RIVERSIDE COUNTY EMS AGENCY

Emergency Management Department

Riverside University HEALTH SYSTEM Public Health

Riverside County

2015 TRAUMA REPORT

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II. EXECUTIVE SUMMARY

The Riverside County 2015 Trauma Report evaluates various types of trauma cases and trends throughout the county from 2010 - 2014. The report provides insight to traumatic injuries that occur within Riverside County, with a population of over 2.3 million residents. Some trends in this report include specific types of injuries, the use of protective devices, and locations in the county where there are higher incidences of a specific type of injury.

Over the five year period covered in this report, the four trauma centers within Riverside County provided care to 27,689 trauma patients. Of these patients, 81.4% (22,540 patients) were Riverside County residents. The majority of other patients were from neighboring counties including San Bernardino, Orange, and San Diego. For the purposes of this report, analysis will be focused on Riverside County residents. The continuum of care for trauma patients starts in the pre-hospital environment then continues throughout the course of definitive care including hospitalization and on-going rehabilitative care. The county trauma system is outlined in the Riverside County Trauma Plan which is designed to establish a coordinated system for injury prevention and the detection, emergency response, treatment, transport, and hospital care for patients that suffer traumatic injury. This comprehensive system based approach to trauma prevention and care is a collaborative effort between emergency service, medical and public health teams that saves lives. This report serves as a reference for the Riverside County Emergency Medical Services Agency (REMSA), the Riverside University Health System - Public Health Department, trauma centers and our partners to continuously improve efforts to prevent and reduce injury related morbidity and mortality for the county residents and visitors we serve. Thank you to all of the professionals who work tirelessly every day to accomplish that goal.

Bruce Barton
Director
Riverside County EMS Agency (REMSA)

III. INTRODUCTION

The Riverside County Emergency Medical Services Agency (REMSA) manages and maintains the county trauma system and is the central site for the data registry. The Trauma Report 2015 is a review of the trauma data from 2010-2014. The Digital Innovations, Inc., *Collector Trauma Registry* ® database has been used since 1993 as the data collection source. Each of the four trauma centers submit data, based on the National Trauma Data Standards (NTDS), to the National Trauma Data Bank ® (NTDB) for analysis. The NTDB is the largest aggregation of U.S./Canadian trauma data registry ever assembled and is the principal national repository for trauma center registry data. In keeping with the American College of Surgeons (ACS) Committee on Trauma (COT) mission, the NTDB publishes and distributes annual benchmark reports for the trauma centers to use for quality reporting.

According to the NTDB National Trauma Data Standard Data Dictionary, a trauma patient is defined as a patient who sustains a traumatic injury with at least one International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) injury diagnostic code between 800 and 959.9. Additional inclusion criteria for the trauma registry include those patients admitted, transferred via emergency medical services (EMS), transported from one hospital to another, or died in a hospital as a result of a traumatic injury. Isolated injuries coded as late effects of injuries, poisonings, toxic effects, and other external causes (905-909.9), superficial injury (910-924.9), and effects of foreign body entering through body orifice (930-939.9) are excluded from data collection.

The Centers for Disease Control and Prevention's proposed matrix of E-code groupings is used to determine the mechanism and manner/intent from external-cause-of-injury codes. This report does not encompass all minor injuries , only ones captured by the trauma registry. Refer to the appendix for the Matrix of E-Code Groupings table.

Trauma centers are licensed hospitals, designated by a local Emergency Medical Services Agency (LEMSA) that include personnel, services, and equipment necessary for the care of trauma patients. ACS developed a verification process for trauma hospitals. ACS does not designate trauma centers; instead, it verifies the presence of the resources listed in *Resources for Optimal Care of the Injured Patient*. ACS verification does not equate to LEMSA designation.

Trauma Center designations include Levels I – IV. Level I Trauma Centers receive the highest volume of trauma patients and level of care capacity. Level I trauma centers provide leadership in research and are teaching facilities. Level II trauma centers offer the same care as Level I Trauma Centers, but are not required to have cardio-thoracic services or research.

Level I and II Pediatric Trauma Centers (PTC) focus specifically on pediatric trauma patients. Level I PTC require additional pediatric specialties, include trauma research programs and are teaching facilities. Level III trauma centers can provide initial stabilization of the trauma patient and must offer the same services as Level II, including surgical capabilities, but they are not required to provide neurosurgery services. Level IV trauma centers have 24-hour personnel and trauma resuscitation staff available in the Emergency Department with the ability to transfer patients out for a higher level of care.

Riverside County has four Level II trauma centers: Desert Regional Medical Center (DRMC) located in Palm Springs, Inland Valley Medical Center (IVMC) located in Wildomar, Riverside Community Hospital (RCH) located in Riverside City, and Riverside University Health Systems – Medical Center (RUHS-MC) located in Moreno Valley. All four trauma centers have the ability to receive air transport. RUHS-MC is Riverside County's designated Level II PTC.

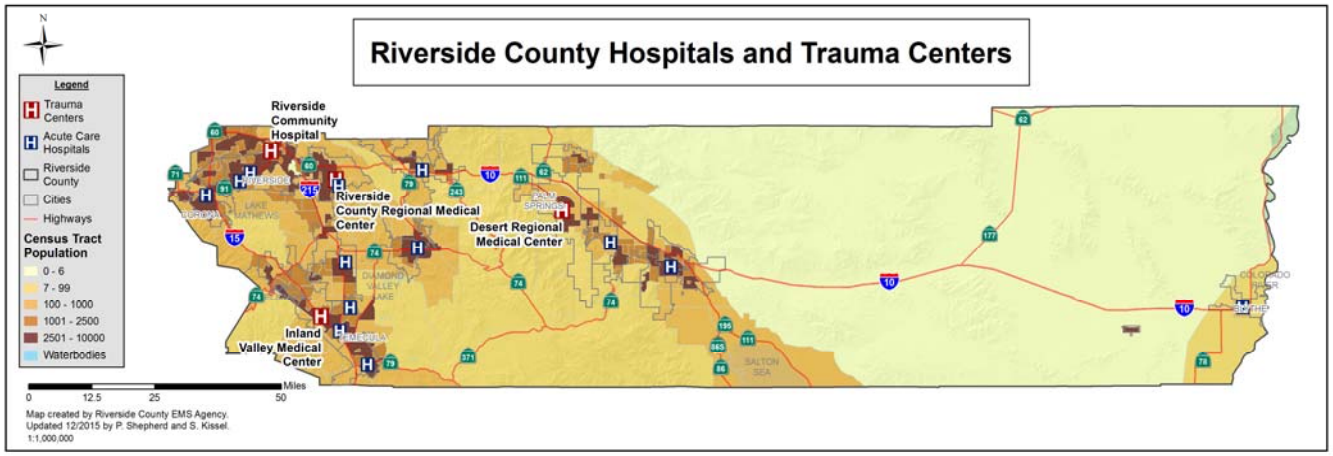
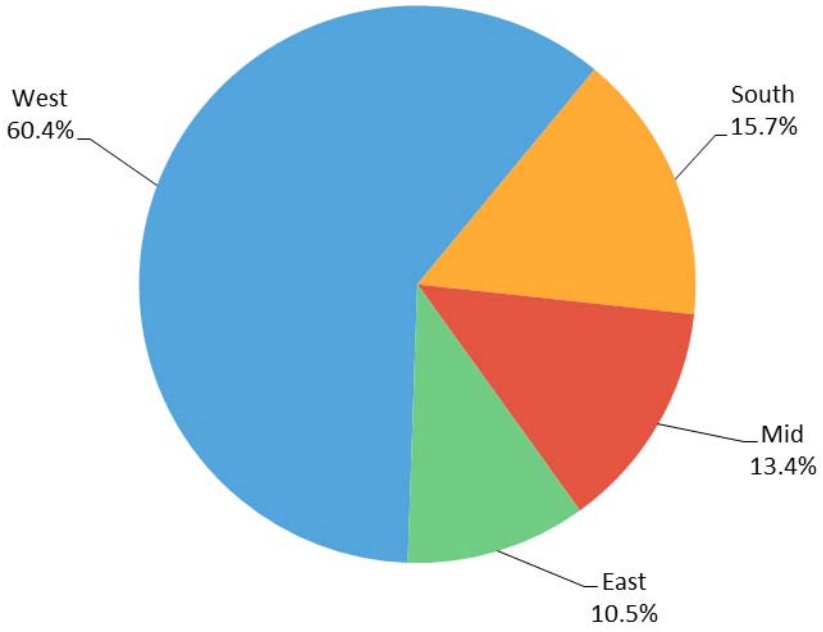


Table 3.1 Riverside County Regions

Southern Region	Western Region	Mid Regions	Eastern Regions
Canyon Lake	Corona	Aguanga	Blythe
Lake Elsinore	Eastvale	Anza	Cathedral City
Menifee	Jurupa Valley	Banning	Coachella
Murrieta	Mira Loma	Beaumont	Desert Hot Springs
Temecula	Moreno Valley	Calimesa	Indian Wells
Wildomar	Norco	Hemet	Indio
	Nuevo	Homeland	La Quinta
	Perris	Idyllwild	Mecca
	Riverside	San Jacinto	Palm Desert
	Sun City/Romoland	Winchester	Palm Springs
			Rancho Mirage
			Thermal
			Thousand Palms

Chart 3.1 Riverside County Trauma Patients by Region, Riverside County, 2010-2014



Case Incidence vs. Case Fatality Definition

In the length of this report, primary data points will include either case incidence and/or case fatality. Calculations of both are provided in the Appendix section. When referring to case incidence, this illustrates the rate, percentage, or number of cases for a certain injury (Fall, Motor Vehicle accident, etc.). When referring to case fatality, this illustrates the rate of individuals who had a fatal injury (died due to injury). At times, case fatality rate will appear higher for certain demographic groups (age, sex, race/ethnicity, etc.) than the corresponding incidence rate. When a case fatality rate is higher than the corresponding incidence rate, the specific demographic group is more likely to have a fatal injury than other demographic groups. For example, Fall incidence rate among 65-74 year olds is 10.8%, and case fatality rate is 16.4% (refer to page 21 for chart). This means that among all Falls, 10.8% are within individuals between ages 65-74 years. However, among Falls that lead to death, 16.4% of them are within individuals between ages 65-74 years. This means that about 10% of Falls are likely to occur among 65-74 year olds. However, if they Fall, it is more likely that they have a fatal injury.

IV. DEMOGRAPHIC INFORMATION

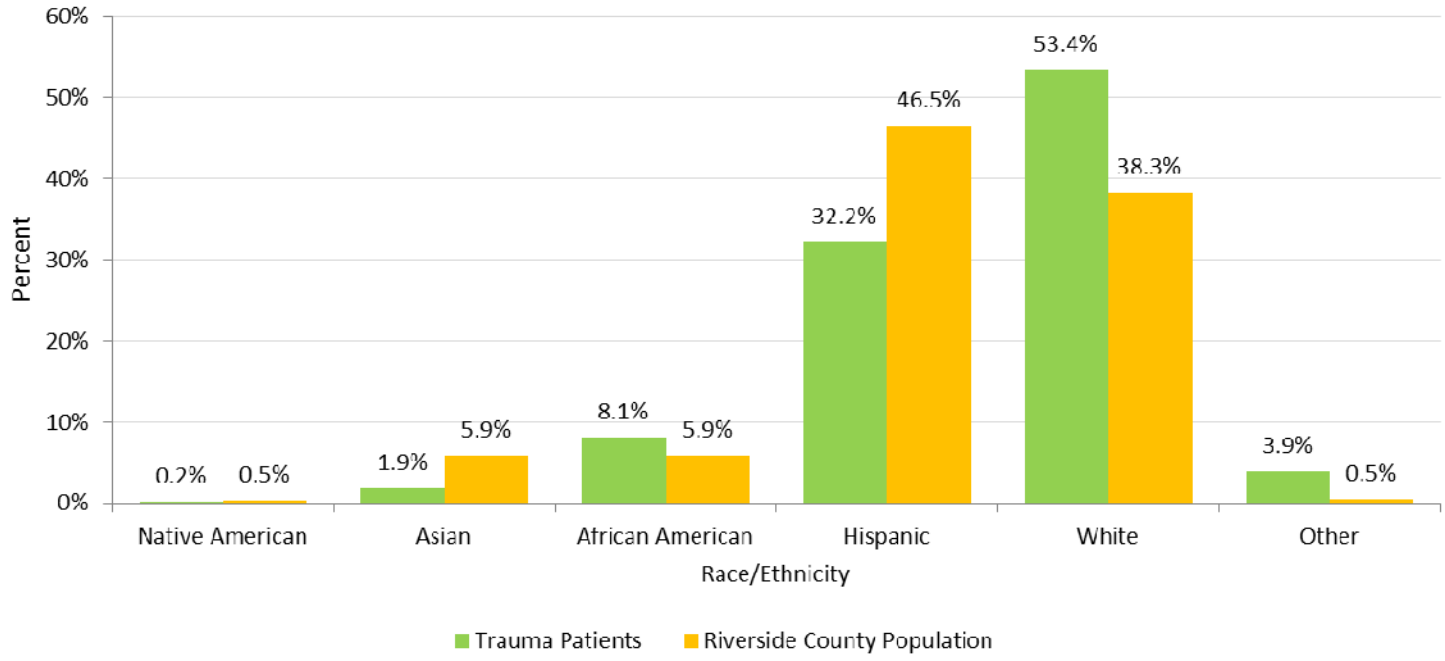
Introduction

According to the California Department of Finance, Riverside County is the fourth largest county in California. With a population of more than 2 million residents, its populace makes up 6% of the overall population in California. Between 2010 and 2014, there were 27,689 people seen at trauma facilities in Riverside County. Of those people, 22,540 (81.4%) were Riverside County residents. From 2010 to 2014, there was an increase in population of Riverside County by nearly 5%.

Race/Ethnicity

From 2010 to 2012, slightly more than half of the trauma patients in Riverside County were White and about one-third were Hispanic. This differs from the overall population of Riverside County where less than half (38.3%) of residents were White and nearly half (46.5%) were Hispanic. Trauma incidence and case fatality rates were consistent among each race.

