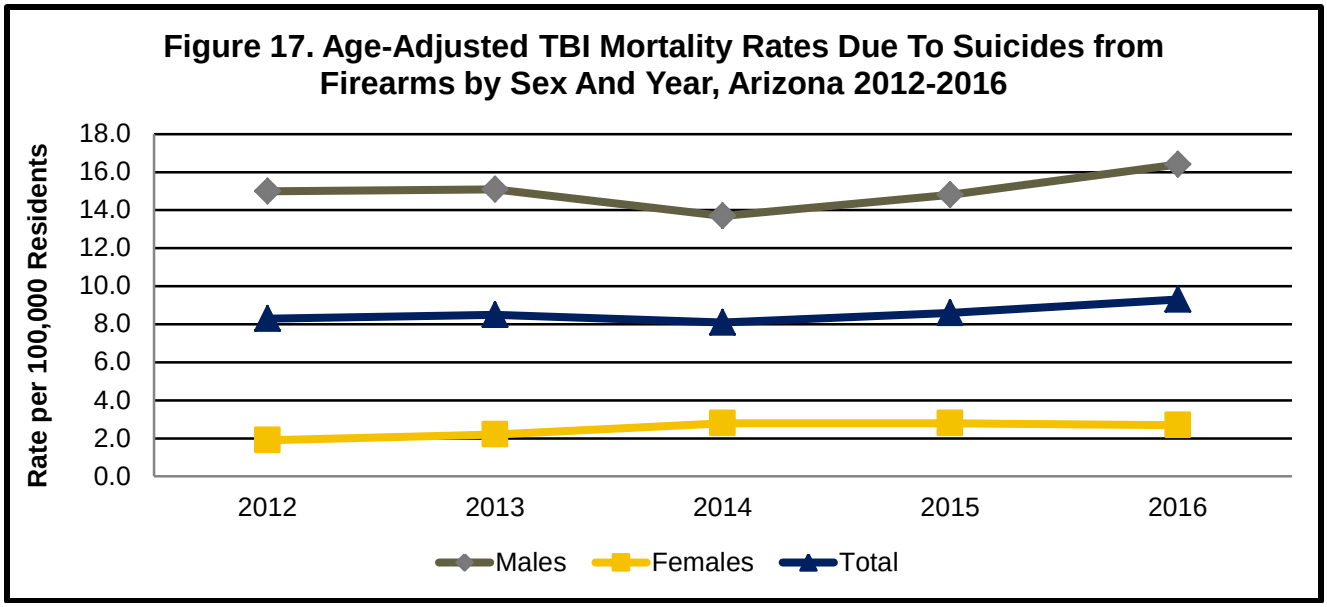
The highest age-adjusted rate of firearm-related TBI deaths was among White non-Hispanics (13.7 deaths per 100,000 residents, n=621). The second highest rate was among Black or African Americans residents (10.4 deaths per 100,000 residents, n=35).

The majority of firearm-related TBI deaths were suicides (86%, n=678). Twelve percent of the firearm-related TBI deaths were due to homicides (n=92) and two percent were due to undetermined intent (n=15). 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 2016



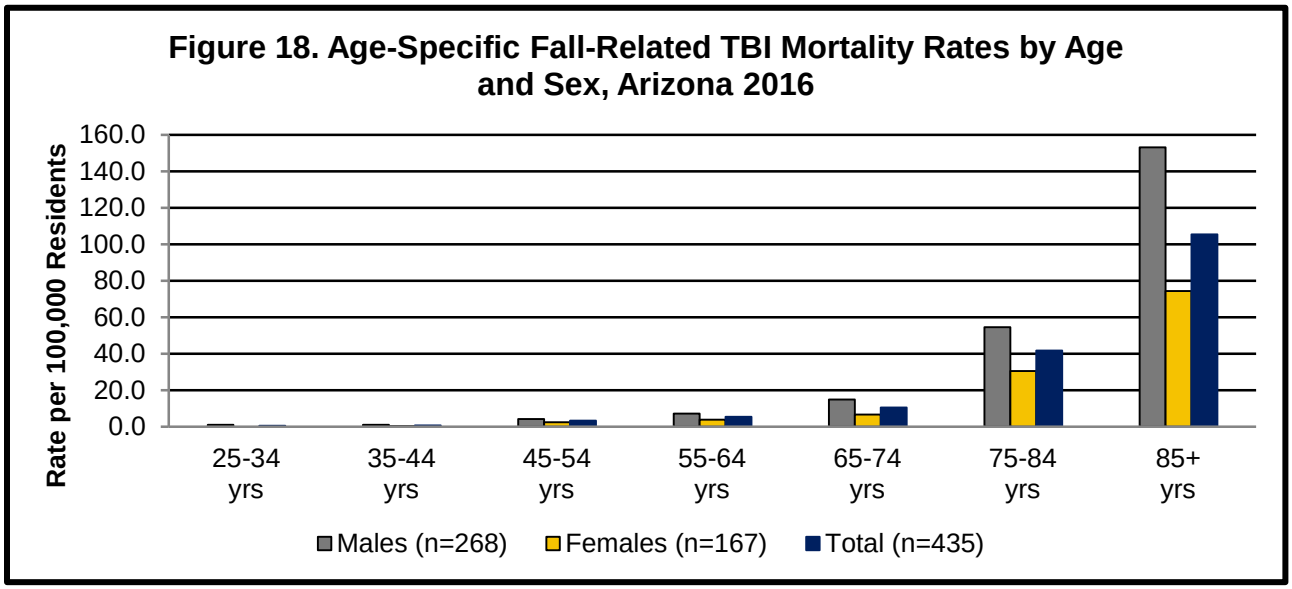
Among the 678 TBI deaths resulting from firearm-related suicides, 86% were among males (n=582) and 14% were among females (n=96). The age-adjusted rate of TBI deaths resulting from firearm-related suicides was 9.3 deaths per 100,000 residents, an 8% increase from 2015. The highest age-specific rates were among adult males, particularly among those 85 years and older (45.8 deaths per 100,000 residents). Age-adjusted rates were substantially higher among males than among females over each of the years from 2012-2016, but female suicide rates have increased 52% since 2012. Figure 17 shows the age-adjusted rate of TBI deaths resulting from firearm-related suicides by sex and year.



