



## *Summary of Reportable Injuries in Oklahoma*

### *Spinal Cord Injuries in Oklahoma, 1988-2003*

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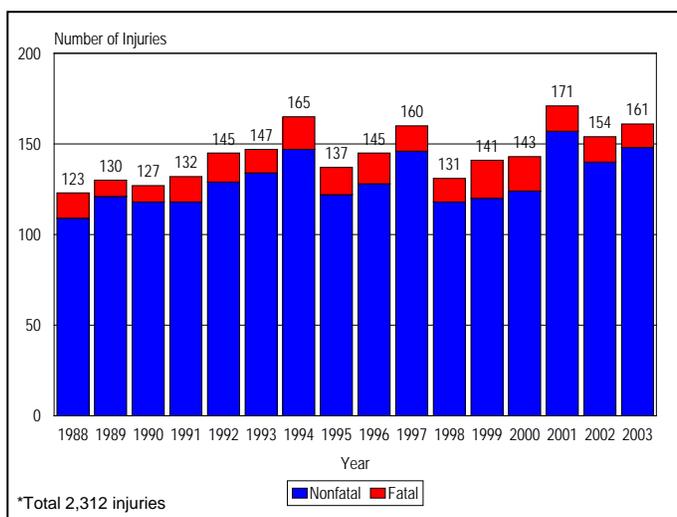
# Spinal Cord Injuries in Oklahoma, 1988-2003

## Background

Traumatic spinal cord injuries (SCI) became a reportable condition in May of 1987. A traumatic SCI is defined as an acute, traumatic lesion of the spinal cord, resulting in any degree of motor and/or sensory deficit; deficits may be permanent or temporary. Injuries to nerve roots or spinal plexus are not included. Fractured vertebra may or may not be present. Cases include Oklahoma residents who suffered a SCI that resulted in death or hospitalization from 1988-2003. Data were collected through hospital inpatient records reviews, inpatient rehabilitation reports, and review of official Medical Examiner's reports. Supplemental data were collected for motor vehicle collisions from the Department of Public Safety. Average annual rates were calculated using U.S. Census bridged-race population estimates summed for all 16 years of data.

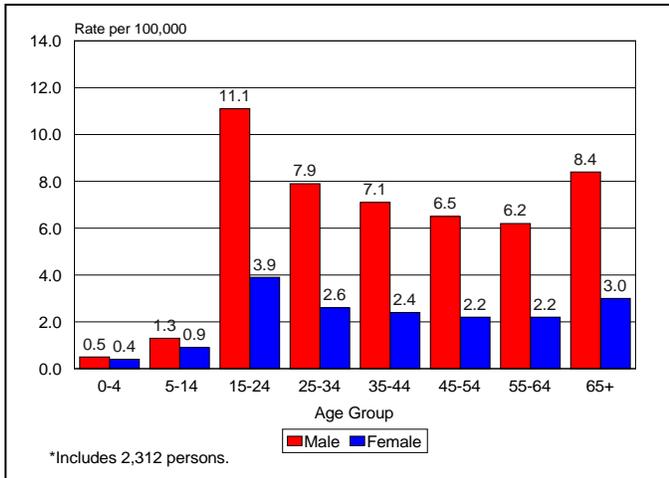
A total of 2,679 Oklahoma residents were identified who suffered a traumatic SCI that resulted in death or hospitalization in the 16-year period from 1988-2003. Among these, 367 persons died before they were admitted to a hospital and did not have a definitive diagnosis. The majority (69%) of these persons died in motor vehicle crashes. Data presented hereafter in this report includes the 2,312 persons that were admitted to a hospital.

**Figure 1. Number\* of Hospitalized SCI by Year of Injury and Survival Status, Oklahoma, 1988-2003**



- An average of 145 SCI hospitalizations resulted each year (4.3 per 100,000 population), ranging from 123 injuries in 1988 to 171 injuries in 2001.
- A total of 233 persons who were hospitalized for SCI died within 90 days following their injury, resulting in an overall case-fatality rate of 10%.
- Forty-one percent of SCI occurred on roadways, followed by homes (20%), recreational waters (4%), farms (3%), construction sites (2%), pools (1%), and other locations (29%). Nine percent were work-related.