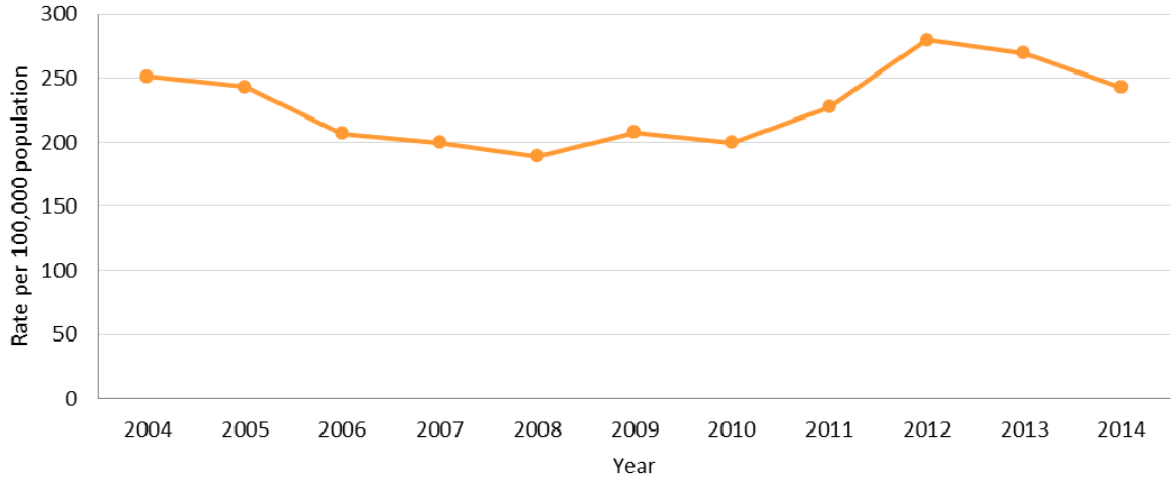
Chart 4.1. Riverside County Residents vs. All Trauma Patients by Race/Ethnicity, Riverside County, 2010-2012



Trauma Injury Trend

Over the past ten years, trauma case incidence has fluctuated, peaking in 2012 with 6,350 patients, a rate of 280 per 100,000 population. Between 2006 and 2010 there was an overall decrease in trauma case incidence with the lowest being in 2008 with 3,965 patients-a rate of 189 per 100,000 population. Between 2010 and 2014, the number of trauma cases increased overall with a rate of 243 per 100,000 in population in 2014.

Chart 4.2. Trauma Incidence Rate by Year, Riverside County, 2004-2014



Injury and Fatality by Age

Trauma incidence is highest among those between 15-24 years old (23.6%), followed by those between 25-34 years old (15.9%). Research indicates that unintentional injury is the leading cause of death for both these age groups (CDC, 2013). The higher rates of injury can be linked to Motor Vehicle use and Assault/Homicide.

For younger adults, trauma incidence remains higher than case fatality. However, the opposite is true for older adults. The highest case fatality is among older age groups, even though incidence rates are low. This suggests that elder adults are less likely to be victim of a traumatic injury, but injuries are more likely to be fatal.

Table 4.1 Trauma Incidence and Case Fatality by Age Group, Riverside County, 2010-2014

Age	Incidence (%)	Case Fatality (%)
<1	0.8%	2.7%
1-4	3.5%	2.7%
5-14	6.5%	1.0%
15-24	23.6%	2.2%
25-34	15.9%	3.1%
35-44	12.0%	2.8%
45-54	12.8%	3.8%
55-64	9.0%	3.9%
65-74	6.0%	6.1%
75-84	5.8%	6.2%
85+	4.1%	6.8%

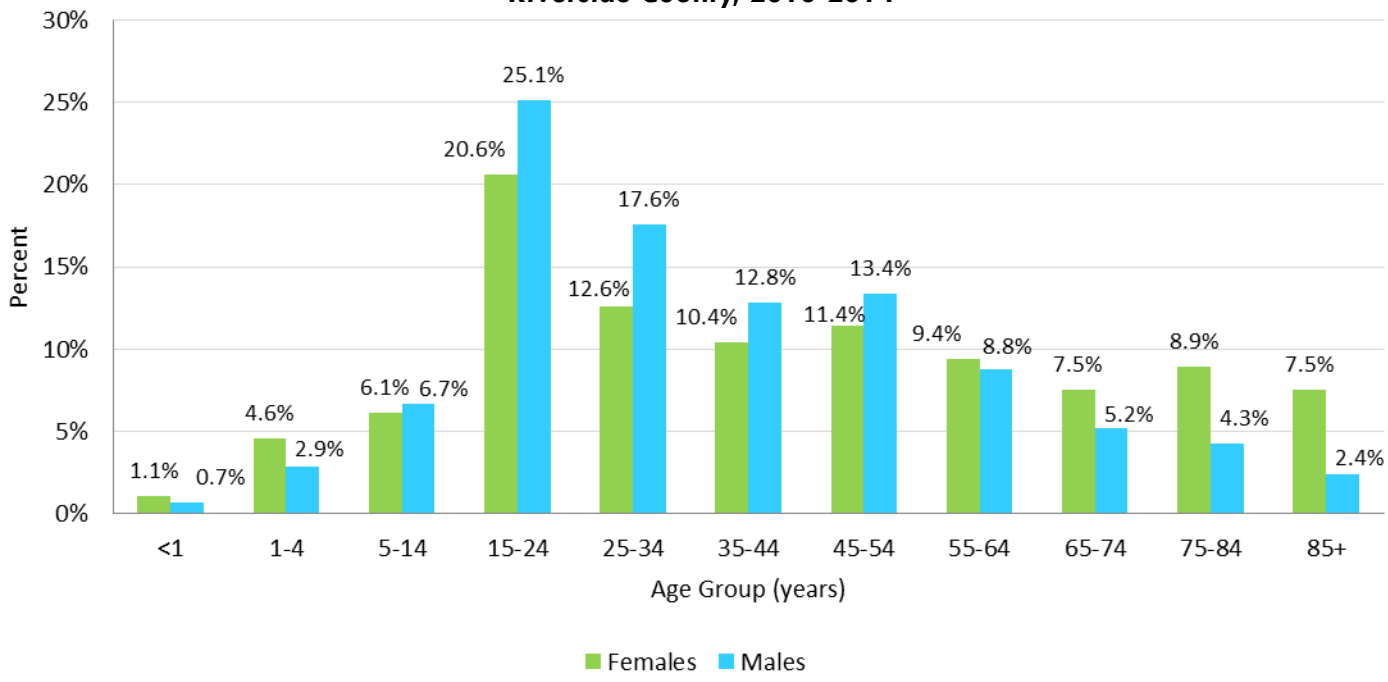
Injury by Age and Gender

When stratified by gender, there is a higher trauma incidence in males (66.7%) versus that in females (33.3%). Additionally, 76.8% of fatal cases were among men while only 23.7% were among women. Among males injured, half of all traumatic injury were those under the age of 34. Older women, above the age of 55, tend to experience traumatic injury more than men. This is justifiable as women maintain longer life expectancies and therefore have greater exposure to injury risk. Type of trauma injury varies based on gender. Motor Vehicle, Fall, Motorcycle, and Stab/Cut accidents are among the top five causes of traumatic injury for both men and women. However, Pedestrian injury is a top cause of trauma for females while Pedal Cycle injury is a top cause for men.

Table 4.2 Top Trauma Incidence by Gender, Riverside County, 2010-2014

Female	Motor Vehicle Accident (43.7%)	Fall (31.8%)	Pedestrian Accident (5.9%)	Stabbing (2.4%)	Motorcycle Accident (2.0%)
Male	Motor Vehicle Accident (26.0%)	Fall (22.8%)	Motorcycle Accident (10.5%)	Stabbing (7.8%)	Pedal Cycle Accident (5.7%)

Chart 4.3 Trauma Incidence by Age and Gender, Riverside County, 2010-2014



V. INCIDENT CHARACTERISTICS

Injury and Fatality by Mechanism

Motor Vehicle-related accidents are the leading cause of trauma incidents (31.9%) followed by Falls (25.8%). Motor Vehicle accident rates have remained the same through 2010 and 2014. However, Fall rates have steadily increased from 21.2% in 2010 to 27.5% in 2014.

The overall rate of trauma fatality remains around 3.4%, peaking at 4.1% in 2010, and reaching a low of 2.8% in 2012. Fatal traumatic injury rates were highest among Gunshot Wounds (22.0%), Falls (19.6%) and Pedestrian Accidents (19.6%).

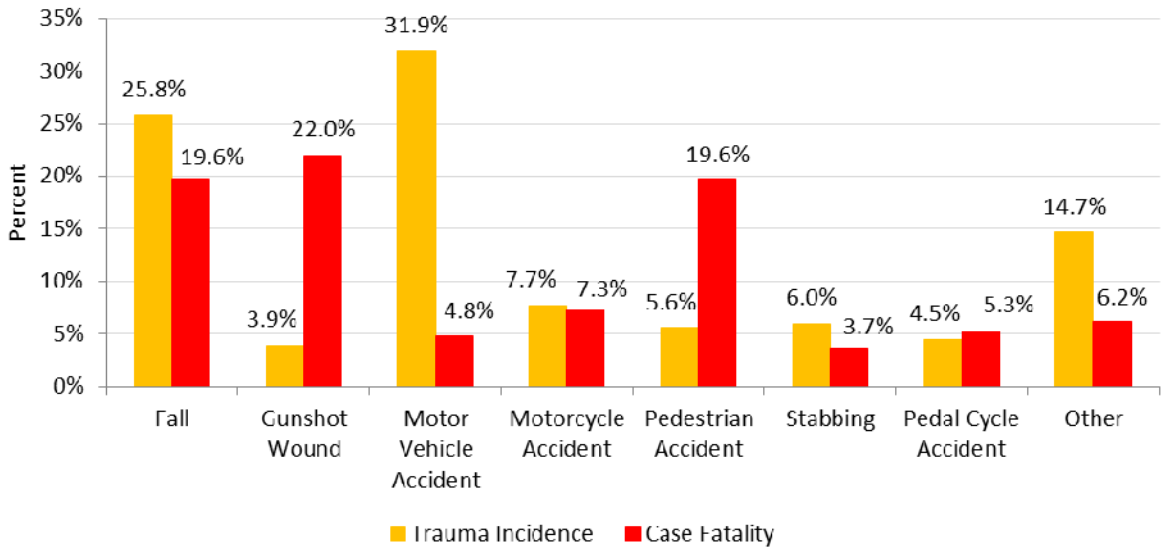
Table 5.1 Trauma Incidence by Type, Riverside County, 2010-2014

	Incidence	Percent
Fall	5809	25.8%
Gunshot Wound	880	3.8%
Motor Vehicle Accident	7194	31.9%
Motorcycle Accident	1730	7.7%
Pedestrian Accident	1259	5.6%
Stabbing	1356	6.0%
Pedal Cycle Accident	1009	4.5%
Other	3303	14.7%

Table 5.2 Case Fatality by Type, Riverside County, 2010-2014

	Case Fatality	Percent
Fall	171	19.6%
Gunshot Wound	133	22.0%
Motor Vehicle Accident	170	4.8%
Motorcycle Accident	61	7.3%
Pedestrian Accident	86	19.6%
Stabbing	31	3.7%
Pedal Cycle Accident	19	5.3%
Other	87	6.2%

Chart 5.1 Trauma Incidence and Case Fatality by Mechanism, Riverside County, 2010-2014



Mechanism by Gender

Although women experience a higher proportion of Motor Vehicle accidents and Falls (43.7% and 31.8%), men are more likely to have an equal or higher rate of case fatality. In all other trauma injuries, men have higher incidences and case fatality rates. Motor Vehicle accidents are the leading cause of trauma incidents, with the rate among females nearly double that of males (43.7% and 26.0%). However, Motor Vehicle case fatality is slightly higher among males than females. For both males and females, Pedestrian trauma incidents are more likely to lead to fatality, compared to other injury mechanisms. The highest case fatality among males and females result from Gunshot Wounds.

Chart 5.2 Trauma Incidence by Mechanism and Gender, Riverside County, 2010-2014

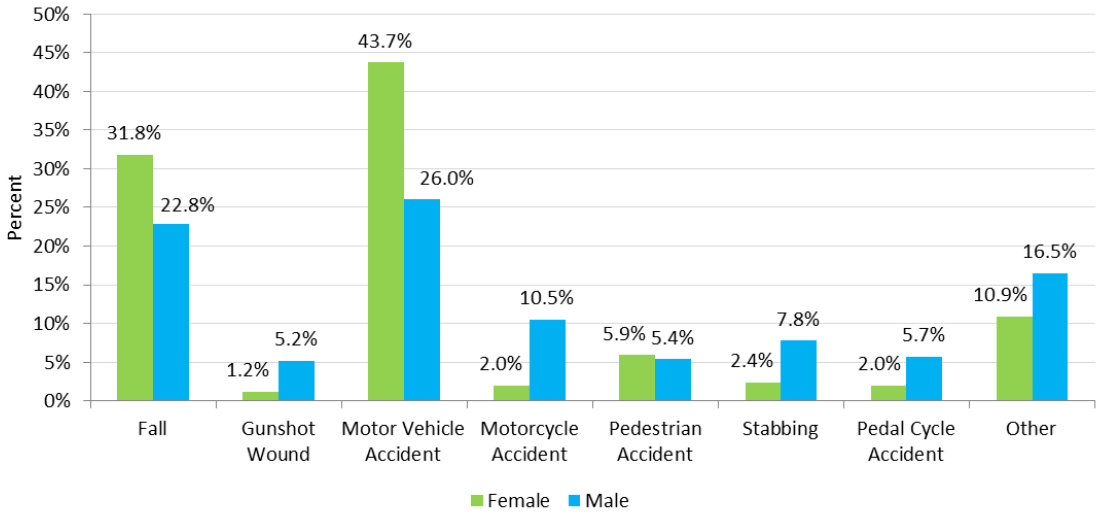
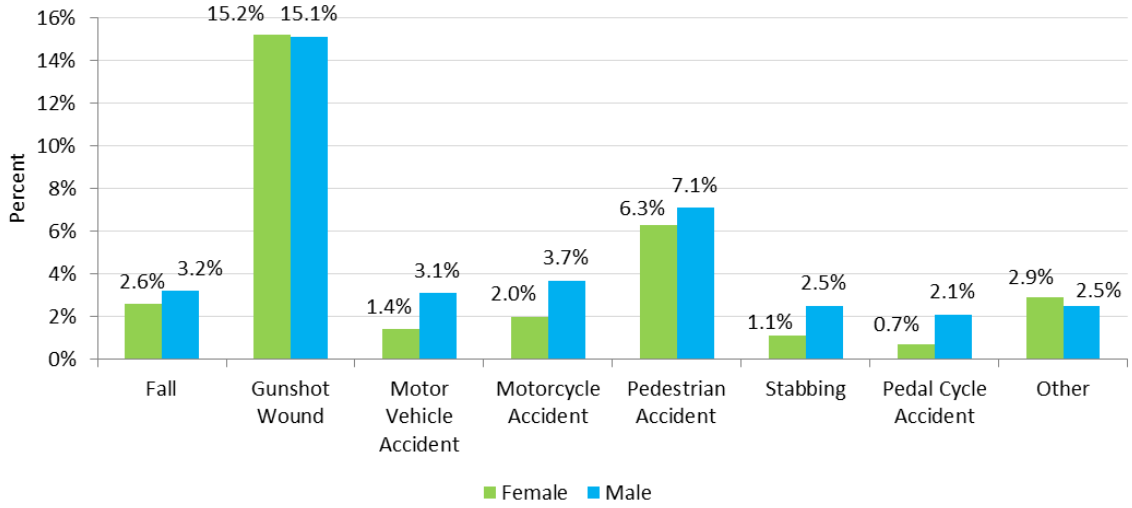