The highest age-adjusted rate of firearm-related TBI suicides was among White non-Hispanics residents (12.5 deaths per 100,000 residents, n=570). The age-adjusted rate among Hispanics or Latinos was 4.2 deaths per 100,000 residents (n=79). 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 435 TBI deaths due to falls (5.4 deaths per 100,000 residents), 62% were among males (n=268) and 38% were among females (n=167). Majority of the falls were unintentional and among adults over the age of 25. Twenty percent of the deaths were among adults ages 25 through 64 years (n=85); and eighty percent were among adults 65 years and older (n=348). In 2016, the age-adjusted rate of all fall-related TBI deaths in Arizona was 5.4 deaths per 100,000 people. The highest age-specific mortality rate was among adults 85 years and older (105.4 deaths per 100,000 residents) followed by adults 75 through 84 years of age (41.8 deaths per 100,000 residents).

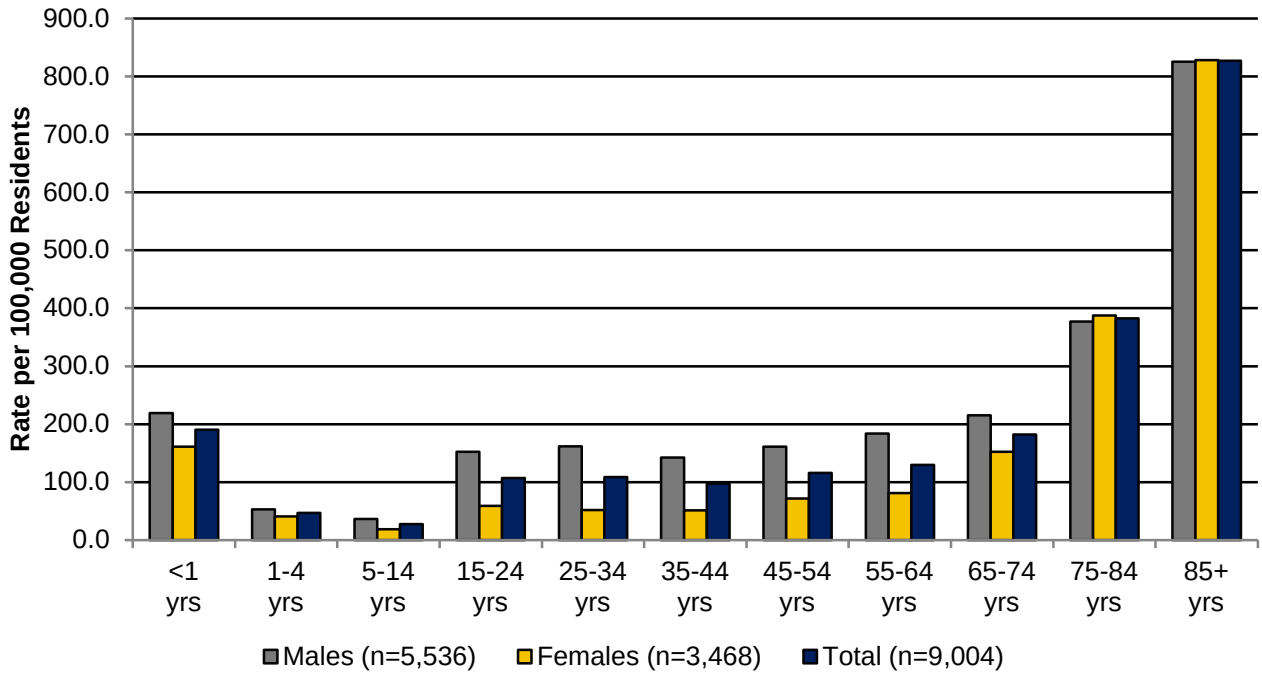


Non-Fatal Inpatient Hospitalizations (IP) among Arizona Residents During 2016

In 2016, 9,004 Arizona residents were hospitalized due to non-fatal TBI. Continuing the trend over the years, males comprised 61% of the total TBI hospitalizations (n=5,536; 159.0 IP per 100,000 residents) and females accounted for 39% (n=3,468; 87.8 IP per 100,000 residents).

