



Traumatic Brain Injury Data Report, 2004-2009

Tracy Wendling, M.P.H.
Director of Surveillance
Injury Prevention Service
Oklahoma State Department of Health

Pam Archer, M.P.H.
Chief
Injury Prevention Service
Oklahoma State Department of Health

For more information, please contact:
Injury Prevention Service
Oklahoma State Department of Health
1000 N.E. 10th Street
Oklahoma City, Oklahoma 73117-1299
(405) 271-3430
<http://ips.health.ok.gov>

October 2011

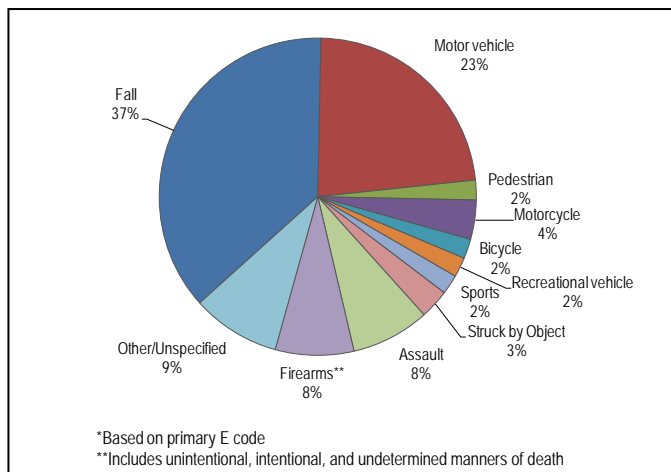
Section 1: Traumatic Brain Injuries in Oklahoma, 2004-2009

Background

Statewide surveillance for hospitalized and fatal traumatic brain injuries (TBI) was conducted in Oklahoma using 2004-2009 hospital discharge data and Vital Statistics (death certificate) data. Persons discharged from an Oklahoma acute care facility with one or more of the following *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes were included in surveillance: 800.0-801.9, 803.0-804.9, 850.0-854.1, 950.1-950.3, 959.01, and 995.55. Deaths were identified by death certificates coded with one or more of the following *International Classification of Diseases, Tenth Revision* (ICD-10) codes: S01.0-S01.9, S02.0, S02.1, S02.3, S02.7-S02.9, S04.0, S06.0-S06.9, S07.0, S07.1, S07.8, S07.9, S09.7-S09.9, T01.0, T02.0, T04.0, T06.0, T90.1, T90.2, T90.4, T90.5, T90.8, or T90.9. Only residents of Oklahoma were included. Oklahoma residents who died out of state were also included. In an attempt to reduce an artificial inflation of the number from readmissions and transfers, the following procedures were used. Discharges for the same person that occurred 2-10 days after the initial stay were removed from the database unless the external cause of injury code (E code) indicated a different type of injury (e.g., fall and motor vehicle crash). If subsequent discharges occurred 11 or more days later, the stays were considered to be related to separate injuries and were included in the database. Back-to-back stays (e.g., transfers where the discharge date at one hospital was the same or one day prior to the admission date at another) were combined into one distinct discharge record. Without a comprehensive review of all medical records, it is unknown exactly how many of the discharges were for follow-up care of a previous injury.

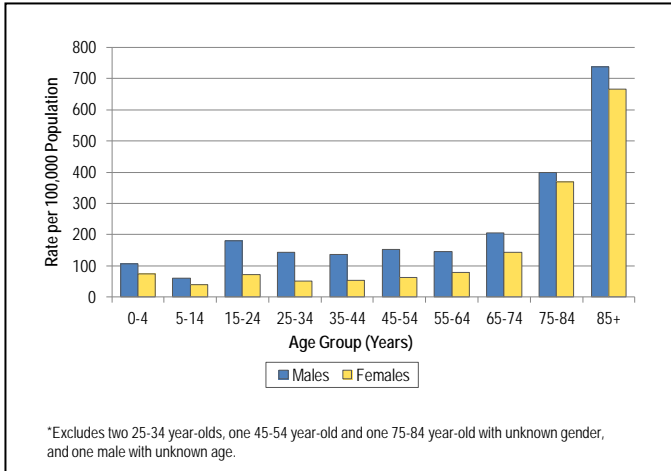
Basic demographic data were collected for all cases. In addition, a stratified random sample of cases was selected for medical record review and detailed information on the injury was collected (see page 7, Section 2). Residents hospitalized out of state or at a federal facility, who survived, were not included in analyses. Therefore, the burden of TBI on Oklahoma's population may be greater than what is presented in this document. Rates were calculated using 2004-2009 bridged-race population estimates.