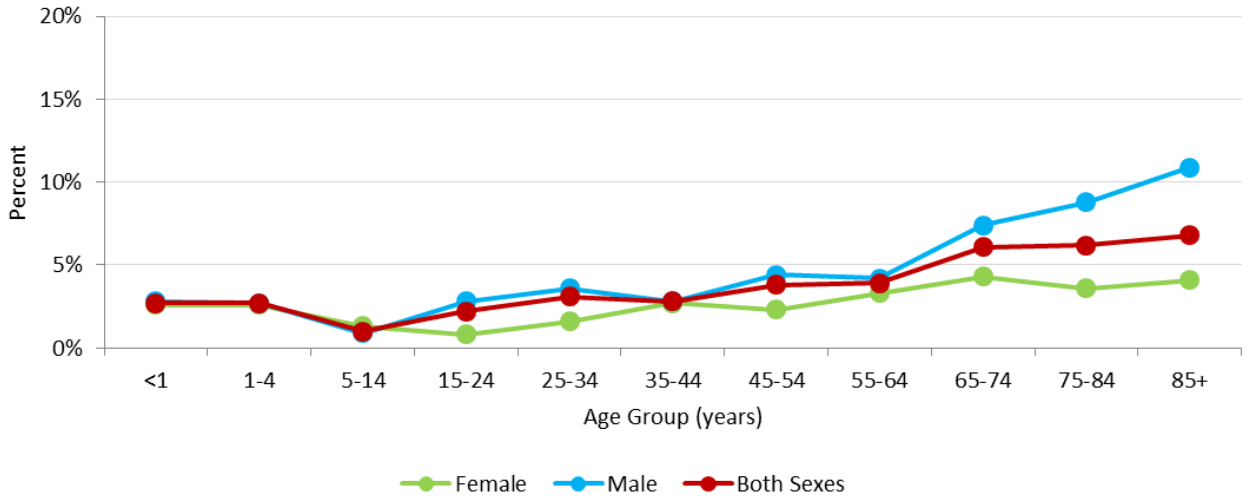
Chart 5.3 Trauma Case Fatality by Mechanism and Gender, Riverside County, 2010-2014



Fatality by Age and Gender

Case fatality rates are similar for males and females from newborns to age 64. Differences in rates exist among males and females over age 65. Among this older age group, case fatality rates decline among females and increase among males.

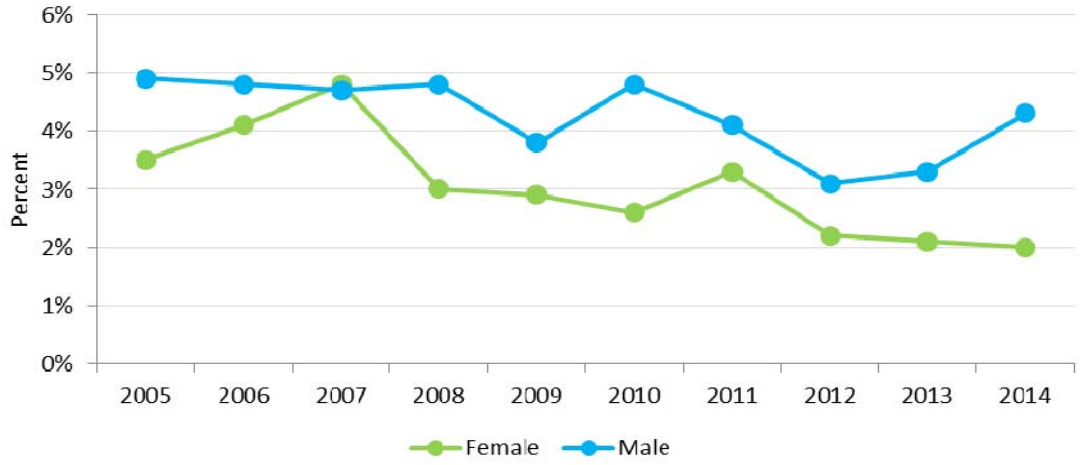
Chart 5.4 Case Fatality by Age and Gender, Riverside County, 2010-2014



Fatality by Year and Gender

There are differences in case fatality between males and females. On average, males maintain a higher case fatality rate from 2008 to 2014, when compared to females. Fatalities among males have appeared relatively consistent with slight fluctuation throughout the years. In 2012, the case fatality rate was 3.1% for males, the lowest in the past decade. For females, case fatality rates appear to be overall declining. The case fatality rates may have been slightly unstable due to the small number of incident cases. The lowest rates for females were in 2012, 2013, and 2014 (2.2%, 2.1%, and 2.0%, respectively). Since the highest rate of 4.8% in 2007, the case fatality rate among females has dropped to 2.0% in 2014.

Chart 5.5 Case Fatality by Gender and Year, Riverside County, 2005-2014



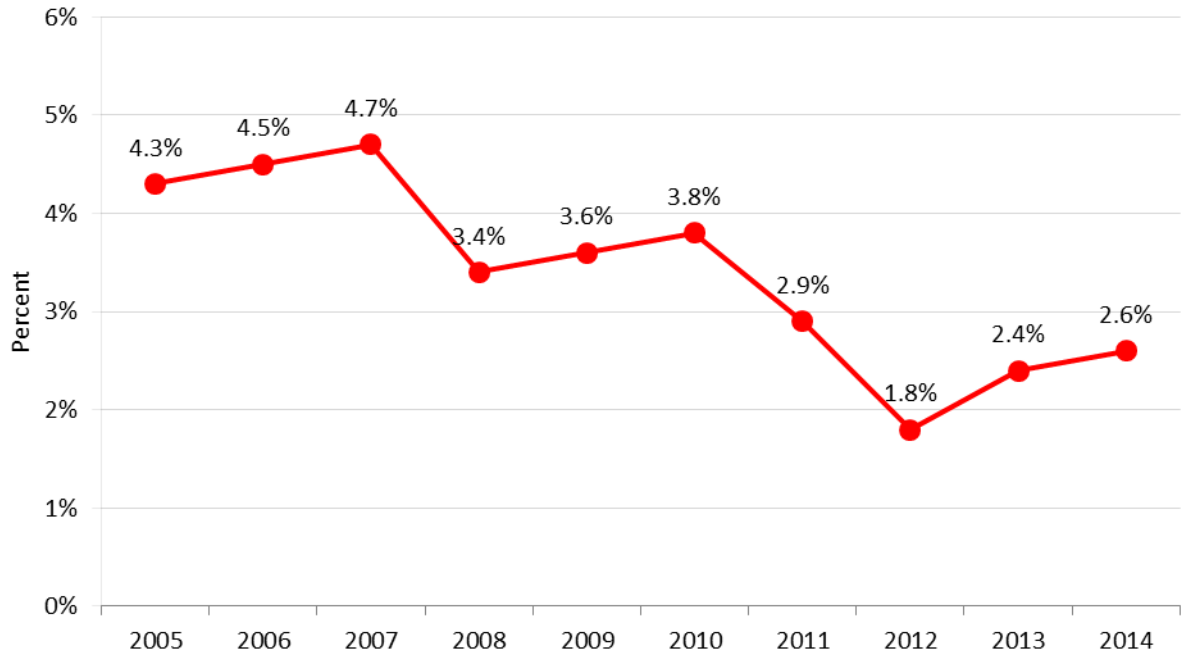
MOTOR VEHICLE-RELATED INCIDENTS

Fatality Trends

Between 2010-2014, Motor Vehicle-related incidents among Riverside County residents accounted for 40% (n=8,924) of all trauma treated in Riverside County trauma centers. When referring to Motor Vehicle-related incidents in this section, this is inclusive of both Motor Vehicle accidents and Motorcycle accidents. In 2010, fewer Motor Vehicle-related trauma incidents occurred (n=1,380), while a high occurred in 2012 (n=2,111). Motor Vehicle-related trauma mirrors the overall trauma incidence rate with its peaks and falls.

In 2007, case fatality from Motor Vehicle-related incidents was at its highest (4.7%) in the last decade and has decreased over the following years. Case fatality was at its lowest in 2012 at 1.8%. Most recently, in 2014 the case fatality rate increased to 2.6%.

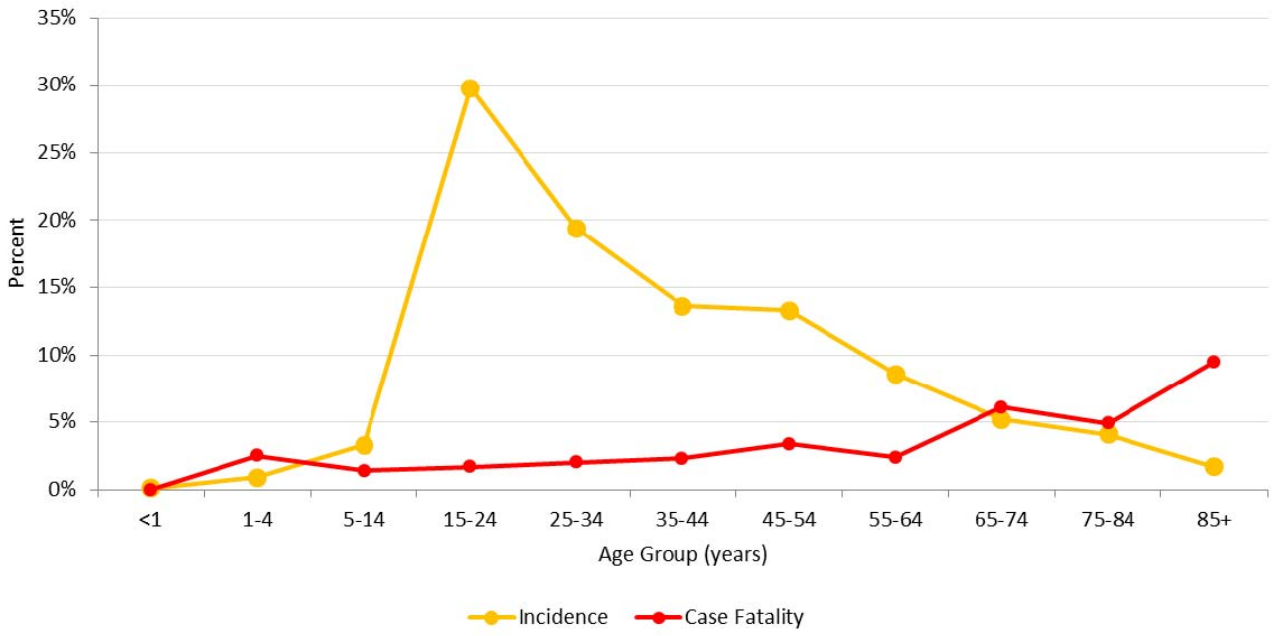
Chart 5.6 Motor Vehicle-Related Case Fatality by Year, Riverside County, 2005-2014



Injury and Fatality by Age

Persons under age 14 and over age 75 experience fewer Motor Vehicle-related injuries. However, persons over the age of 65 account for higher proportions of Motor Vehicle-related case fatalities. Teens and young adults, ages 15-24, account for the highest number of Motor Vehicle-related incidents (30%), but maintain a low case fatality rate of 1.7%. The inverse is true for those 85 years and older where they account for fewer incidents (1.7%) but maintain the highest case fatality rate of 9.5%.