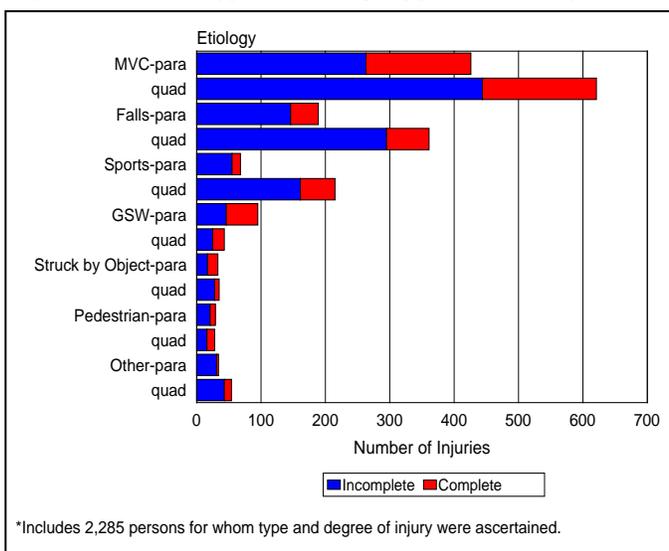
**Figure 2. SCI Rates by Age and Gender, Oklahoma, 1988-2003**



- The average age of injured persons was 40 years of age; ages ranged from 8 months to 98 years.
- The highest rate of SCI was among persons 15-24 years of age. Motor vehicle crashes (MVC) were the leading cause of SCI among persons in this age group (4.0), followed by sports (1.6) and gunshot wounds (0.9).
- The rate of SCI among males (6.4) was almost three times higher than the rate among females (2.3).

- Among children 5-14 years of age, sports activities were the leading cause of SCI (0.4) followed by MVC (0.3 per 100,000), and falls (0.1 per 100,000).
- Among persons 65 years of age and older, almost all (94%) SCI resulted from falls (62%) and MVC (32%).

**Figure 3. Etiology of SCI by Type and Degree\* of Injury, Oklahoma, 1988-2003**



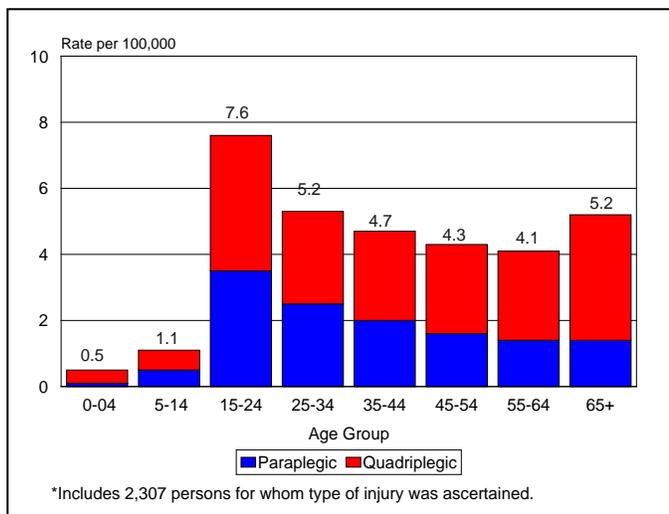
- The leading causes of SCI were MVC (46%), falls (26%), sports (12%), and gunshot wounds (6%).
- 60% of SCI were quadriplegic injuries (injury of the cervical spinal cord) and 40% were paraplegic injuries (injury of the thoracic, lumbar, or sacral spinal cord).
- More than one-fourth (28%) of injuries resulted in complete SCI (complete loss of movement and feeling).
  - 32% of paraplegic injuries and 25% of quadriplegic injuries resulted in complete SCI.
- 76% of sports-related injuries resulted in quadriplegic injuries.
- Complete injuries occurred more frequently with gunshot wounds (48%), pedestrian injuries (34%), being struck by an object (34%), and MVC (32%).

**Table 1. Subgroups of Selected Etiologies of SCI, Oklahoma, 1988-2003**

Etiology Subgroups	Number of Injuries
<b>Traffic</b>	<b>1,121</b>
Vehicle Occupant	948 (85%)
Motorcycle	83 (7%)
Pedestrian	57 (5%)
ATV/Rec. Vehicle	33 (3%)
<b>Sports Activity</b>	<b>283</b>
Diving	88 (31%)
Football	53 (19%)
Horseback or Rodeo	42 (15%)
Bicycle	20 ( 7%)
Hunting	19 ( 7%)
Wrestling	12 ( 4%)
Other	49 (17%)
<b>Violence</b>	<b>189</b>
Gunshot	140 (74%)
Assault	36 (19%)
Stabbing	13 ( 7%)