Figure 1. Traumatic Brain Injuries by Etiology*, Oklahoma, 2004-2009



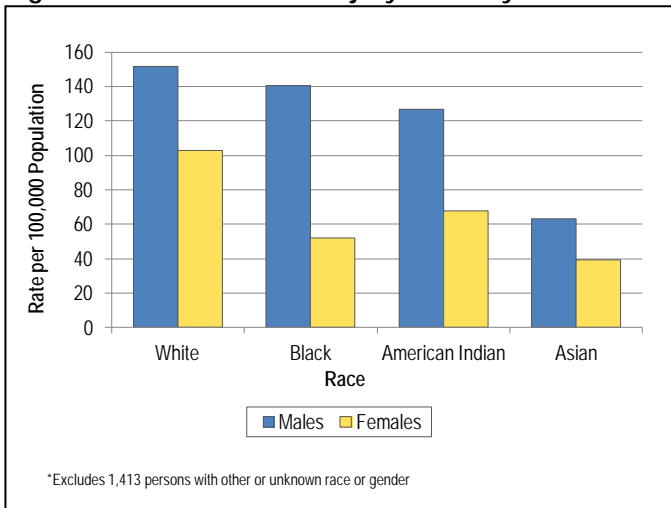
- A total of 27,306 TBIs resulted in hospitalization or death in 2004-2009 (4,386 in 2004; 4,395 in 2005; 4,593 in 2006; 4,516 in 2007; 4,654 in 2008; and 4,762 in 2009) among Oklahoma residents.
- Falls and motor vehicle crashes were the leading causes of all TBI.
- Gunshot wounds and motor vehicle crashes were the leading causes of TBI preadmission deaths.

Figure 2. Traumatic Brain Injury Rates by Age Group* and Gender, Oklahoma, 2004-2009



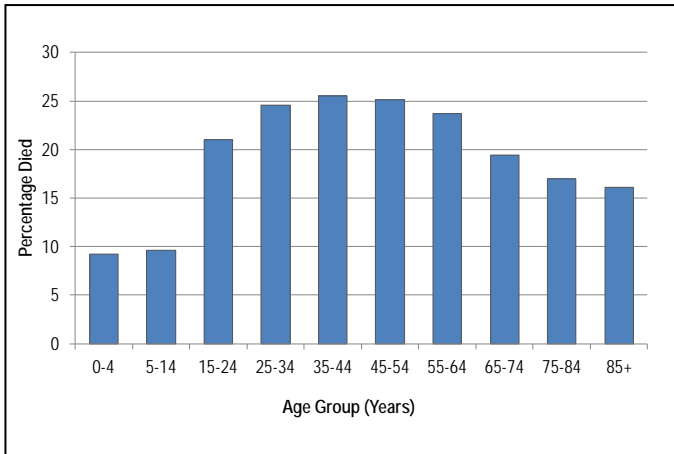
- The age range of persons who suffered a TBI was less than 1 year to 105 years, with an average age of 50 years.
- The injury rate was highest for persons 85 years and older, followed by persons 75-84 years, for both males and females.
- The third highest rate among males and females was in the 65-74 year age group.
- Males were over 1.5 times more likely to be injured than females (155.9 and 98.1 injuries per 100,000 population, respectively).