Chart 5.7 Motor Vehicle-Related Incidence and Fatality by Age, Riverside County, 2010-2014

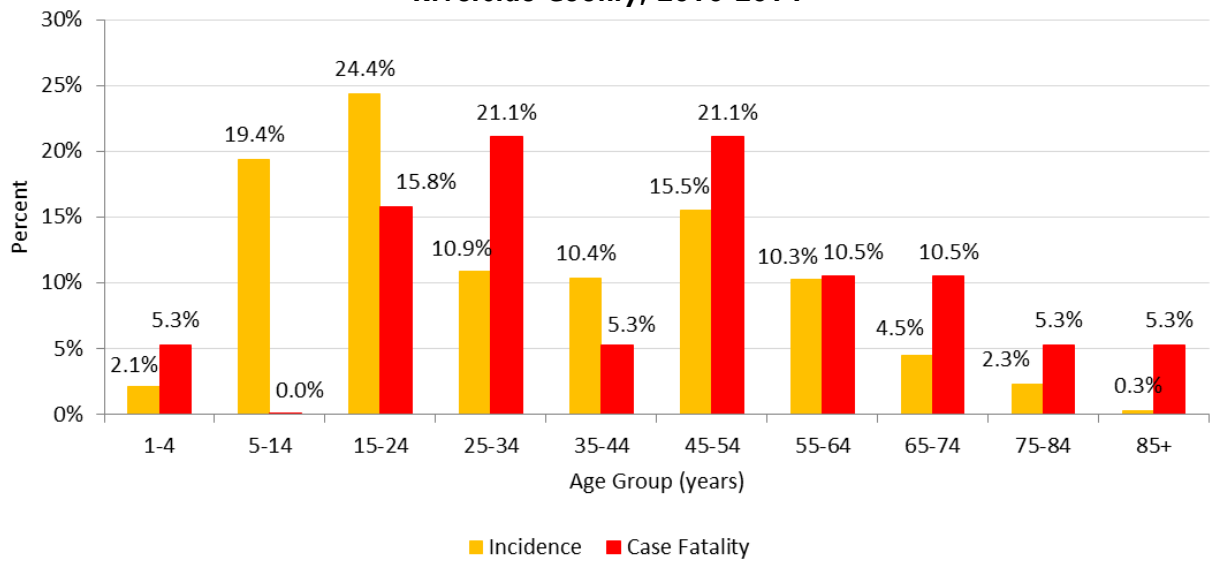


PEDAL CYCLE-RELATED INCIDENTS

Injury and Fatality by Age

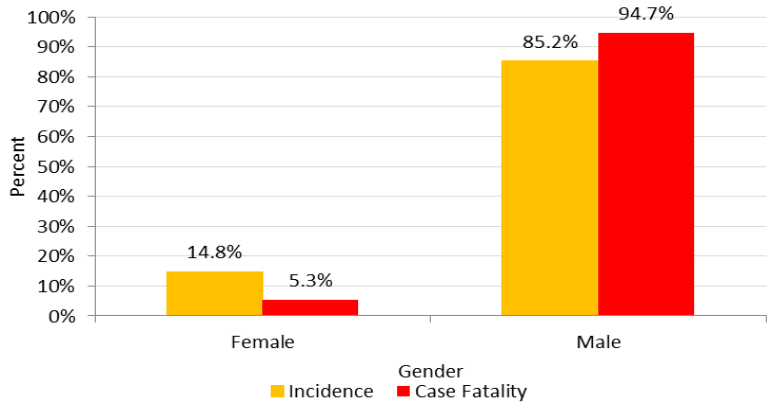
Children, teens, and young adults have the highest proportion of Pedal Cycle-related incidents. The highest proportion of Pedal Cycle incidents can be attributed to the 15-24 year age group (24.4%), followed by the 5-14 year age group (19.4%). Pedal Cycle-related incidence decreases with age; however, there is a slight spike among the 45-54 year age group (15.5%). Fatality rate is highest among adults 25-34 years old (21.1%) and 45-54 years old (21.1%). Overall, case fatality proportions are higher in older adults while incidence seems to be higher among younger age groups.

Chart 5.8 Pedal Cycle-Related Incidence and Fatality by Age, Riverside County, 2010-2014



Injury and Fatality by Gender

Chart 5.9 Pedal Cycle-Related Incidence and Fatality by Gender, Riverside County, 2010-2014



Males account for a higher incidence and case fatality rate in Pedal Cycle-related injuries than females (85.2% and 94.7%). Females account for only 14.8% of all Pedal Cycle injuries. Among those fatally injured, females account for 5.3%.

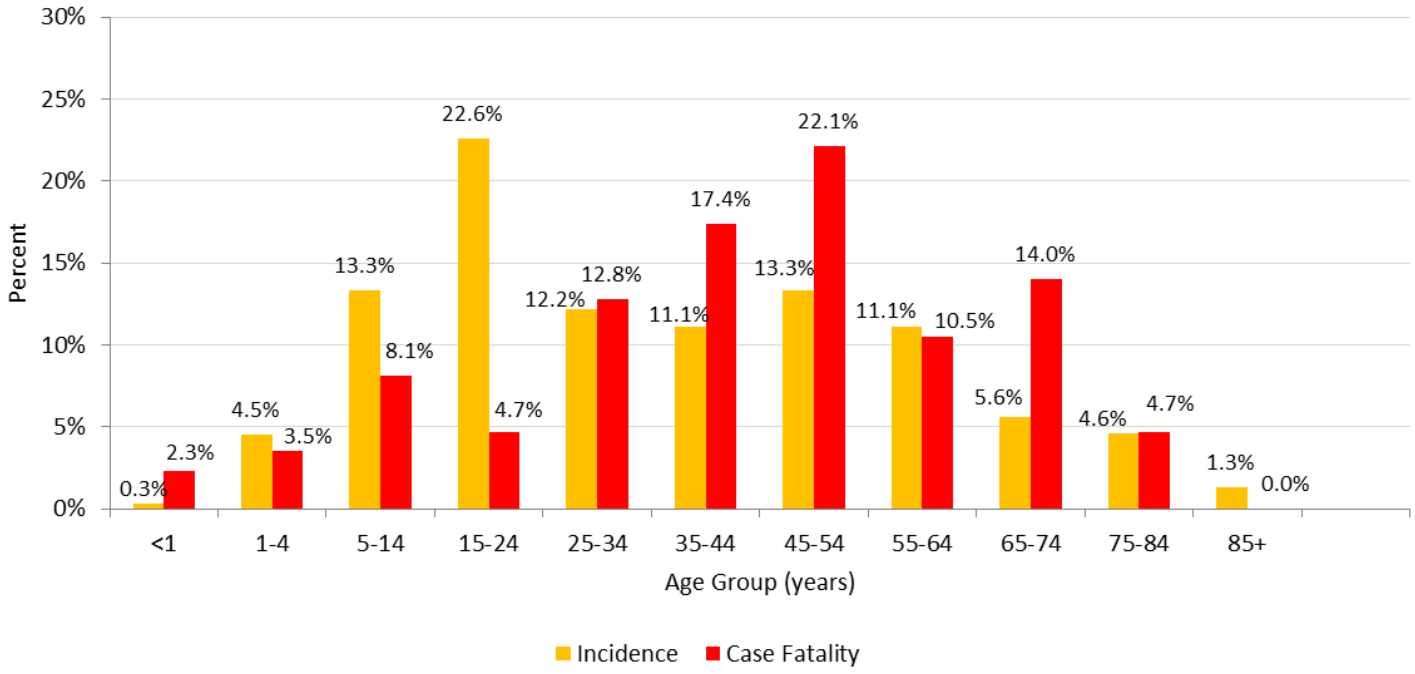
PEDESTRIAN-RELATED INCIDENTS

Injury and Fatality by Age

The proportion of Pedestrian-related injury varied with age (n=1,173). Teens and young adults experienced the highest incidents of Pedestrian-related injury (22.6%). Children under 4 years and adults over 65 years experienced fewer injuries. Adults between ages 25 to 64 experienced an average of 12% incidence.

Case fatality rates appear to increase gradually from age 25 onwards and then decrease overall. The highest fatality rate is seen among the 45 -54 age group (22.1%). Older adults aged 65-74 have a high fatality rate of 14.0% compared to a corresponding low incidence rate of 5.6%.

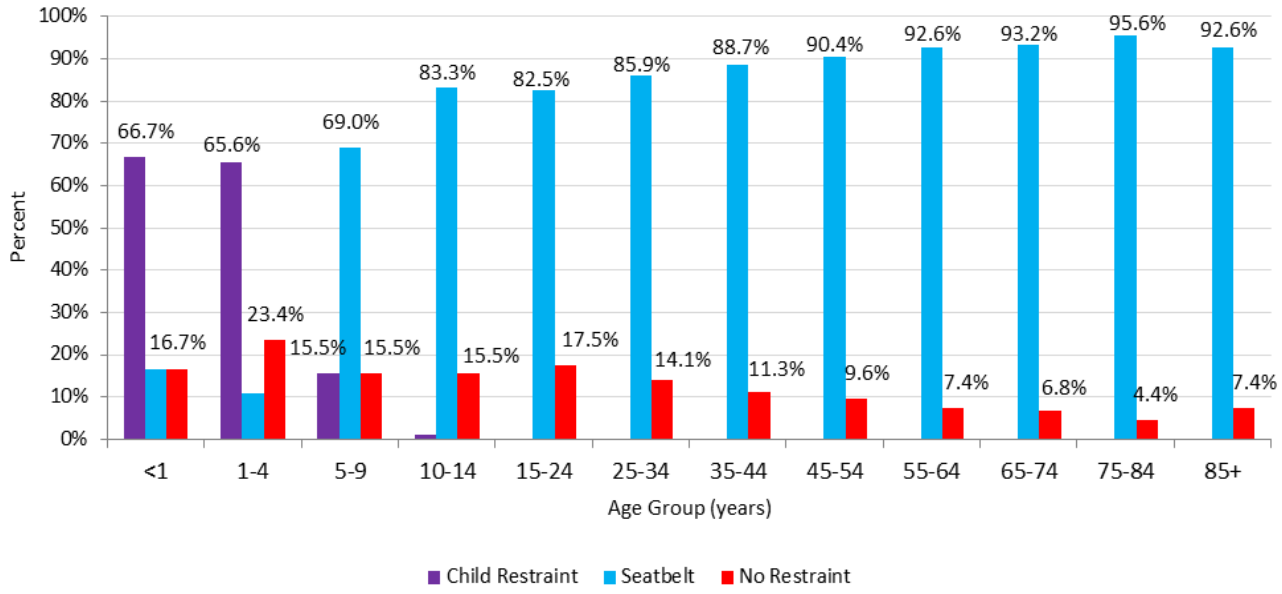
Chart 5.10 Pedestrian-Related Incidence and Fatality by Age, Riverside County, 2010-2014



PROTECTIVE DEVICES

Older adults were more likely to use protective devices. Among pediatric patients, 55.6% of children ages 9 and under were not using a protective device during the Motor Vehicle accident. Among young adults, 15-24 years, nearly 20% of accidents involved a driver or passenger not wearing a seatbelt restraint. This is especially alarming since young adults aged 15-24 make up nearly 1 in 3 of total Motor-Vehicle Accidents (31.1%).

Chart 5.11 Protective Devices Among Drivers/Passengers of a Motor Vehicle by Age, Riverside County, 2010-2014



ALCOHOL CONSUMPTION

In California and the United States, an individual is considered to be "drunk" or intoxicated when an individual over 21 has a Blood Alcohol Concentration (BAC) level over 80. For individuals under 18, a BAC level 1 and over is considered intoxicated. Among trauma patients, individuals involved in Motor Vehicle, Pedal Cycle, and Pedestrian accidents had the highest incidence of alcohol consumption. From 2010-2014, 20% of people involved in Motor Vehicle-related incidents were drunk during the accident. This statistic is similar for overall Pedal Cycle-related (20%) and Pedestrian-related injuries (20%). In the last five years, there has been an increase in the number of trauma cases where alcohol consumption was present. Among trauma cases, the highest percentage of alcohol consumption was seen among young adults 15-24 years and adults 25-34 years, 34.4% and 21.1%, respectively.

Chart 5.12 Alcohol Consumption Among Trauma Cases by Mechanism, Riverside County, 2010-2014

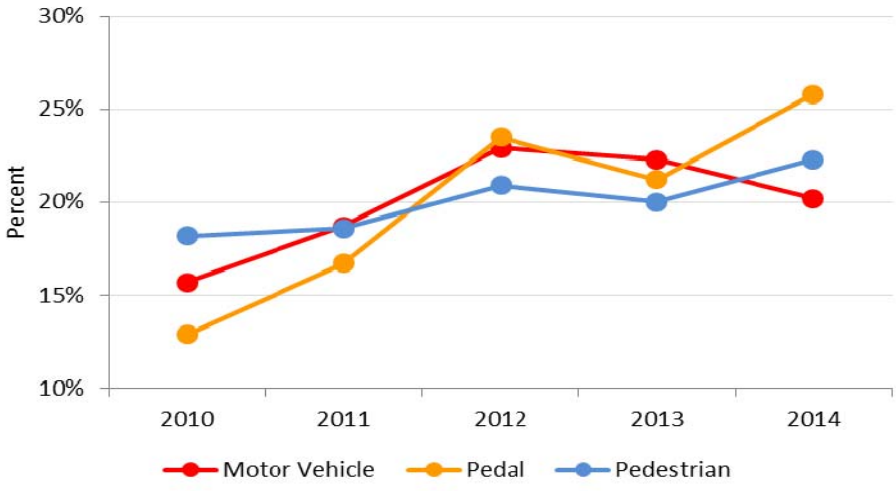
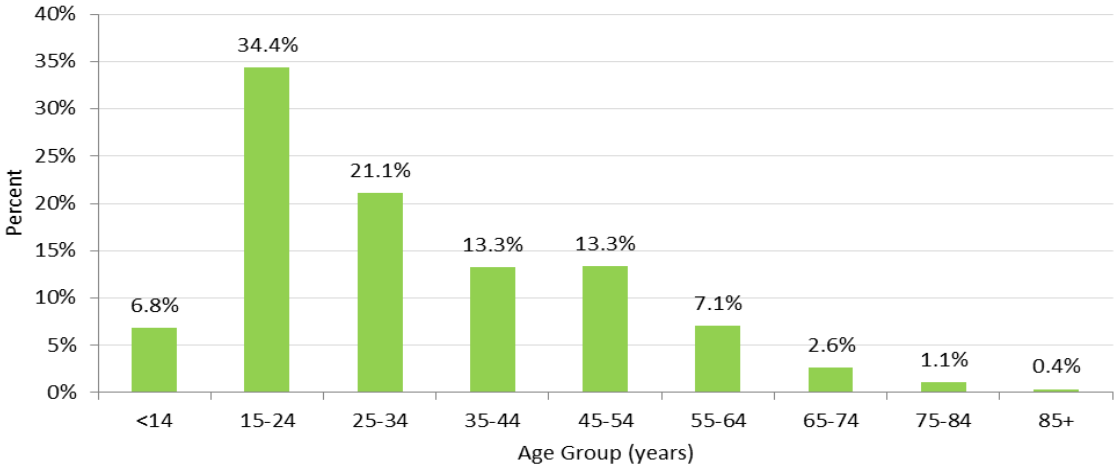