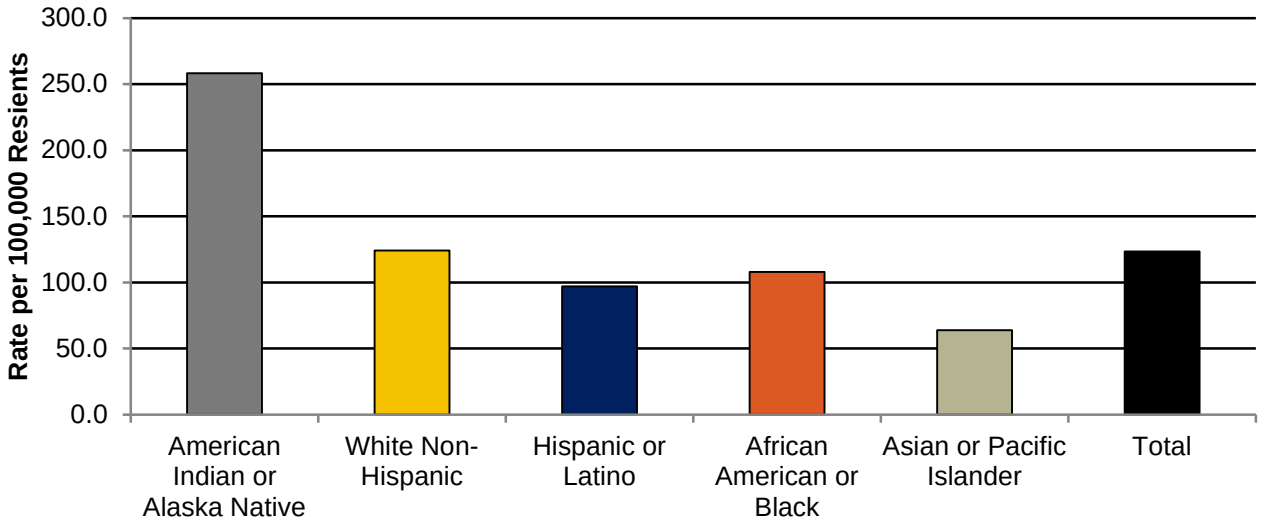
Adults 85 years and older had the highest rates of TBI inpatient hospitalizations (IP) at 827.1 IP per 100,000 in 2016. Within this age group, the age-specific rate of TBI hospitalizations for females was 828.2 IP per 100,000 residents, and the rate for males was 825.2 IP per 100,000 residents. For adults 85 years and older, 91% of TBI hospitalizations were due to unintentional falls (n=989). Figure 19 shows the 2016 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 2016



Age-adjusted TBI IP rates were highest among American Indian or Alaska Native (258.3 IP per 100,000 residents), and represents a 12% percent increase from 2015, when the rate for this group was 230.6 IP per 100,000 residents. White non-Hispanics had the second highest hospitalization rate (124.1 IP per 100,000 residents), and represents a 25% increase from 2015, when the rate was 99.6 IP per 100,000 residents. Figure 20 shows the 2016 age-adjusted TBI Inpatient Hospitalization rates by race/ethnicity in Arizona.

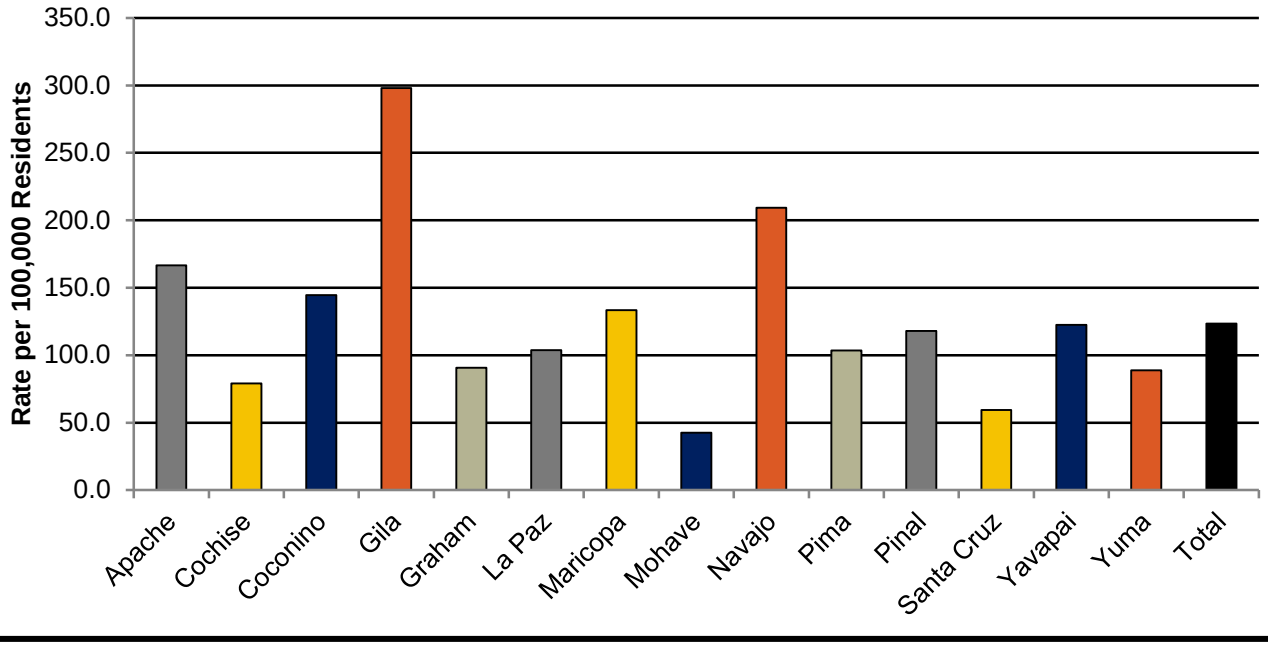
Figure 20. Age-Adjusted TBI-Related Non-Fatal Inpatient Hospitalization Rates by Race/Ethnicity, Arizona 2016*