- The leading cause of SCI was traffic-related injuries, accounting for nearly half (48%) of all injuries.
  - 85% of traffic-related SCI were among vehicle occupants. Of those, the majority were occupants of cars (59%), followed by pickups (24%), vans (4%), sports-utility vehicles (3%), and other types of vehicles (3%) or unknown vehicle type (7%).
- Sports/recreational activity was the third leading cause of SCI accounting for 12% of injuries.
  - Diving was the most common cause of sports-related SCI followed by football, and horseback riding/rodeo.
- Violence accounted for 8% of all SCI.
  - Gunshots accounted for almost three-fourths of violence-related injuries; assaults and stabbings combined accounted for 26% of injuries.

**Figure 4. Rates of SCI by Age and Type of Injury,\* Oklahoma, 1988-2003**



- Children less than 5 years of age had a higher proportion of quadriplegic injuries and a higher proportion of complete injuries than any other age group (82% and 60%, respectively).
- 65% of SCI among children less than 5 years of age resulted from MVC, 24% from pedestrian injuries, 6% from gunshot wounds, and 6% from falls.
- Among persons 5 years of age and older, the proportion of quadriplegic injuries increased with age. Fifty-seven percent of injuries among children 5-14 years of age were quadriplegic injuries compared to 73% of injuries among persons 65 years and older.

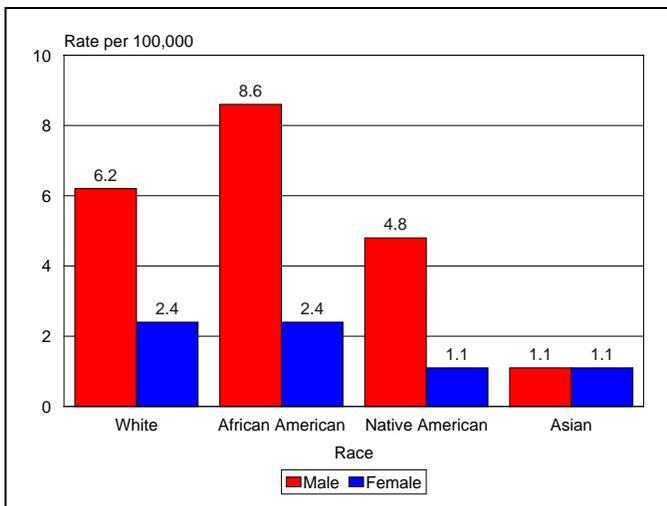
**Table 2. Alcohol/Drug Contribution to SCI by Etiology, Oklahoma, 1988-2003**

Etiology	Alcohol/Drug Contribution*	
	No./Total	Percent
Assault	25/49	51%
Pedestrian	24/48	50%
Gunshot Wound	64/131	49%
Motor Vehicle	373/1027	36%
Sport/Recreation	55/228	24%
Bicycle	4/19	21%
Fall/Jump	119/599	20%
Falling Object	3/69	4%
Other	3/39	8%
Total	670/2209	30%

\*Includes only persons > 14 years.