Chart 5.13 Alcohol Consumption Among Trauma Cases by Age, Riverside County, 2010-2014

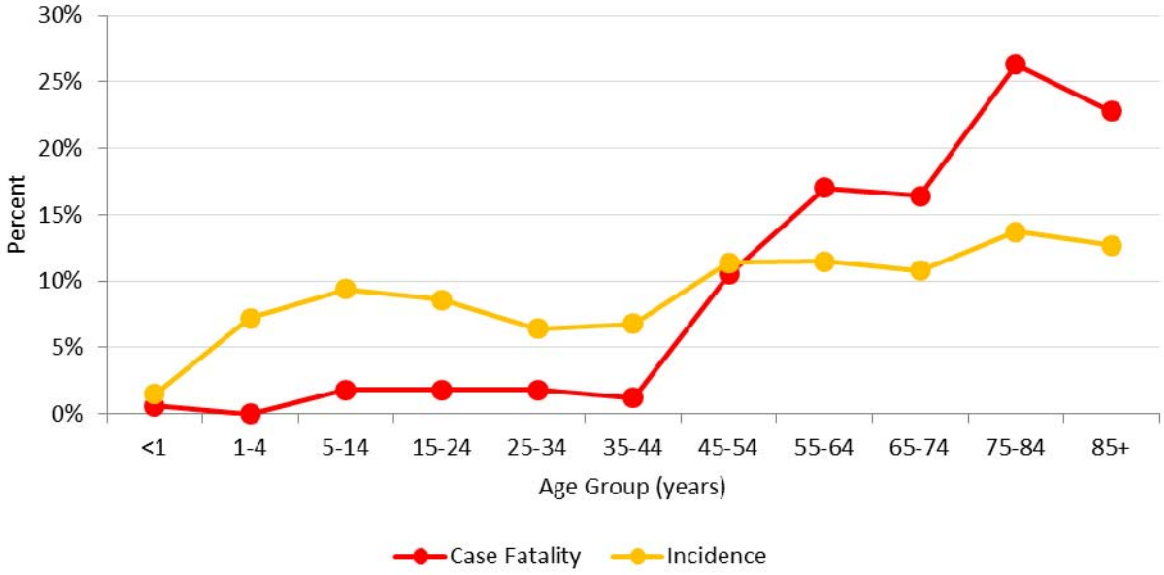


FALL-RELATED INCIDENTS

Injury and Fatality by Age

The proportion of Falls is relatively constant among those under age 44. The highest proportion of Falls can be attributed to 75-84 years old, at 13.7%. Fall incidence gradually increases with age. Fall-related fatalities also increase with age, but at a much higher rate. Among all ages, there were 5,807 total Fall-related cases. Of these cases, 171 individuals died, a 2.9% case fatality rate. However, among the 75-84 age group, the case fatality rate was 26.3%.

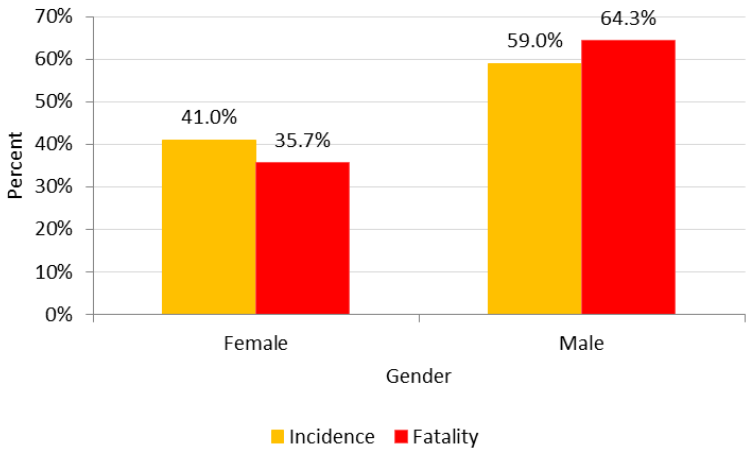
Chart 5.14 Fall Incidence and Fatality by Age, Riverside County, 2010-2014



Injury and Fatality by Gender

Males account for a higher incidence and case fatality rate in Fall-related injuries than females (59.0% and 64.3%). Females account for 41.0% of all Fall injuries. Among those fatally injured, females account for 35.7%.

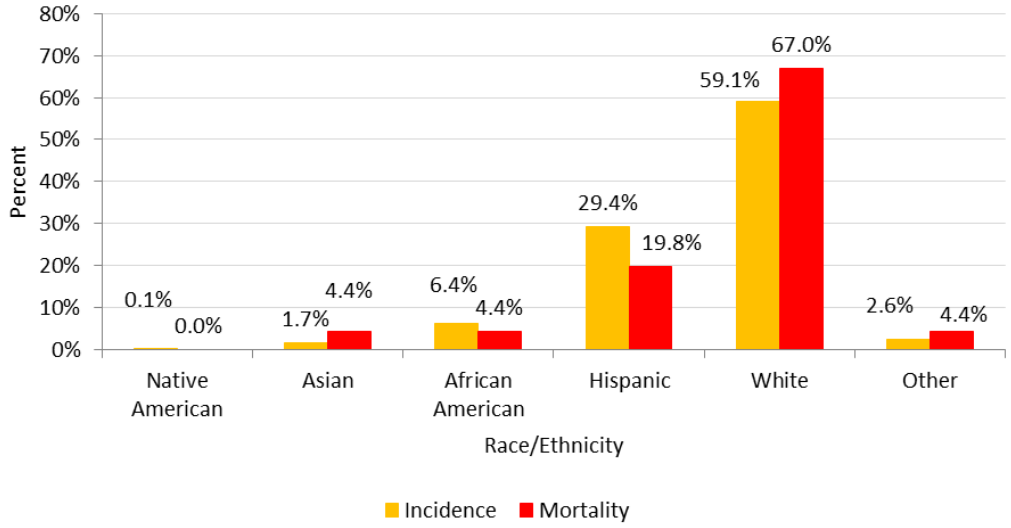
Chart 5.15 Fall Incidence and Fatality by Gender, Riverside County, 2010-2014



Injury and Fatality by Race

Injuries and fatalities from Falls were highest among Whites, accounting for 59.1% and 67.0% of the total number, respectively. Injuries among the Hispanic population accounted for 29.4% of the total number of incidents. Among Asians, there was a higher proportion of Fall-related fatalities compared to incidence. Falls were much less common among Native Americans, Asians, and African Americans, accounting for less than 10% of the total number of Falls.

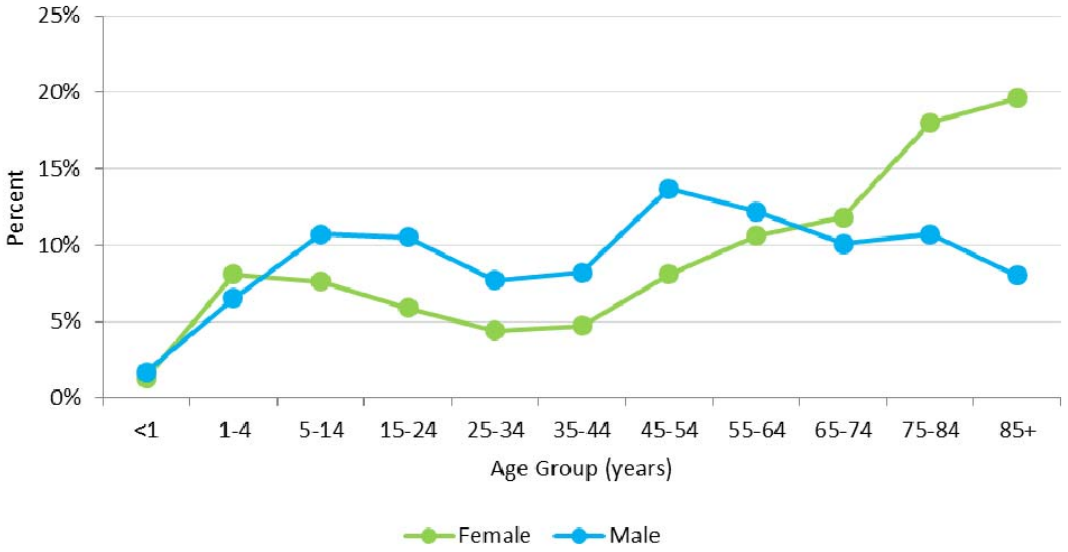
Chart 5.16 Fall Incidence and Fatality by Race/Ethnicity, Riverside County, 2010-2012



Injury by Gender and Age

Fall Incidence was highest among older adults. Among females, Fall incidence increased after age 45. Older men overall had a higher incidence, but that slightly decreased after age 55.

Chart 5.17 Fall Incidence by Gender and Age, Riverside County, 2010-2014

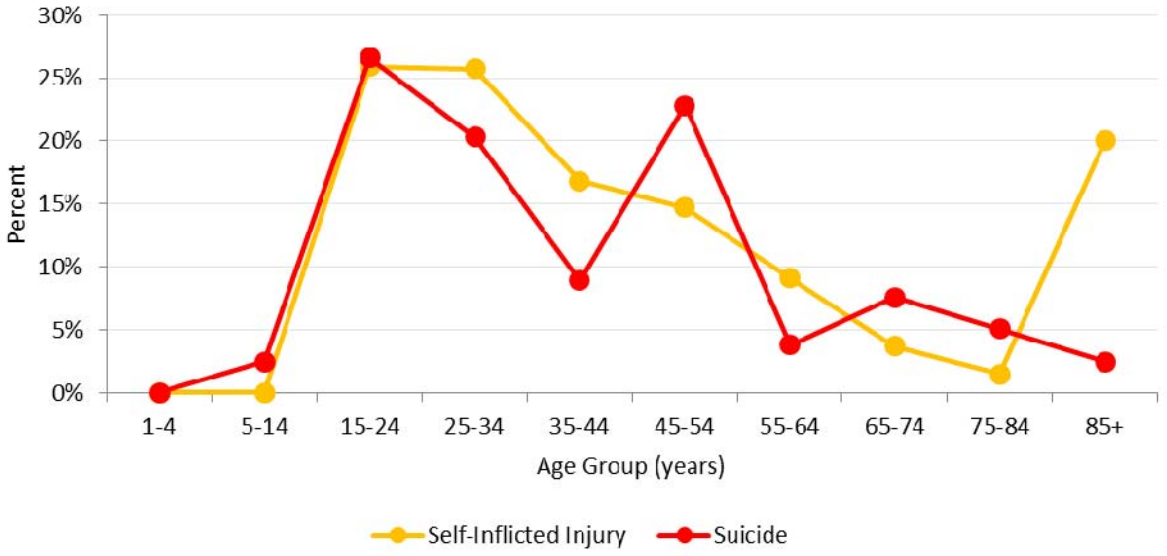


SELF-INFLICTED INJURY AND SUICIDE

Injury and Fatality by Age

Self-Inflicted injury is the deliberate act of hurting oneself, while Suicide is the intentional act of causing one's own death. Self-Inflicted injury and Suicide is highest among the 15-24 age-group, 25.9% and 26.6%, respectively. Within 2010-2014, there were 543 reported Suicides and Self-Inflicted injuries admitted to trauma hospitals in Riverside County. The data represented here does not mirror general trends related to Self-Inflicted injury and Suicide. This may be due to the fact that Suicide and Self-Inflicted injury cases are transported to the morgue or a non-trauma hospital.

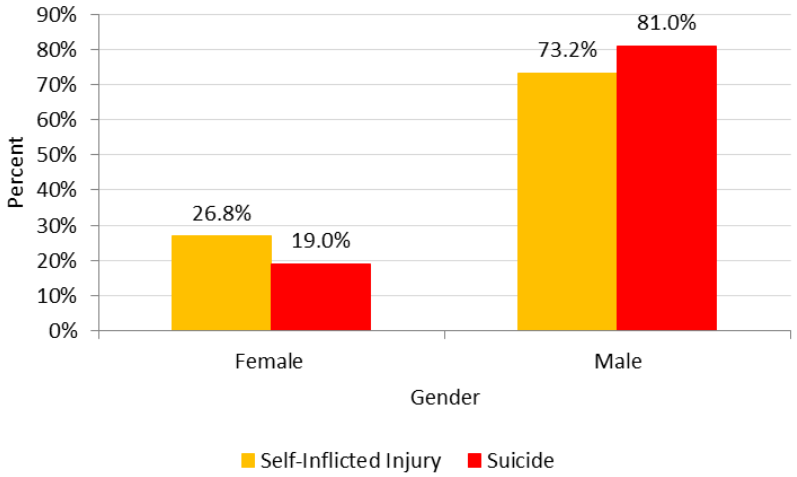
Chart 5.18 Self-Inflicted Injury and Suicide by Age, Riverside County, 2010-2014



Injury and Fatality by Gender

Males account for a higher proportion of both Self-Inflicted injury and Suicide when compared to females. Females are more likely to cause Self-Inflicted injury, and males are more likely to be successful in taking their own lives.