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

There were five counties that had non-fatal TBI-related inpatient hospitalization rates higher than the state rate (123.5 IP per 100,000 residents) in 2016. Gila (298.1), Navajo (209.4), Apache (166.5), and Coconino (144.6) had the highest non-fatal TBI related inpatient hospitalization rates per 100,000 residents. Figure 21 shows the age-adjusted non-fatal TBI-related inpatient hospitalizations by county for Arizona in 2016.

Figure 21. Age-Adjusted TBI-Related Non-Fatal Inpatient Hospitalization Rates, by County, Arizona 2016*

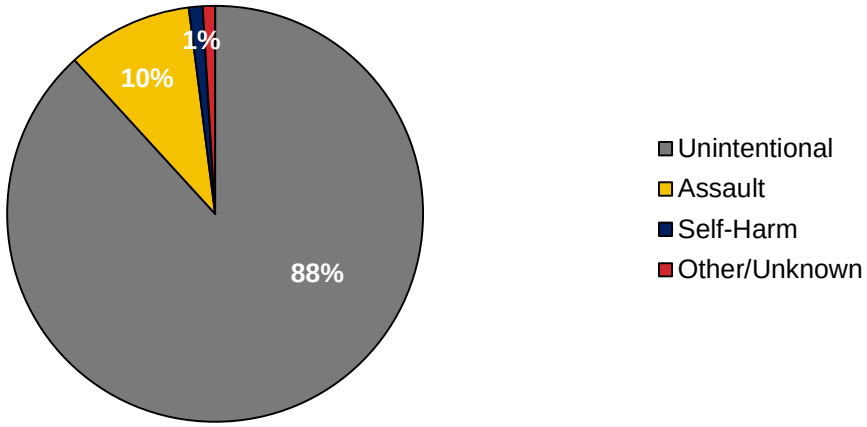


*Only Counties with 20 or more records were included in graph.

For TBI inpatient hospitalizations, the average length of stay was six days (median=4 days), and hospital stays due to TBI ranged from less than one full day to 175 days. In total, Arizonans spent 56,294 days hospitalized for TBI in 2016.TBI inpatient hospitalization charges in 2016 totaled more than $911.1 million, with 71% paid by the Arizona Health Care Cost Containment System (AHCCCS)/Medicaid and Medicare (n=6,427 cases, over $624.1 million). This total does not include costs related to physician care, rehabilitation, lost wages, or long-term costs of disability.

Unintentional injuries accounted for 88% of TBI hospitalizations (n=7,952). There were 97 hospitalizations due to self-harm TBI (less than one percent) and 869 due to assaults (ten percent). Figure 22 shows the TBI inpatient hospitalizations by manner of injury for Arizona in 2016.

Figure 22. TBI-related Non-Fatal Inpatient Hospitalizations by Manner, Arizona 2016



Fall-related injuries were the most common cause of TBI hospitalizations (47%, n=4,236), followed by motor vehicle traffic injuries (28%, n=2,554). Table 2 shows causes of TBI inpatient hospitalizations in Arizona during 2016.

Table 2. Number and Percentage of TBI Inpatient Hospitalizations by Cause, Arizona 2016

Cause	Number	Percentage
Fall	4,236	47%
Motor vehicle traffic	2,554	28%
Struck by/against	748	8%
Other/unspecified	606	7%
Transport	447	5%
Other pedestrian/pedal cycle	199	2%
Cut/pierce	115	<1%
Firearm	99	<1%
Total	**9,004**	**100**