Figure 3. Traumatic Brain Injury Rates by Gender and Race*, Oklahoma, 2004-2009



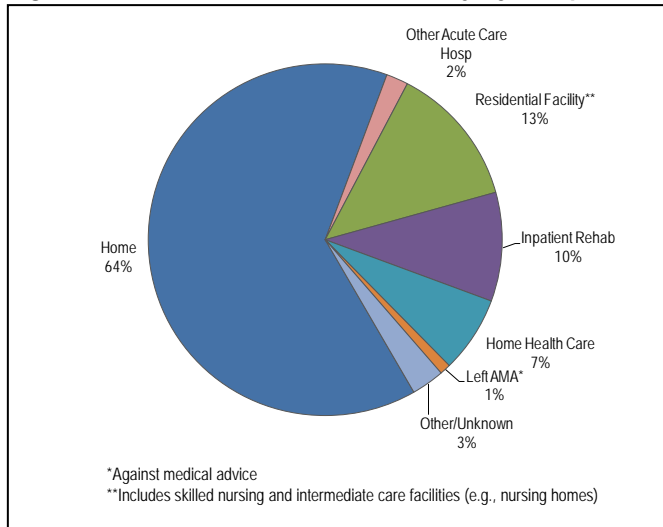
- Whites had the highest rate of TBI (126.9 injuries per 100,000 population), followed by American Indians (96.7), blacks (96.0), and Asians (50.9).
- The TBI rate was highest for white males, followed by black and American Indian males.
- The TBI rate was over 2.5 times higher for black males than for black females.
- The TBI rate was lowest for Asian females; all females had a lower rate than their male counterparts.
- In terms of ethnicity, Hispanic males had an injury rate 2.6 times higher than Hispanic females (data not shown; 99.6 and 38.5 injuries per 100,000 population, respectively).

Figure 4. Traumatic Brain Injury Case Fatality Rates by Age Group, Oklahoma, 2004-2009



- There was a total of 5,492 deaths (20%) from a TBI in 2004-2009.
- Persons 35-44 and 45-54 years had the highest fatality rates (26% and 25%, respectively), while children under 15 years had the lowest (9%).
- Males had a higher case fatality rate than females (24% compared to 14%).

Figure 5. Nonfatal Traumatic Brain Injury Hospitalizations by Discharge Status, Oklahoma, 2004-2009



- Of the 27,306 TBIs identified, 80% were nonfatal.
- The majority of TBI discharges (64%) were to home after inpatient acute care.
- Ten percent of survivors went to an inpatient rehabilitation facility upon discharge.
- Thirteen percent of injured patients were discharged to a skilled nursing facility or nursing home.

Figure 6. Traumatic Brain Injury Rates by County of Residence, Oklahoma, 2004-2009