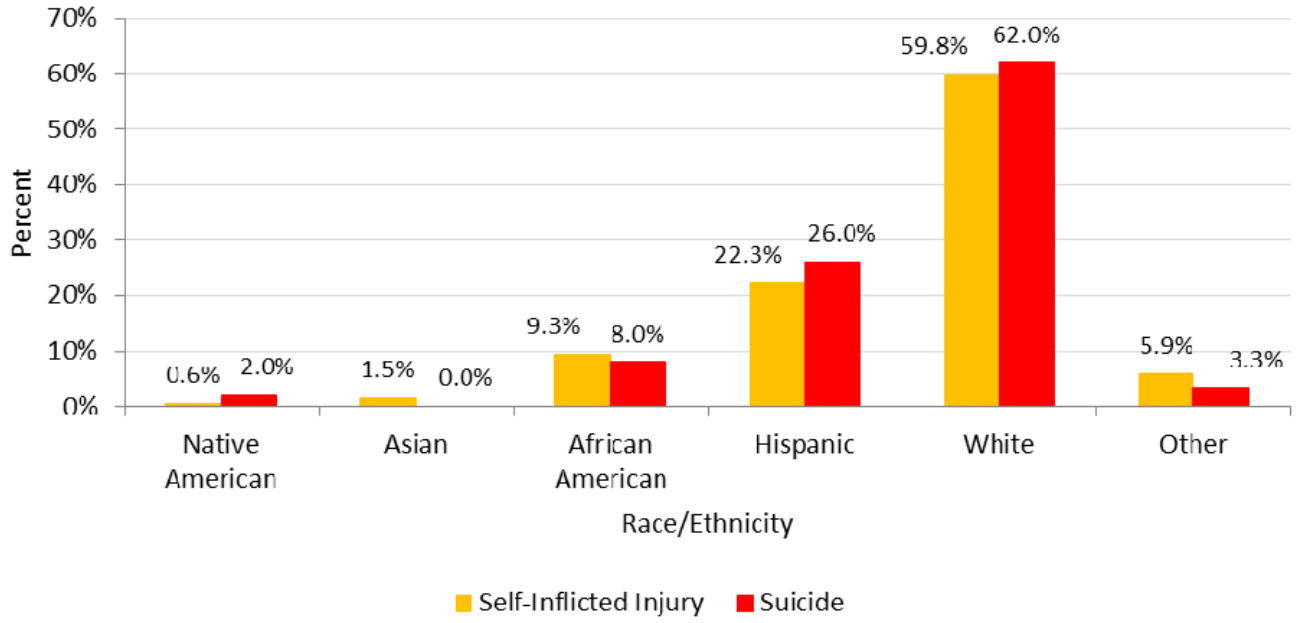
Chart 5.19 Self-Inflicted Injury and Suicide by Gender, Riverside County, 2010-2014



Injury and Fatality by Race/Ethnicity

The majority of Self-Inflicted injuries and Suicides occurred among Whites, accounting for 59.8% and 62.0%, respectively. The second highest rate of Self-Inflicted injuries occurred among Hispanics, contrary to what we see with all other ethnic groups. African Americans are more likely to self-inflict non-fatal injuries, more so than commit Suicide. Self-Inflicted injuries and Suicides were less common among Native Americans and Asians.

Chart 5.20 Self-Inflicted Injury and Suicide by Race/Ethnicity, Riverside County, 2010-2012

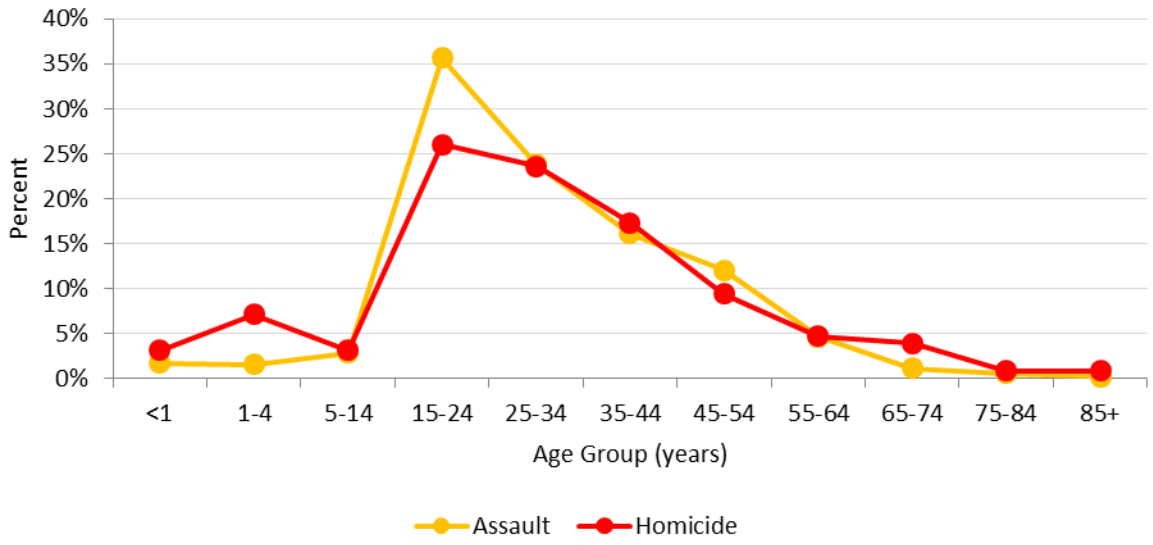


ASSAULT AND HOMICIDE

Injury and Fatality by Age

Assaults are most common among the 15-24 age-group, accounting for 35.6% of all incidents. After age 24, Assault incidence drops sharply. Similar to Self-Inflicted injury rates, there is a higher incidence of injury caused by Assaults among teens and young adults. Teens and young adults are also more likely to die of their injuries. Those of older age are less likely to be victims of Assault. 59.4% of Homicides occur among ages 15-34 years.

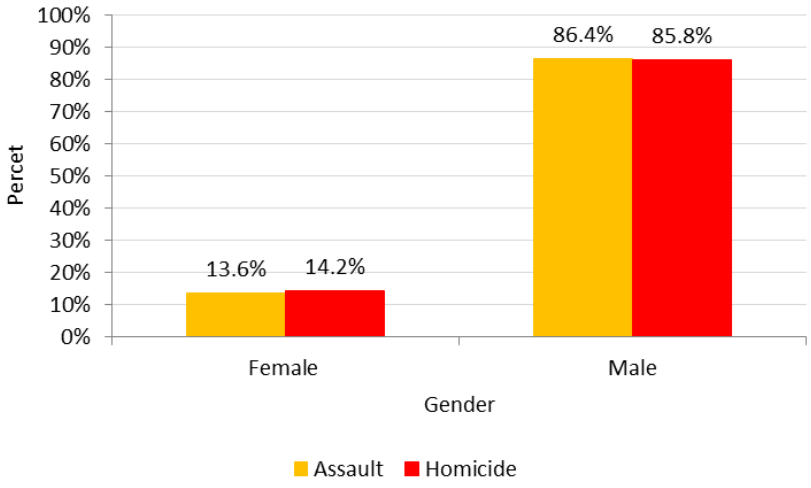
Chart 5.21 Assault and Homicide by Age, Riverside County, 2010-2014



Injury and Fatality by Gender

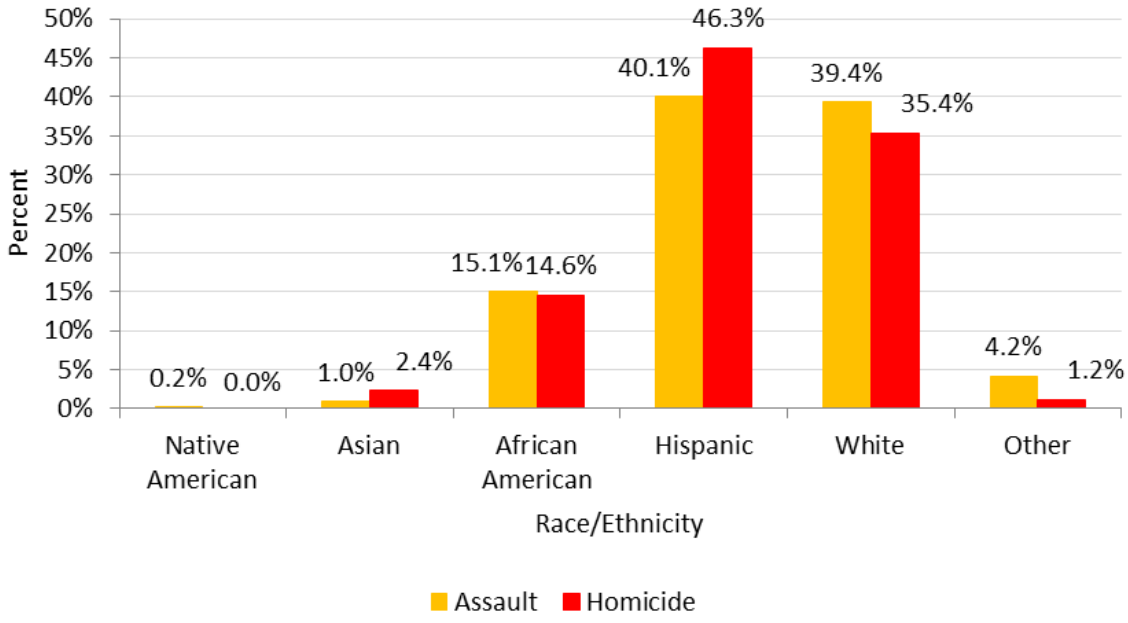
Most Assaults and Homicides occur among males (86.4% and 85.8%, respectively). Females account for 13.6% of all assault injuries and 14.2% of all homicide.

Chart 5.22 Assault and Homicide by Gender Riverside County, 2010-2014



Injury and Fatality by Race/Ethnicity

Chart 5.23 Assault and Homicide by Race/Ethnicity, Riverside County, 2010-2012



Among ethnic subgroups, most Assaults and Homicides occurred among Whites and Hispanics. However, 15.1% of Assaults and 14.6% of Homicides occurred among African Americans. This is a disparity, as African Americans comprise only 6% of the overall population of Riverside County. The inverse is true for all other ethnic groups.

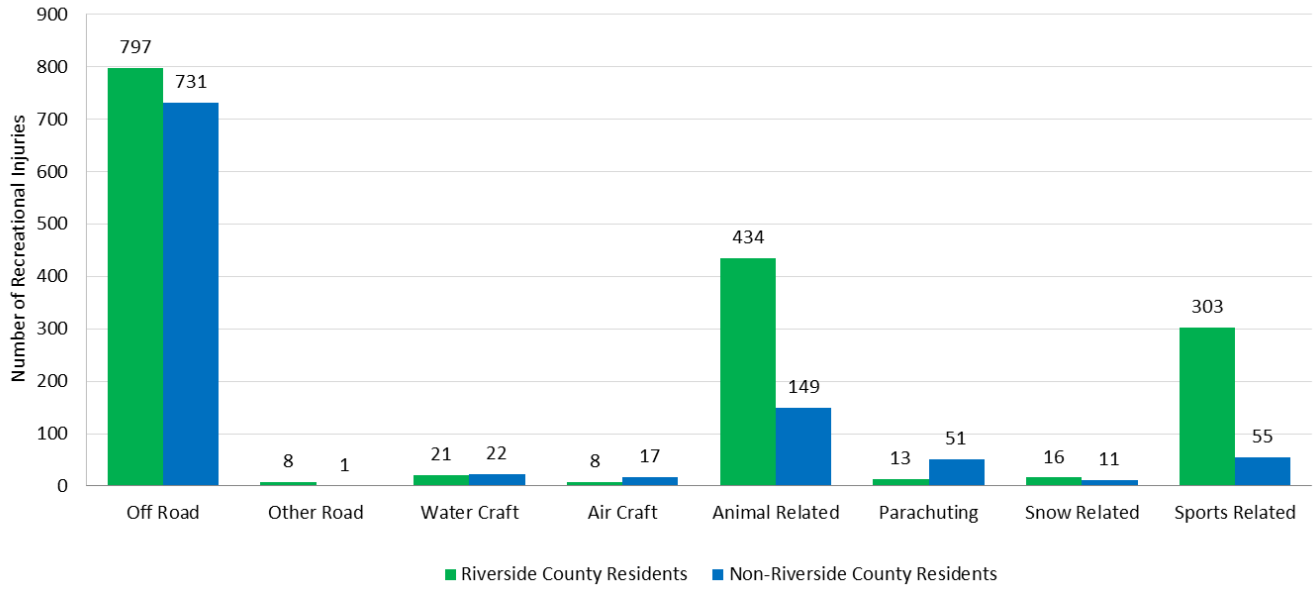
Incidents of Assault and Homicide are least common among Native Americans and Asians. However, due to smaller population sizes, this is expected.

RECREATIONAL INJURIES

Injury by Mechanism and Residence

Riverside County is a popular destination for outdoor recreational activities. At Riverside County Trauma Centers, 47.8% of Off-Road injuries were among residents from other counties. Overall, 40% of recreational injuries in Riverside County were among residents visiting from other counties.

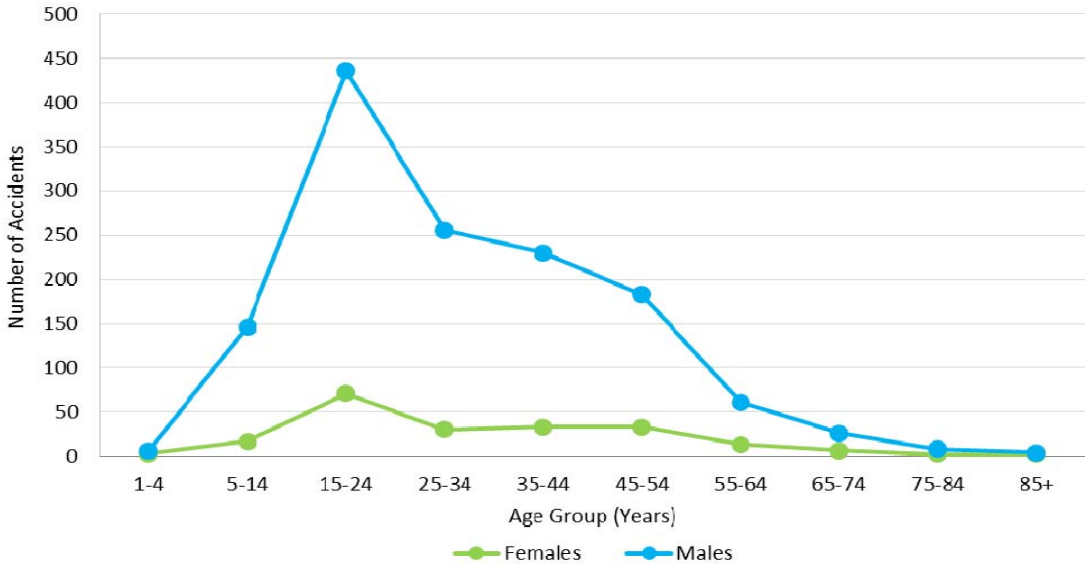
Chart 5.24 Recreational Injury by Type and Patient's County of Residence, Riverside County, 2010-2014



Injury by Age and Gender

The highest incidence of Off-Road accidents were among the 15-24 year old age group. 1 in 3 (32.4%) Off-Road accidents were within this age group. 86.6% of all Off-Road accidents were among Males.