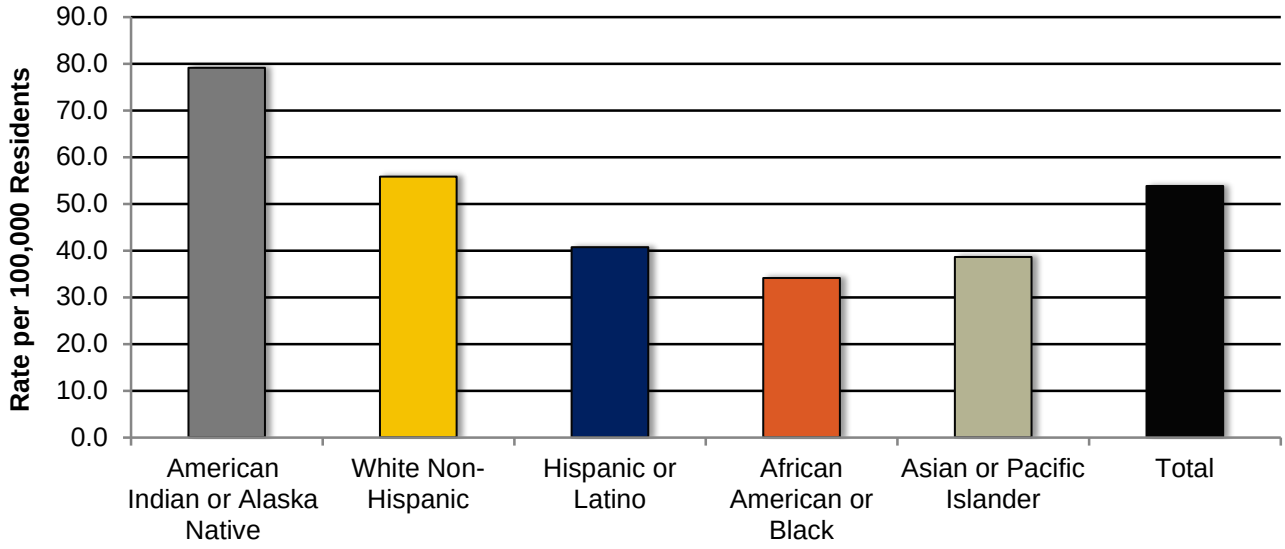
Source: Arizona Hospital Discharge Database

Non-Fatal Fall-Related TBI Inpatient Hospitalizations (IP)

There were 4,236 inpatient hospitalizations due to fall-related TBI (53.8 IP per 100,000 residents). Fifty-two percent were among males (n=2,172) and forty-eight percent were among females (n=2,064). Falls were unintentional more than 99% of the time (n=4,222), with only 15 cases in which another manner was identified.

American Indians or Alaska Natives had the highest age-adjusted rate of fall-related TBI hospitalizations with 79.1 IP per 100,000 residents (n=192). The second highest rate was among White Non-Hispanic or Pacific (55.8 IP per 100,000 residents; n=3,262). The age-adjusted rate for non-fatal fall-related inpatient hospitalizations among all Arizonans was 53.8 IP per 100,000 residents.

Figure 23. Fall-Related Non-Fatal TBI Inpatient Hospitalization Rates By Race/Ethnicity, Arizona 2016*



*Does not include 78 cases in which race/ethnicity information is unknown.

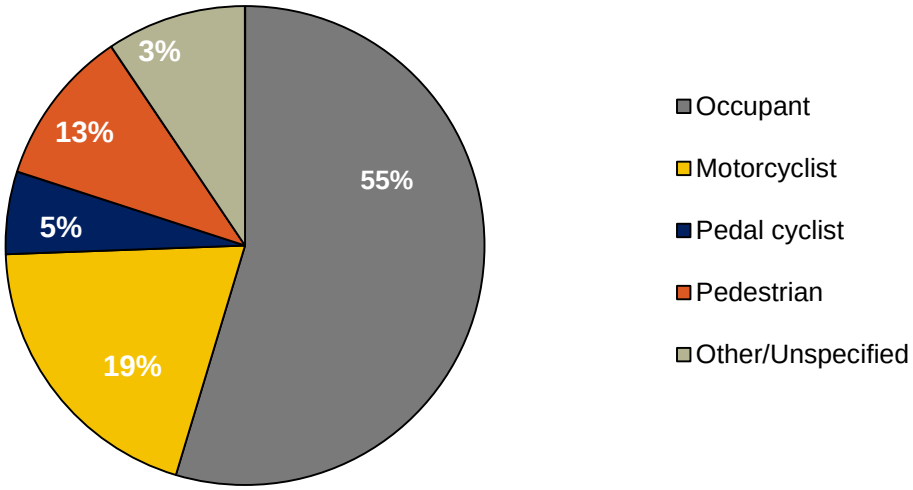
Non-Fatal Motor Vehicle Traffic Crash-Related TBI Inpatient Hospitalizations (IP)

Of the 2,554 TBI hospitalizations due to motor vehicle traffic crashes (36.9 IP per 100,000 residents), 67% were among males (n=1,701) and 33% were among females (n=851). Over 99% 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 (59.1 IP per 100,000 residents), for both males (78.4 IP per 100,000 residents) and females (38.5 IP per 100,000 residents).