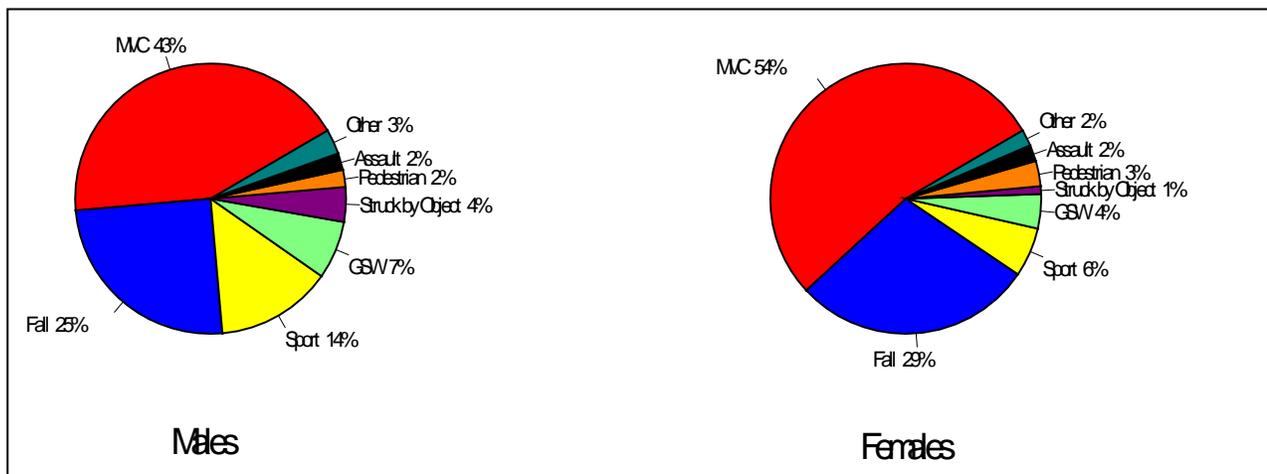
- Alcohol and/or drugs were contributing factors in 30% of injuries among persons over 14 years of age.
- Alcohol/drugs were a contributing factor in 47% of SCI among persons 25-34 years of age, 39% among persons 35-44 years of age, and 33% among persons 15-24 years of age.
- Alcohol/drugs most frequently contributed to assault-related SCI, pedestrian-related SCI, gunshot wound-related SCI, and MVC-related SCI.
- When time of injury was known, alcohol/drugs contributed to 64% of SCI occurring between midnight and 4 a.m., 50% of SCI occurring between 8 p.m. and midnight, and 36% of injuries occurring between 4 a.m. and 8 a.m.

**Figure 5. Rates of SCI by Race and Gender, Oklahoma, 1988-2003**



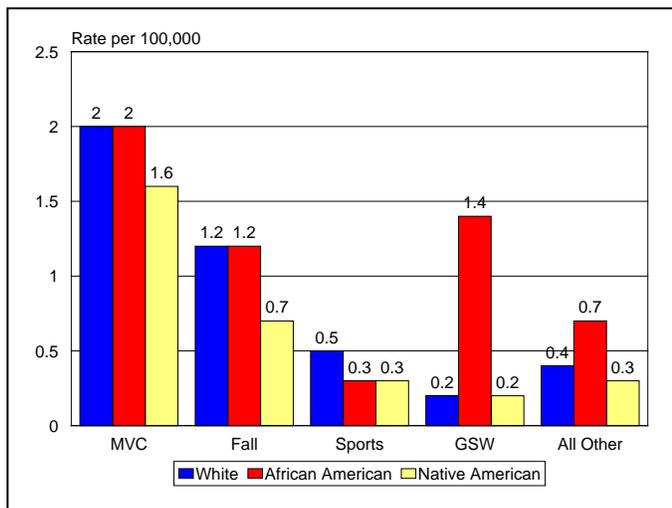
- Males in all racial categories had higher rates of injury than females.
- Overall, the rate of SCI among African Americans (5.4) was 23% higher than the rate among whites (4.4) and 80% higher than the rate among Native Americans (3.0).
- The rate of SCI among African American males was 1.4 times the rate among white males, and 1.8 times the rate among Native American males.
- Rates of SCI for African American females and white females were the same and were over twice the rate for Native American females.

**Figure 6. Etiology of SCI by Gender, Oklahoma, 1988-2003**



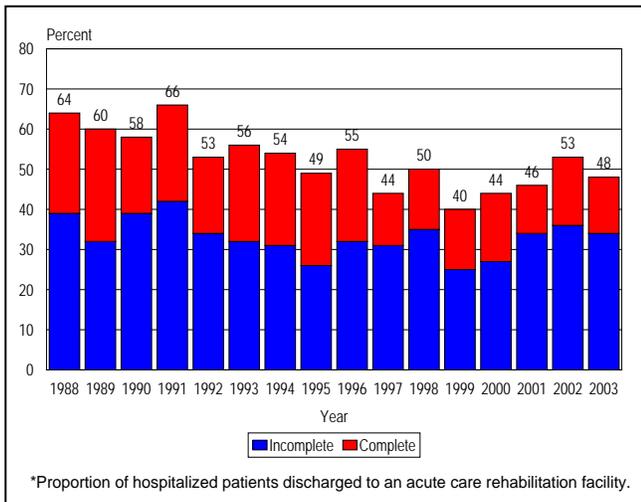
- The three leading causes of SCI were MVC, falls, and sports for both males and females.
- Among males, proportionally more SCI resulted from sports, gunshot wounds, and being struck by an object. Among females, proportionally more SCI resulted from motor vehicle crashes, and falls.
- Cause-specific rates among males were higher than rates for females in every category. The rate of sports-related SCI among males (0.9) was over 9 times higher than the corresponding rate among females (0.1). Males were over 4 times more likely to suffer a SCI from a gunshot wound than females.