Chart 5.25 Off Road Accidents by Age and Gender, Riverside County, 2010-2014



SUBMERSIONS

Overall, submersion incidence has gone down in Riverside County over the last five years. Children ages 1-4 tend to have the highest incidence rate and case fatality. From 2010 to 2014, 71.4% of submersion cases were among children between 1-4 years. This data captures all submersion incidents that were brought to a Riverside County Trauma Center. As a result, the data may not be inclusive of all cases.

Chart 5.26 Submersion Incidence by Year
Riverside County, 2010-2014

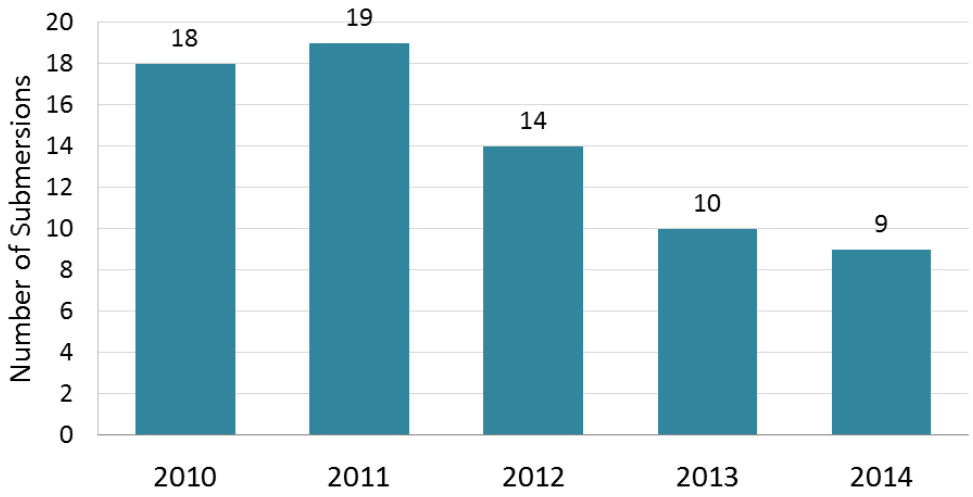
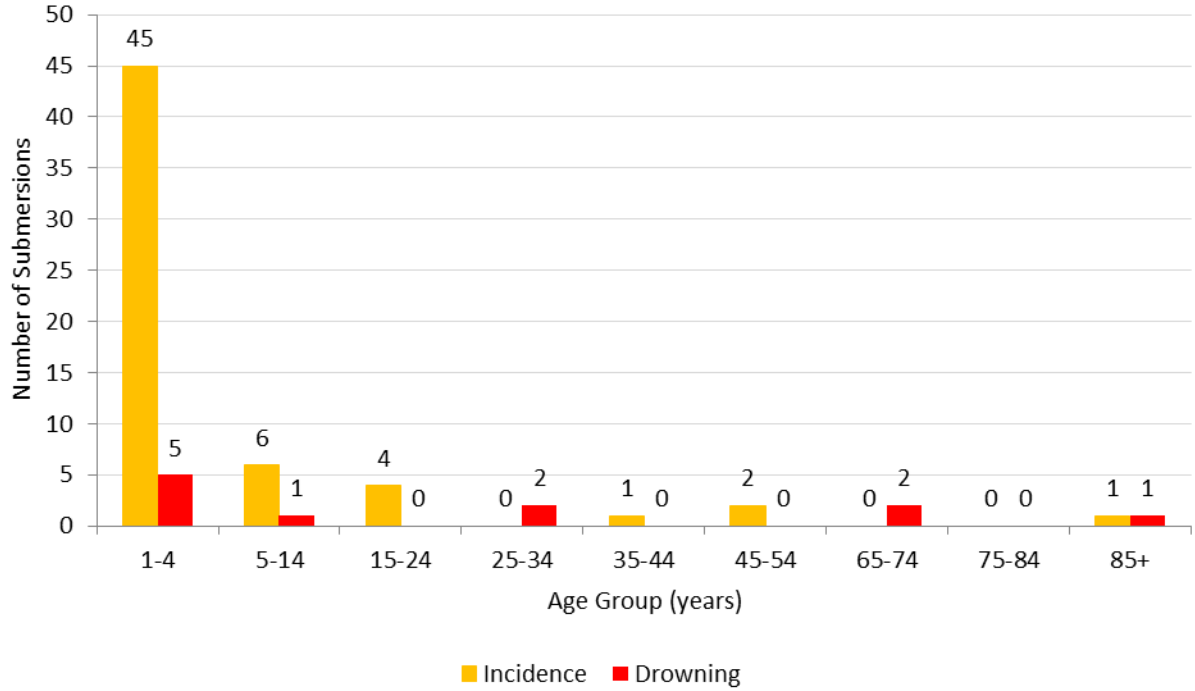


Chart 5.27 Submersion Incidence and Drowning by Age,
Riverside County, 2010-2014



VI. PEDIATRIC PATIENTS

Introduction

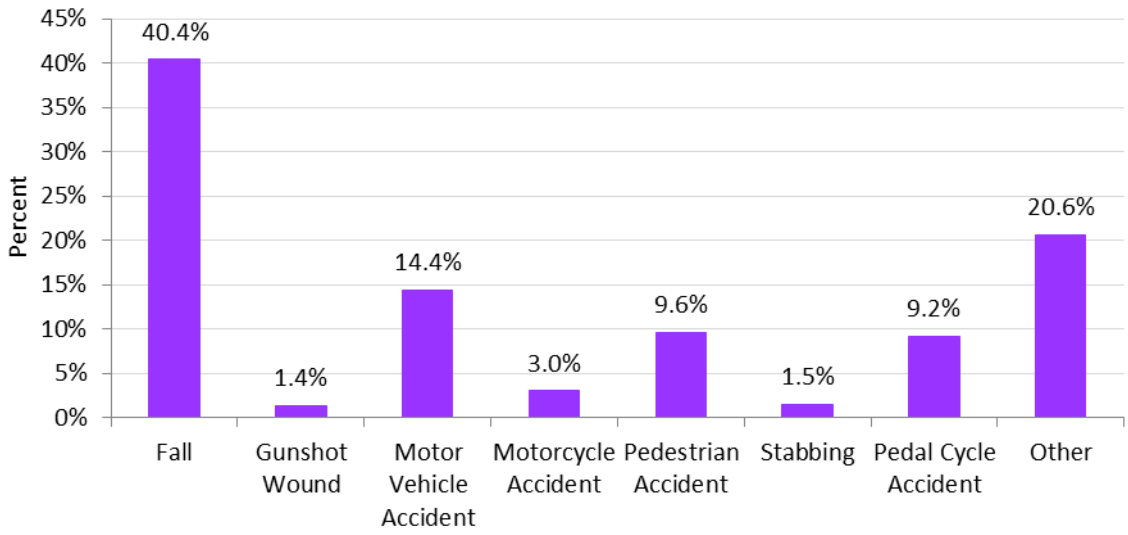
Pediatric patients in the trauma system are defined as those under age 15. This differs slightly from hospital admitting, which in some instances may be those under age 22. From 2010 to 2014, there were 3,094 pediatric trauma patients receiving care at Riverside County trauma centers. Of these pediatric patients, about 88.5% were Riverside County residents (n=2,738). The median age for pediatric patients was 7 years, with most patients (65%) being male. The fatality rate among Riverside County pediatric patients was 1.6%.

The data illustrated in the following charts and discussed in the narrative refers to Riverside County pediatric residents receiving care at Riverside County trauma centers .

Mechanism

Falls were the most common mechanisms of injury, accounting for 40.4% of cases. Fewer injuries were caused by Gunshot Wound or were a result of Stabbing (1.4% and 1.5%, respectively).

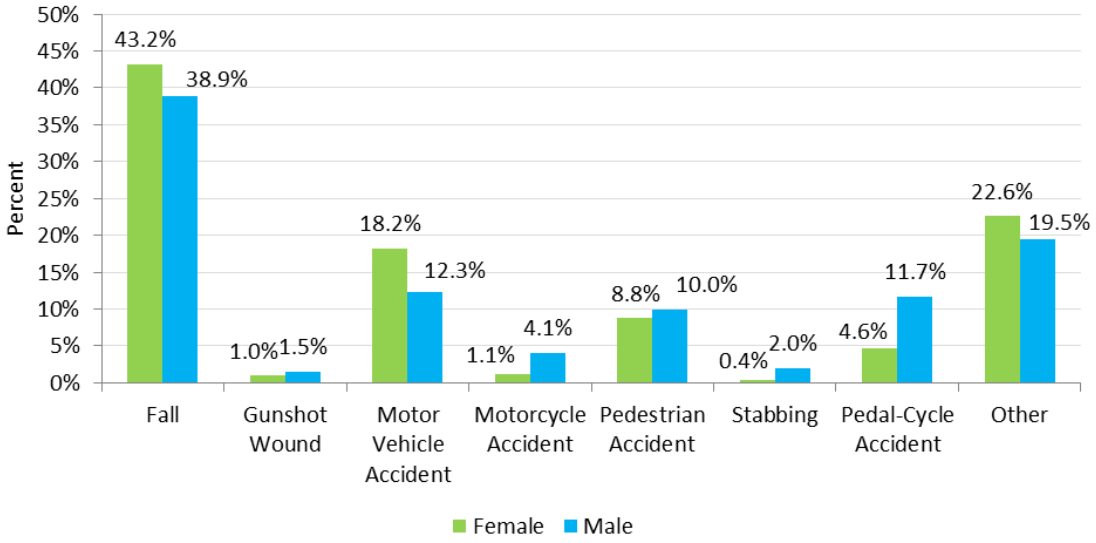
Chart 6.1 Mechanism of Injury Among Pediatric Patients, Riverside County, 2010-2014



Injury by Mechanism and Gender

Female pediatric patients were victim to a higher proportion of Falls and Motor Vehicle-related Accidents (43.2% and 18.2%). A higher proportion of male pediatric patients experienced Pedal Cycle Accidents (11.7%), Motorcycle Accidents (4.1%) , Pedestrian Accidents (10.0%), Stabbing (2.0%) and Gunshot Wounds (1.5%).

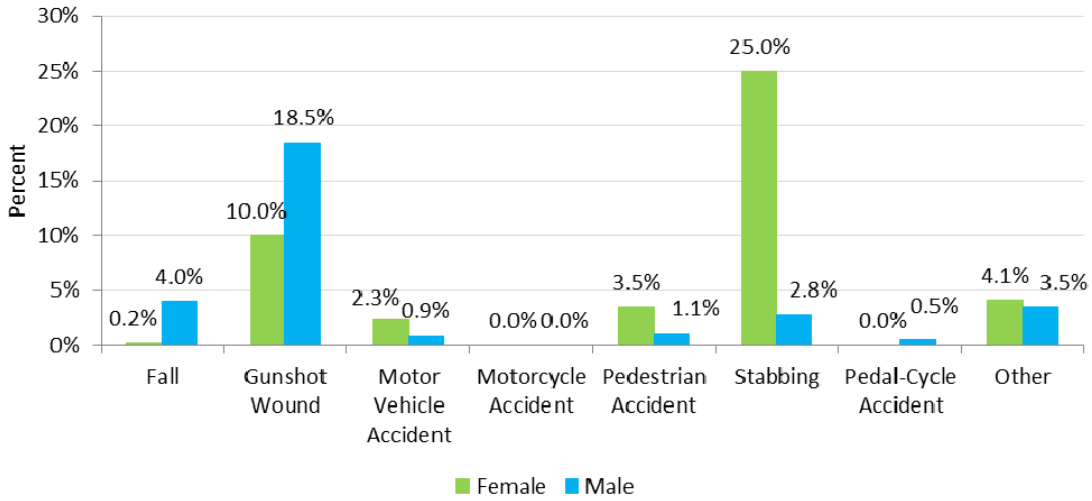
Chart 6.2 Pediatric Trauma Incidents by Mechanism and Gender, Riverside County, 2010-2014



Fatality by Mechanism and Gender

Higher case fatality rates were seen among male victims of Gunshot Wounds and Falls (18.5% and 4.0%). Although Gunshot incidents are few, case fatality rate is highest in this injury group. The case fatality rate of stabbing among female pediatric patients is exceptionally high. This is due to there being only 4 stabbing incidents among pediatric female patients with one injury being fatal.

Chart 6.3 Pediatric Trauma Case Fatality by Mechanism and Gender, Riverside County, 2010-2014



VII. INCIDENT OUTCOME

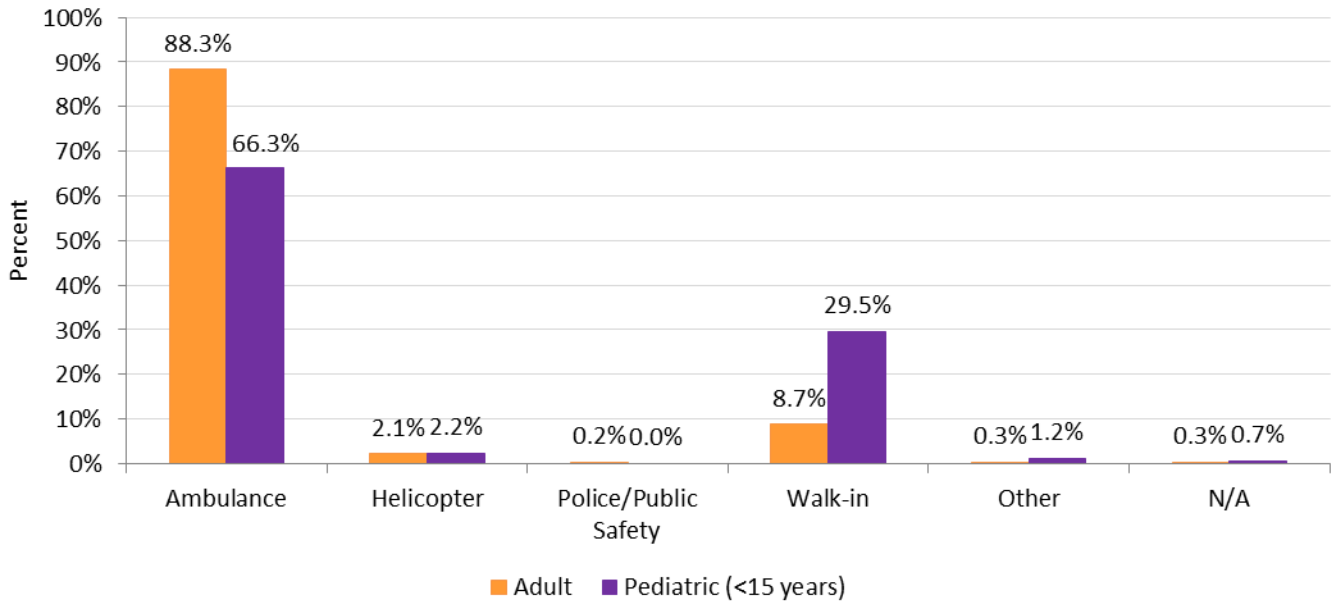
TRANSPORTATION

Transportation by Age

Most patients arrive to the trauma center via ambulance, accounting for 77% of all transports from the location of injury. Among adults, 88.3% were transported to the trauma center by ambulance.