American Indians or Alaska Natives had the highest rate of TBI hospitalizations for motor vehicle traffic crashes with 61.0 IP per 100,000 residents (n=179), representing a 3% decrease from 2015 (63.0 IP per 100,000 residents). White non-Hispanic residents had the second highest rate at 36.8 IP per 100,000 residents (n=1,457). The age-adjusted rate for non-fatal motor vehicle traffic-related inpatient hospitalizations among all Arizonans was 36.9 IP per 100,000 residents.

The majority of TBI inpatient hospitalizations due to motor vehicle traffic crashes were among occupants of motor vehicles (55%, n=1,396), followed by motorcyclists (19%, n=505), pedestrians (13%, n=270), and pedal cyclists (5%, n=142). This distribution is consistent with data from previous years. Figure 24 shows TBI inpatient hospitalizations due to motor vehicle traffic crashes by injured person.

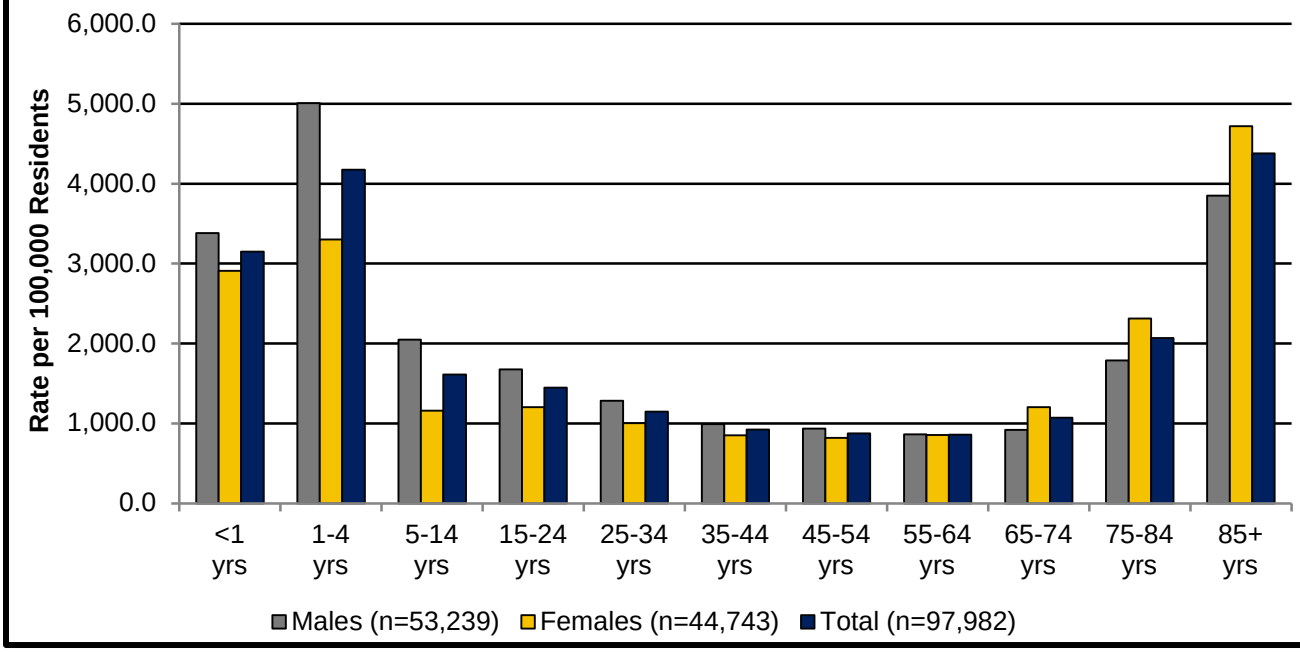
Figure 24. Non-Fatal Motor Vehicle Crash-Related TBI Inpatient Hospitalizations by Injured Person, Arizona 2016