**Figure 7. SCI Rates by Etiology and Race, Oklahoma, 1988-2003**



- MVC was the leading cause of SCI among all racial groups. The rate of MVC-related SCI for both whites and African Americans was 25% higher than the rate among Native Americans.
  - African American males 55-64 years of age had the highest rate of MVC-related SCI (7.3) followed by African American males 65 years of age and older (5.7) and white males 15-24 years of age (5.4).
- The rate of gunshot wound-related SCI was 7 times higher among African Americans than among whites or Native Americans.
- Among males 65 years and older, the rate of fall-related SCI among African Americans (8.9) was almost twice the rate among whites (4.8), and over 4 times higher than the rate among Native Americans (2.1).

**Figure 8. Acute Patient Rehabilitation Rates\* by Year and Degree of Injury, Oklahoma, 1988-2003**



- Fifty-two percent of hospitalized persons received treatment in an acute inpatient rehabilitation center.
- Thirty-seven percent of patients admitted to an acute inpatient rehabilitation center had complete SCIs (representing 69% of all patients with complete injuries) and 63% of patients had incomplete SCIs (representing 46% of all patients with incomplete injuries).
- Annual rehabilitation admission rates ranged from a high of 66% of hospitalized patients in 1991, to a low of 40% of hospitalized patients in 1999. The rate of acute rehabilitation admission declined by 27% from 64% in 1988 to 47% in 2003.

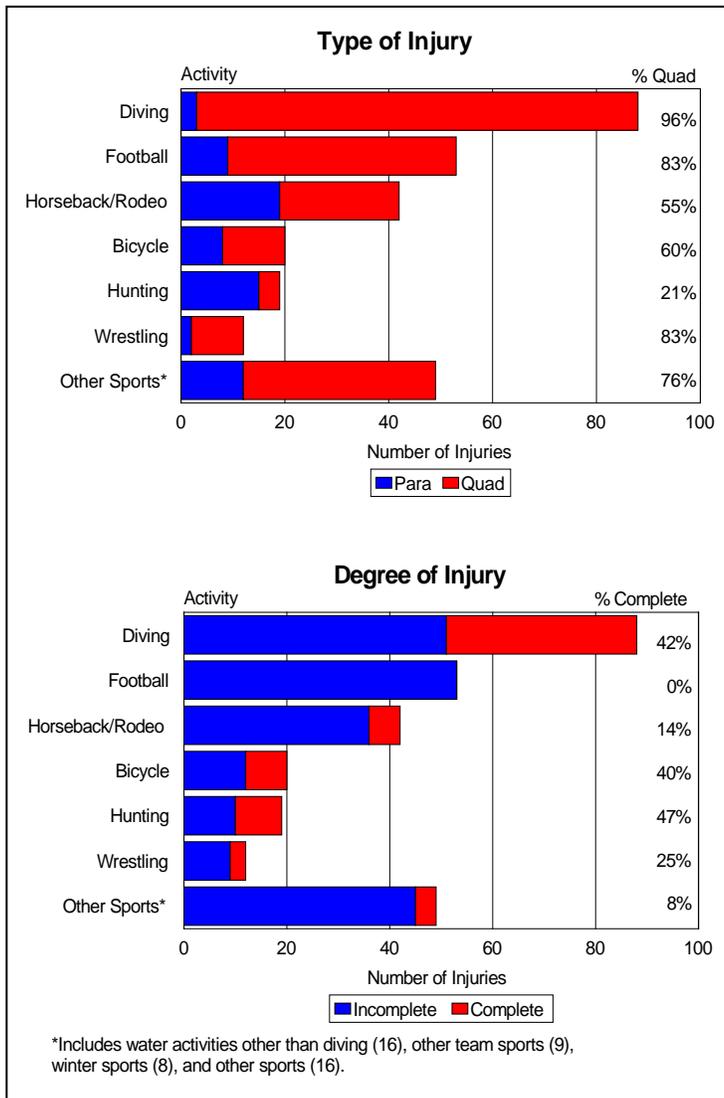
**Table 3. Seat Belt Usage by Type and Degree of SCI, Oklahoma, 1988-2003\***

	Seatbelt		No Seatbelt		TOTAL
	Complete	Incomplete	Complete	Incomplete	
Paraplegia	18 (5%)	73 (22%)	110 (33%)	131 (39%)	332
Quadriplegia	45 (9%)	123 (24%)	104 (20%)	239 (47%)	512

\*Seat belt data was available from the Oklahoma Department of Public Safety. Seat belt use was determined for 844 persons.