A larger portion of children are transported by private vehicle compared to adults. Between 2010-2014, pediatric patients were transported by private vehicle at a rate three times higher than that of adult patients (29.5% and 8.7%, respectively).

Chart 7.1 Transportation from Injury Location by Age Group, Riverside County, 2010-2014



Emergency Department (ED) Discharge by Age

For adults, the most common location for ED dispositions were Home (29.5%), Surgical/Medical Admits (28.8%), and the Intensive Care Unit (18.8%).

For pediatric patients, the most common location for ED dispositions were Pediatric Admits (31.0%), Home (25.4%) and Transfer to Another Hospital for Specialty Care (13.3%)

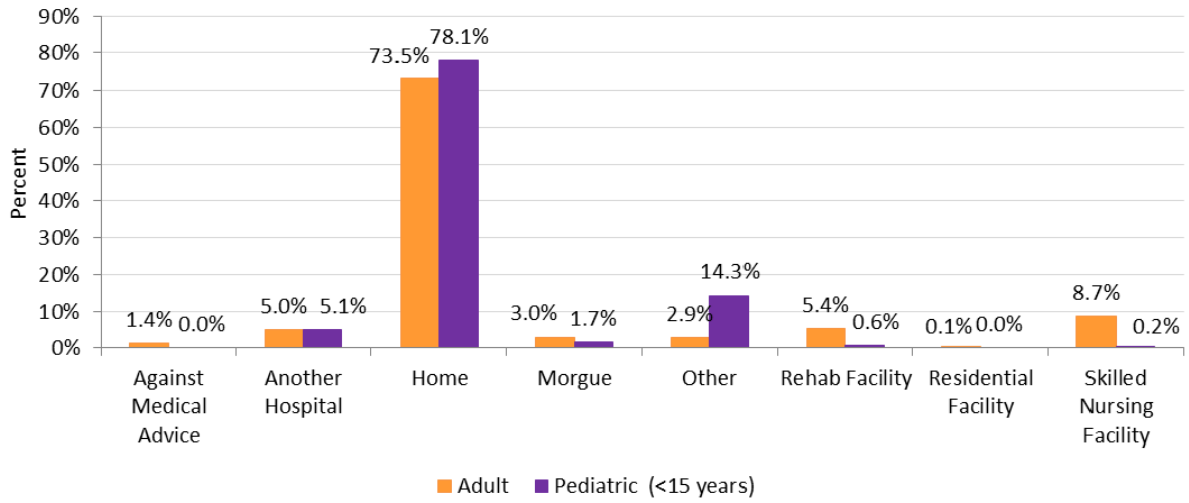
Table 7.1 Emergency Department Discharge Disposition by Age Group, Riverside County, 2010-2014

Emergency Room Discharge Disposition	Adult	Pediatric
Home	29.5%	25.4%
Surgical/Medical Admits	28.8%	3.8%
Intensive Care Unit	18.8%	8.1%
Progressive Care Unit	11.2%	2.3%
Pediatric Admits	0.7%	31.0%
ED Transfer to Another Hospital for Specialty Care	2.1%	13.3%
Operating Room	2.2%	4.1%
Other	0.8%	9.6%
Expired in ED	1.7%	0.8%
Left Against Medical Advice	1.6%	0.2%
Correctional Facility/Court/Law Enforcement	1.0%	0.1%
Observation Unit	1.0%	0.7%
Admitted Directly to Inpatient Service	0.7%	0.5%
Skilled Nursing Facility	0.1%	0.0%
Rehab	0.0%	0.0%

Hospital Discharge by Age

Overall, the majority of adult patients were discharged home (73.5%) from their hospital stay, followed by being transferred to a skilled nursing facility (8.7%). The majority of pediatric patients were also discharged home (78.1%) from their hospital stay. A higher proportion of pediatrics were also transferred to Other (14.3%) compared to adults (2.9%). A disposition of "Other" among pediatric patients is either child protective services, a correctional facility, mental health facility, or discharged to family other than parents.

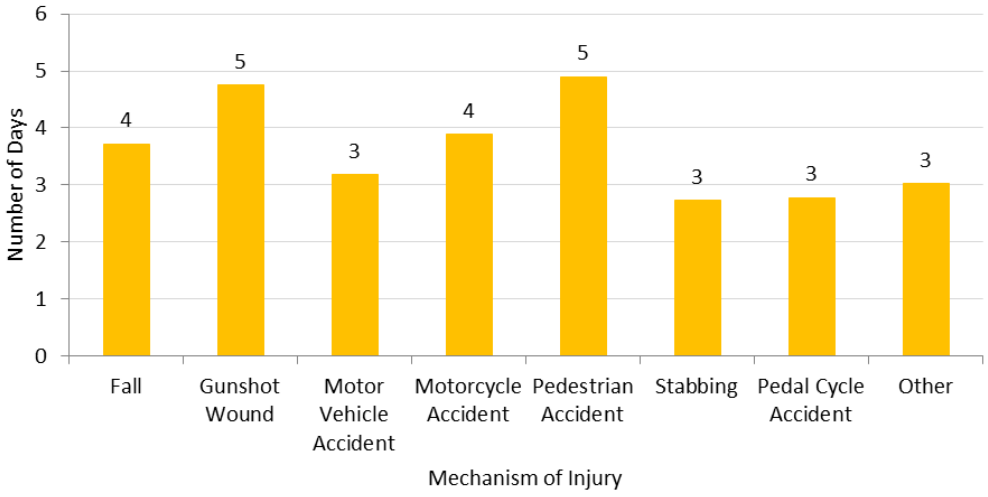
Chart 7.2 Hospital Discharge Disposition by Age Group, Riverside County, 2010-2014



Length of Stay by Injury Mechanism

The average length of stay by all mechanisms of injury is 3.8 days. On average, the longest length of stay (5 days) are among those sustaining injuries by Gunshot and Pedestrian accidents.

Chart 7.3 Median Length of Stay by Injury Mechanism Riverside County, 2010-2014



VIII. APPENDIX

Racial/Ethnic Category Labels

Please note that the following racial/ethnic categories were self–identified and used to compile the data:

- Native American
- Asian
- African American
- Hispanic
- White, not Hispanic
- Other

Racial/Ethnic categories changed per NTDB Data Dictionary in 2013. As a result, all Racial/Ethnic data analysis was completed only for years 2010, 2011, and 2012.

Definitions and Rate Calculations

Abbreviated Injury Scale (AIS) is an anatomical based scoring system to determine the severity of single injuries based on the survivability of the injury. The score range is 1-5 with a score of 5 being among the most severe injuries.

Case fatality is the ratio of deaths due to a specific cause.

$$\text{Case fatality Rate} = \frac{\text{number of deaths in a specific time due to specific condition}}{\text{Estimated total population with specific condition}} \times 100\%$$

Death Rate is the number of deaths during a stated period of time, usually one year.

$$\text{Death Rate} = \frac{\text{number of deaths in a specific time period}}{\text{Estimated total population}} \times 100{,}000$$

EMS Time is the time (in minutes) between the arrivals of emergency personnel at the injury location to the time the patient is delivered to the trauma center.

Incidence is the number of new cases of a specific illness diagnosed or reported during a stated period of time, usually one year.

$$\text{Incidence Rate} = \frac{\text{number of observed cases reported in specified time period}}{\text{Estimated total population}} \times 100{,}000$$

Injury Severity Score (ISS) is a method used to determine the severity of multiple injuries. An individual's ISS can be calculated by assessing each injury with the Abbreviated Injury Scale (AIS), the summing the squares of the highest AIS rating for each of the three most severely injured body areas. The highest score for a single area is 25 and therefore the highest score possible is 75.

Inland Region refers to Riverside and San Bernardino Counties. *Place of Residence* refers to the place where a person lives or maintains legal residency.

Scene Time is the time (in minutes) between the arrivals of emergency personnel at the injury location to the time of departure from the injury location.

MATRIX OF E CODE GROUPINGS

Recommended framework of E-code groupings for presenting injury mortality and morbidity data (August 10, 2011)

This matrix contains the ICD-9 external-cause-of-injury codes used for coding of injury mortality data and additional ICD-9-CM external-cause-of-injury codes, designated in bold, **only** used for coding of injury morbidity data. In addition, a list of ICD-9-CM external-cause-of-injury codes that have been added since 1994 along with their descriptors is appended to the matrix.

Mechanism/Cause	Manner/Intent				
	Unintentional	Self-Inflicted	Assault	Undeter-mined	Other[1]
Cut/pierce	E920.0-.9	E956	E966	E986	E974**. E995.2**
Drowning/submersion	E830.0-.9, E832.0-.9 E910.0-.9	E954	E964	E984	**E995.4**
Fall	E880.0-E886.9, E888	E957.0-.9	E968.1	E987.0-.9	
Fire/burn[3]	E890.0-E899, E924.0-.9	E958.1,.2,.7	E961, E968.0,.3, **E979.3**	E988.1,.2,.7	
Fire/flame[3]	E890.0-E899	E958.1	E968.0, **E979.3**	E988.1	
Hot object/substance	E924.0-.9	E958.2,.7	E961, E968.3	E988.2,.7	
Firearm[3]	E922.0-.3,.8, .9	E955.0-.4	E965.0-4, **E979.4**	E985.0-.4	E970
Machinery	E919 (.0-.9)				
Motor Vehicle traffic[2,3]	E810-E819 (.0-.9)	E958.5	**E968.5**	E988.5	
Occupant	E810-E819 (.0,.1)				
Motorcyclist	E810-E819 (.2,.3)				
Pedal cyclist	E810-E819 (.6)				
Pedestrian	E810-E819 (.7)				

MATRIX OF E CODE GROUPINGS CONTINUED

Unspecified	E810-E819 (.9)				
Pedal cyclist, other	E800-E807 (.3) E820-E825 (.6), E826.1,.9 E827-E829(.1)				
Pedestrian, other	E800-807(.2) E820-E825(.7) E826-E829(.0)				
Transport, other	E800-E807 (.0,.1,.8,.9) E820-E825 (.0- .5,.8,.9) E826.2-.8 E827-E829 (.2-.9), E831.0-.9, E833.0- E845.9	E958.6		E988.6	
Natural/environmental	E900.0-E909, E928.0- .2	E958.3		E988.3	
Bites and stings[3]	E905.0-.6,.9 E906.0-.4,**.5**,.9				
Overexertion	E927**.0-.4,.8-.9**				
Poisoning	E850.0-E869.9	E950.0-E952.9	E962.0-.9**, E979.6,.7**	E980.0-E982.9	E972
Struck by, against	E916-E917.9		E960.0; E968.2		E973, E975, **E995 (.0,.1)**
Suffocation	E911-E913.9	E953.0-.9	E963	E983.0-.9	**E995.3**
Other specified and classifiable[3,4]	E846-E848, E914- E915 E918, E921.0-.9, **E922.4,.5** E923.0-.9, E925.0- E926.9 **E928(.3-.7)**, E929.0- .5	E955.5,**.6**,.7,.9 E958.0,.4	E960.1, E965.5-.9 E967.0-.9, E968.4,**.6, .7** **E979 (.0-.2,.5,.8,.9)**	E985.5,**.6,.7** E988.0,.4	E971, E978, E990-E994, E996 E997.0-.2

MATRIX OF E CODE GROUPINGS CONTINUED

Other specified, not elsewhere classifiable	E928.8, E929.8	E958.8, E959	E968.8, E969,E999.1	E988.8, E989	E977, E995 **(.8,.9)**, E997.8 E998, E999.0
Unspecified	E887, E928.9, E929.9	E958.9	E968.9	E988.9	E976, E997.9
All injury[3]	E800-E869, E880-E929	E950-E959	E960-E969, **E979**,E999.1	E980-E989	E970-E978, E990-E999.0
Adverse effects					E870-E879 E930.0-E949.9
Medical care					E870-E879
Drugs					E930.0-E949.9
All external causes					E800-E999

[1]Includes legal intervention (E970-E978) and operations of war (E990-E999).
[2]Three 4th-digit codes (.4 [occupant of streetcar], .5 [rider of animal], .8 [other specified person]) are not presented separately because of small numbers. However, because they are included in the overall Motor Vehicle traffic category, the sum of these categories can be derived by subtraction.
[3]Codes in bold are for morbidity coding only. For details see table 2.
[4]E849 (place of occurrence) has been excluded from the matrix. For mortality coding, an ICD-9 E849 code does not exist. For morbidity coding, an ICD-9-CM E849 code should never be first-listed E code and should only appear as an additional code to specify the place of occurrence of the injury incident.

Note: ICD-9 E codes for coding underlying cause of death apply to injury-related death data from 1979 through 1998. Then there is a new ICD-10 external cause of injury matrix that applies to death data from 1999 and after. This can be found on the National Center for Health Statistics website(http://www.cdc.gov/nchs/injury/injury_tools.htm).

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EMS
AGENCY


COUNTY OF RIVERSIDE
EMD
Emergency Management Department


Riverside
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HEALTH SYSTEM
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