Non-Fatal Emergency Department Visits (EDV) among Arizona Residents During 2016

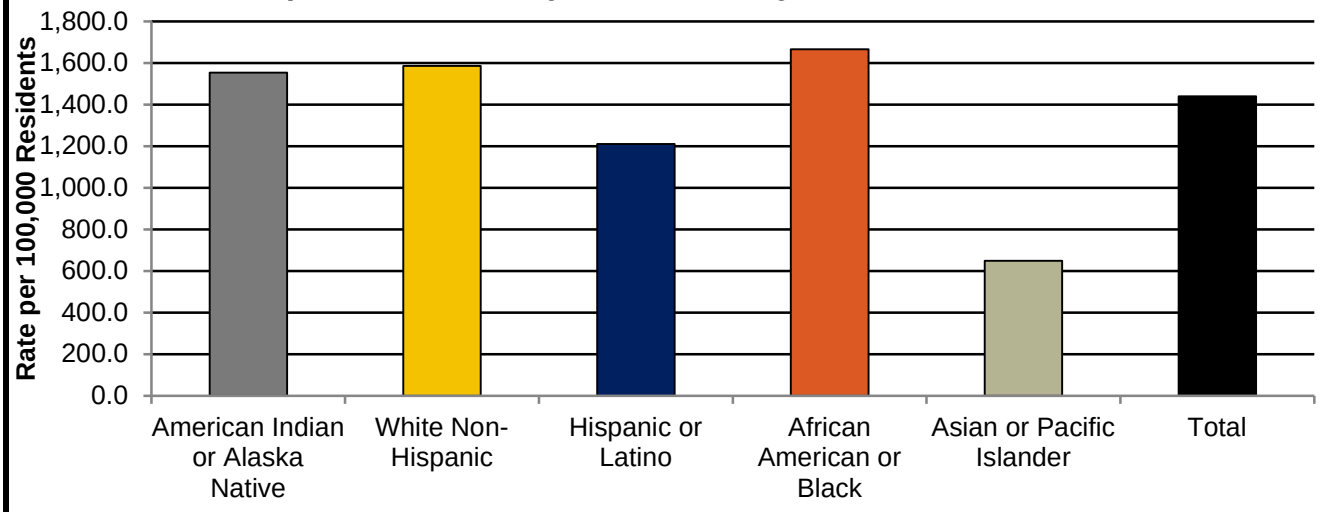
In 2016, there were 97,982 TBI Emergency Department Visits (EDV) among Arizona residents. Males accounted for over half of TBI EDV (54%, n=53,239), while females accounted for 46% of visits (n=44,743). TBI EDV rates were highest among adults 85 years and older followed by children 1-4 years of age. There were 3,744 EDV among females 85 years and older (of 4,719.8 EDV per 100,000 residents), and 1,988 EDV among males 85 and older (3,851.1 EDV per 100,000 residents). For children 1-4 years, 66% of TBI EDV were due to unintentional falls (n=9,503). Figure 25 shows the 2016 TBI emergency department visit rates for Arizona residents.

Figure 25. Age-Specific TBI Emergency Department Visit Rates by Sex, Arizona 2016



Age-adjusted TBI emergency department visits were highest among Black or African American residents (1,666.3 EDV per 100,000 residents). White non-Hispanics residents had the second highest emergency department visit rate with 1,585.6 EDV per 100,000 residents, followed by American Indian or Alaska Native residents (1,554.3 EDV per 100,000 residents). The age-adjusted rate for non-fatal TBI-related emergency department visits among all Arizonans in 2016 was 1,439.9 EDV per 100,000 residents. Figure 26 shows the age-adjusted emergency department rates by race/ethnicity.

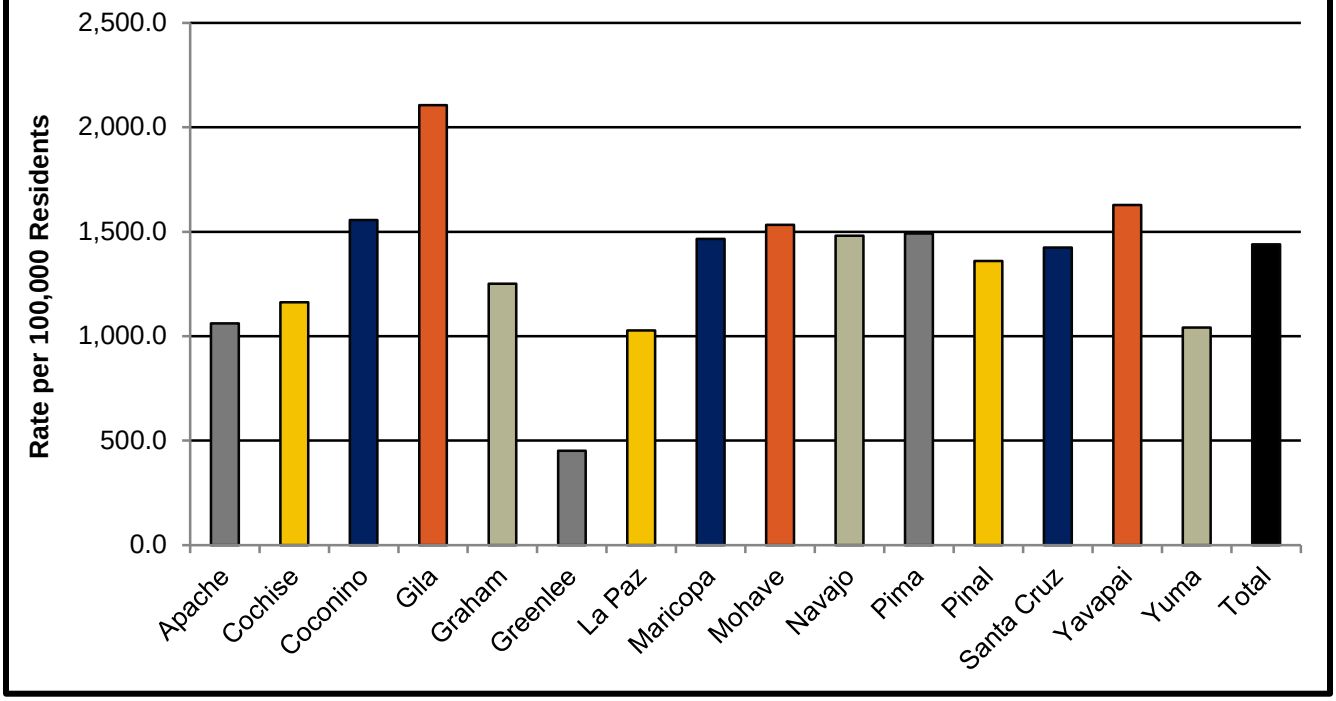
Figure 26. Age-Adjusted TBI-Related Non-Fatal Emergency Department Rates by Race/Ethnicity, Arizona 2016*



*Does not include 1,352 cases in which race/ethnicity information is unknown.