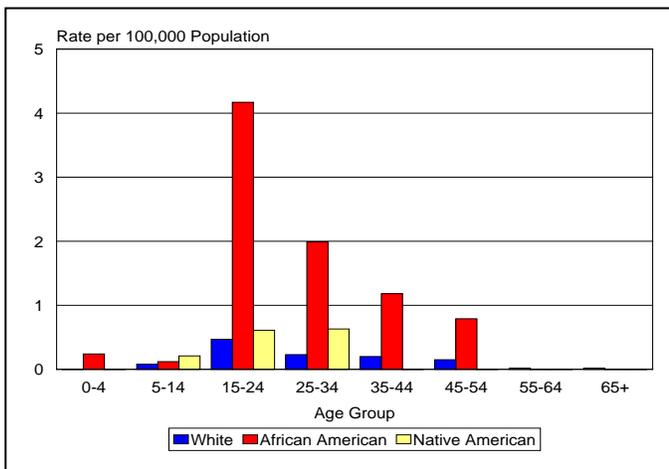
- Among persons who suffered an MVC-related SCI in which they were a motor vehicle occupant, only 31% were wearing a seat belt at the time of the crash.
  - Overall, seat belts were worn by 19% of SCI cases in 1988 and 43% of SCI cases in 2003. (In 1988, the state seat belt usage rate was 32% for drivers; in 2003, the state seat belt usage rate was 77% for drivers and front seat passengers).
- Persons who suffered incomplete SCI wore seat belts more often than persons who suffered complete injuries (34% and 23%, respectively).
- Rollover crashes occurred in 35% of MVC-related SCIs. Over three-fourths (78%) of persons in rollover crashes were not wearing a seat belt.
- In 20% of crashes, the patient was ejected from the vehicle; 97% of persons ejected from vehicles were not wearing a seat belt.

**Figure 9. Sports-Related SCI by Activity, Type and Degree of Injury, Oklahoma, 1988-2003**



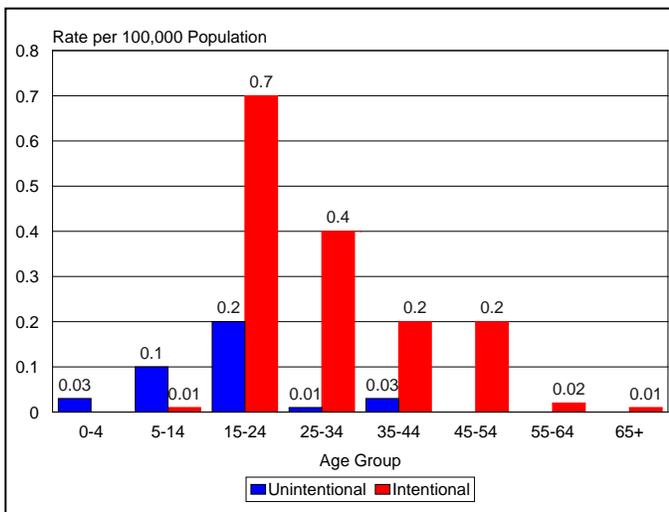
- Eighty-seven percent of sports-related SCI were among males; 48% of these occurred among males 15-24 years of age.
  - The rate among white males 15-24 years of age (3.3) was 65% higher than the rate for African American males (2.0) and almost twice the rate of Native American males (1.7).
- Diving was the most common etiology of sports-related SCI, accounting for 31% of injuries, or approximately 6 SCI per year.
  - 96% of diving injuries resulted in quadriplegia, of which 44% were complete injuries.
- 83% of football injuries resulted in quadriplegia. None of the football injuries resulted in complete SCI.
- All of the hunting injuries occurred when persons fell from trees or tree stands used in deer hunting. Seventy-nine percent of these injuries resulted in paraplegia, of which 53% were complete injuries.