There were five counties that had higher non-fatal TBI-related emergency department visits than the state rate in 2016 (1,439.9 EDV per 100,000 residents). Gila (2,105.4), Yavapai (1,627.2), Coconino (1,555.6), Mohave (1,533.1), Pima (1492.0), Navajo (1480.8) and Maricopa (1,465.2) counties had the highest non-fatal TBI-related EDV per 100,000 residents. Figure 27 shows the age-adjusted TBI-related non-fatal emergency department visits by county.

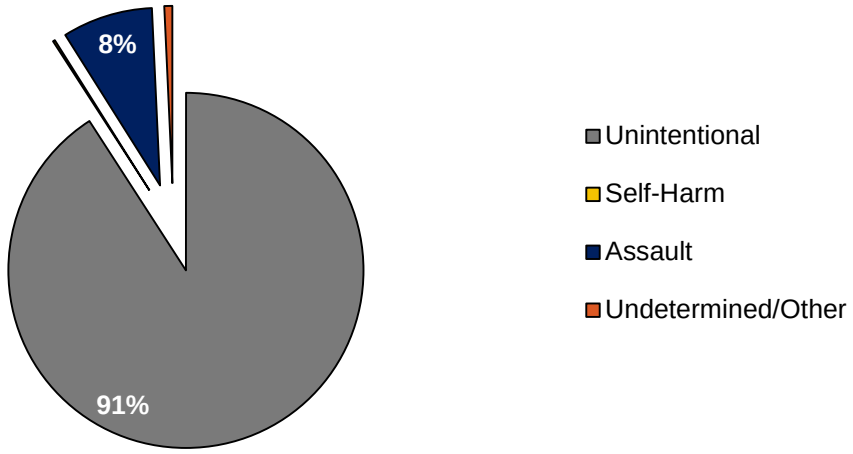
Figure 27. Age-Adjusted TBI-Related Non-Fatal Emergency Department Rates by County, Arizona 2016



TBI emergency department charges in 2016 totaled more than $655 million, with 59% paid by the Arizona Health Care Cost Containment System (AHCCCS)/Medicaid and Medicare (n=57,651, over $399.5 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%, n=89,097), followed by assaults (8%, n=7,946). Figure 28 shows TBI emergency department visits by intent during 2016 in Arizona.

Figure 28. Percentage of TBI Emergency Department Visits by Manner of Injury, Arizona 2016



The leading causes of TBI emergency department visits were falls (50%, n=48,631), struck by/against injuries (26%, n=24,871), and motor vehicle traffic crashes (11%, n=11,357). Table 3 shows TBI emergency department visits by cause for Arizona in 2016. Descriptions of all causes are given in Appendix A.

Table 3. Number and Percentage of TBI Emergency Department Visits by Cause, Arizona 2016

Cause	Number	Percentage
Fall	48,631	50%
Struck by/against	24,871	25%
Motor vehicle traffic	11,357	12%
Other/unspecified	5,319	5%
Other Transport	2,297	2%
Natural/Environment	2,227	2%
Pedestrian/pedal cycle	1,752	2%
Cut/Pierce	1,528	2%
Total	**91,267**	**100%**

Source: Arizona Hospital Discharge Database

Non-Fatal Fall-Related Emergency Department Visits (EDV)

There were 48,631 emergency department visits due to fall-related TBI (690.2 EDV per 100,000 residents) Majority of fall-related TBI were among females (51%, n=24,896) and males were not far behind (49%, n= 23,733). Over 99% of these falls were unintentional (n=48,610). The oldest and youngest members of the population are the most at risk for fall-related TBI resulting in emergency department visit. Among children 1-4 years of age, the rate of fall-related TBI was 2,768.4 EDV per 100,000 residents; and among adults 85 and older, the rate was 3,962.7 EDV per 100,000 residents.

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

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 24,871 TBI emergency department visits (380.6 EDV per 100,000 residents) due to struck by/against injuries, 63% were among males (n=15,596) and 37% were among females (n=9,274). Seventy-four percent of these injuries were unintentional (n=18,436), and twenty-five percent were assaults (n=6,265). Fifty-six percent of TBI emergency department visits from struck by/against injuries were among individuals 1 and 24 years of age (n=13,990).

The emergency department discharge database did not include specific information regarding contributing event for 29% of the struck by/against injuries. The most frequently specified contributing events were assault by blunt objects (25%, n=6,265), falling from/falling object (10%, n=2,429), stationary objects (15%, n=3,847), and objects in sports (7%, n=1,732). 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 2016