**Figure 10. Rates of Gunshot Wound-Related SCI by Age and Race, Oklahoma, 1988-2003**



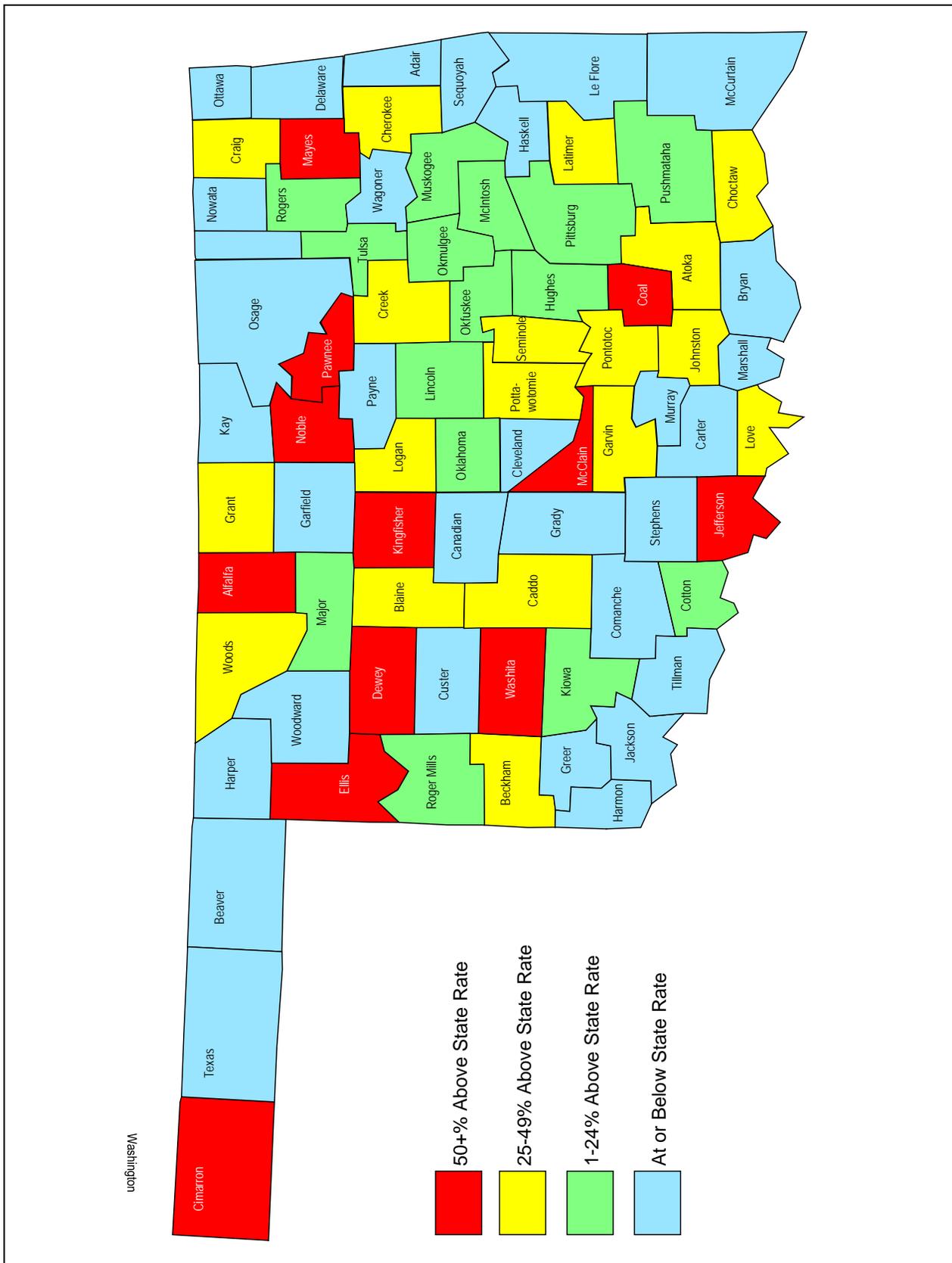
- Gunshot wounds accounted for 6% of SCI or an average of 9 SCI per year. The proportion of gunshot wound-related SCIs peaked in 1999 to 11%, and fell in 2001 to 2% of all SCIs. In 2003, gunshot wound-related SCI accounted for 8% of all SCI.
- The rate of gunshot wound-related SCI among males (0.4) was 4 times higher than for females (0.1).
  - Among males 15-24 years of age, the rate for African Americans (7.1) was almost 12 times higher than for whites (0.6) and 10 times higher than for Native Americans (0.7).
- 25% of SCI among African American males of all ages and 46% of SCI among African American males 15-24 years of age were caused by gunshot wounds.

**Figure 11. Rates of Gunshot Wound-Related SCI by Age and Intentionality, Oklahoma, 1988-2003**



- 89% of gunshot wound-related SCIs among persons less than 15 years of age were unintentional, as were 18% among persons 15-24 years of age and 5% among persons 25 years of age and older.
- The highest rate of both intentional and unintentional gunshot wound-related SCI was among persons 15-24 years of age.
- The rate of unintentional gunshot wound-related SCI among males (0.07) was 3.5 times higher than for females (0.02).
- When the location of occurrence was known, the gunshots occurred most often in a home (46%), followed by a street/highway (11%).

Figure 12. Spinal Cord Injury Rates by County of Residence, Oklahoma, 1988-2003



**Table 4. Spinal Cord Injury Rates by County of Residence, Oklahoma, 1988-2003**

County	Average Annual Population	Number of Cases 1988-2003	Average Annual Rate*
Jefferson	6,931	13	11.7
Ellis	4,241	7	10.3
Cimarron	3,207	5	9.7
Kingfisher	13,639	19	8.7
Washita	11,509	15	8.1
Mayes	36,093	45	7.8
Coal	5,920	7	7.4
Dewey	5,086	6	7.4
Noble	11,300	13	7.2
Alfalfa	6,252	7	7.0
McClain	25,534	28	6.9
Pawnee	16,062	17	6.6
Caddo	30,065	31	6.4
Blaine	11,783	12	6.4
Choctaw	15,402	15	6.1
Creek	64,720	63	6.1
Johnston	10,306	10	6.1
Seminole	25,113	24	6.0
Love	8,457	8	5.9
Garvin	26,919	25	5.8
Cherokee	38,769	36	5.8
Grant	5,403	5	5.8
Pontotoc	34,642	32	5.8
Logan	31,898	29	5.7
Craig	14,563	13	5.6
Atoka	13,479	12	5.6
Woods	9,046	8	5.5
Beckham	19,227	17	5.5
Pottawatomie	62,410	55	5.5
Latimer	10,504	9	5.4
Muskogee	69,094	59	5.3
Rogers	63,673	54	5.3
Kiowa	10,744	9	5.2
Roger Mills	3,725	3	5.0
Okfuskee	11,609	9	4.8
Major	7,744	6	4.8
Cotton	6,597	5	4.7
Okmulgee	38,336	29	4.7
Lincoln	30,634	23	4.7

County	Average Annual Population	Number of Cases 1988-2003	Average Annual Rate*
Pittsburg	42,873	32	4.7
Hughes	13,497	10	4.6
Oklahoma	636,241	468	4.6
Tulsa	537,309	383	4.5
McIntosh	18,291	13	4.4
Pushmataha	11,397	8	4.4
<b>State of Oklahoma</b>	<b>3,323,837</b>	<b>2,312</b>	<b>4.3</b>
Nowata	10,270	7	4.3
Garfield	57,379	38	4.1
Carter	44,558	29	4.1
Custer	26,341	17	4.0
Woodward	18,759	12	4.0
Greer	6,264	4	4.0
Jackson	28,835	18	3.9
Payne	65,535	40	3.8
Stephens	42,992	25	3.6
Kay	48,295	28	3.6
Marshall	12,213	7	3.6
Harmon	3,503	2	3.6
Grady	43,952	24	3.4
Osage	43,323	23	3.3
Sequoyah	36,687	19	3.2
Washington	48,553	25	3.2
Adair	20,029	10	3.1
McCurtain	33,967	16	2.9
Ottawa	31,870	15	2.9
Bryan	34,543	16	2.9
Delaware	33,150	15	2.8
Comanche	115,358	52	2.8
Haskell	11,403	5	2.7
Cleveland	194,157	84	2.7
Tillman	9,768	4	2.6
Murray	12,396	5	2.5
Wagoner	53,423	21	2.5
Canadian	82,161	32	2.4
Texas	18,181	5	1.7
Harper	3,764	1	1.7
LeFlore	46,053	11	1.5
Beaver	5,910	1	1.1

\*Average annual rates per 100,000 population were computed using bridged-race population estimates summed for all 16 years of data with the exception of the years 1988-1989 for which regular census data were used.

County of residence was unknown for 4 persons.