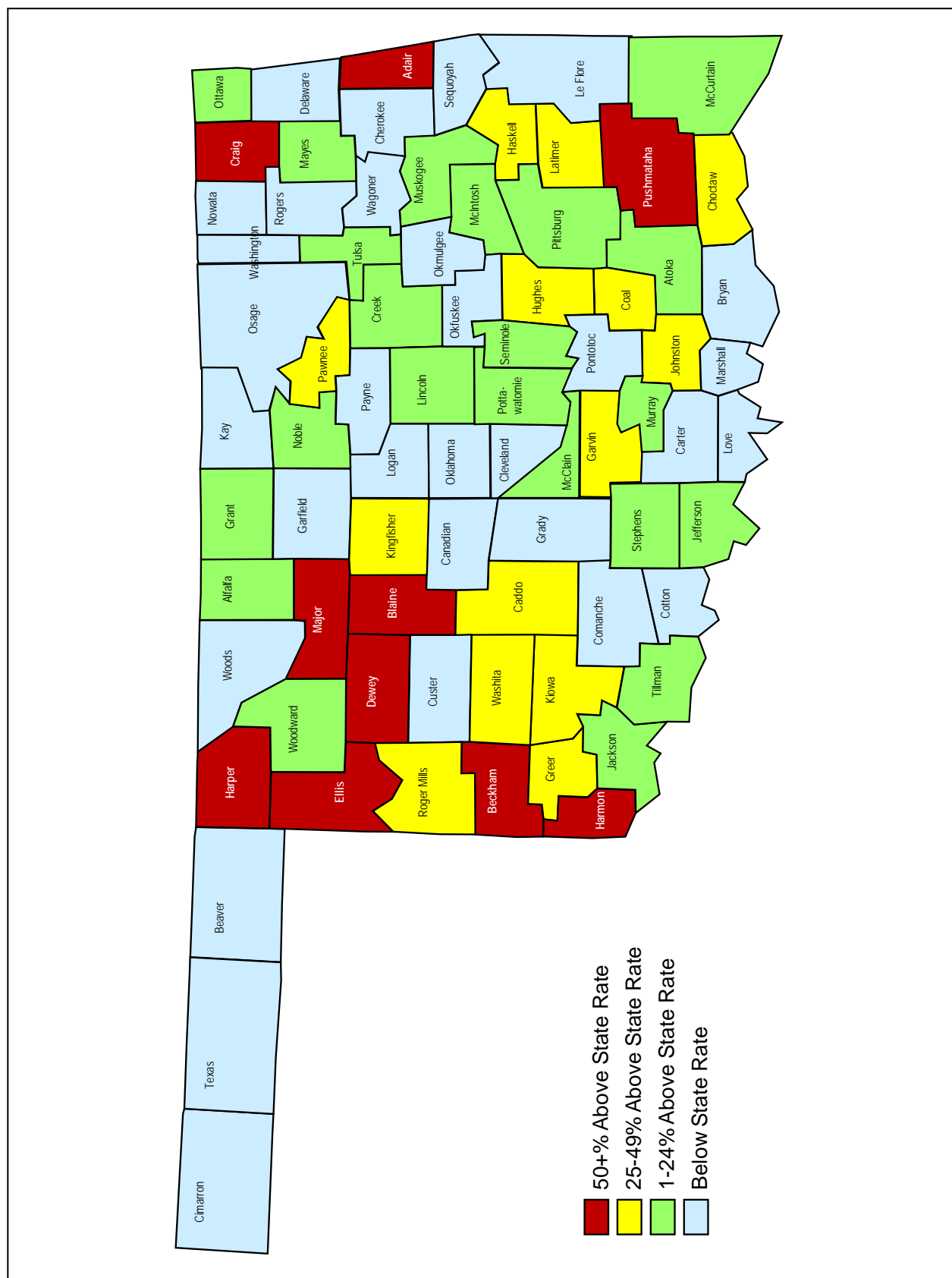


Table 1. Traumatic Brain Injury Rates* by County of Residence, Oklahoma, 2004-2009**

County	2004-2009 Population	Number of Cases	Annual Rate	County	2004-2009 Population	Number of Cases	Annual Rate
Adair	130,480	272	208.5	Le Flore	296,016	247	83.4
Alfalfa	33,605	43	128.0	Lincoln	192,738	290	150.5
Atoka	86,410	113	130.8	Logan	221,178	254	114.8
Beaver	32,005	24	75.0	Love	54,302	49	90.2
Beckham	119,506	249	208.4	Major	43,132	98	227.2
Blaine	75,827	154	203.1	Marshall	87,703	99	112.9
Bryan	234,701	276	117.6	Mayes	237,171	326	137.5
Caddo	177,430	285	160.6	McClain	187,412	277	147.8
Canadian	612,440	730	119.2	McCurtain	200,731	302	150.5
Carter	283,545	351	123.8	McIntosh	117,393	161	137.1
Cherokee	270,334	310	114.7	Murray	76,144	111	145.8
Choctaw	90,105	158	175.4	Muskogee	423,392	597	141.0
Cimarron	16,056	12	74.7	Noble	66,235	103	155.5
Cleveland	1,401,650	1,364	97.3	Nowata	63,827	77	120.6
Coal	34,321	56	163.2	Okfuskee	67,107	84	125.2
Comanche	677,769	731	107.9	Oklahoma	4,181,134	5,146	123.1
Cotton	38,151	43	112.7	Okmulgee	235,697	298	126.4
Craig	90,211	180	199.5	Osage	270,181	324	119.9
Creek	413,006	567	137.3	Ottawa	193,127	276	142.9
Custer	155,398	185	119.0	Pawnee	98,673	180	182.4
Delaware	239,179	202	84.5	Payne	468,715	544	116.1
Dewey	26,467	59	222.9	Pittsburg	266,208	366	137.5
Ellis	23,186	51	220.0	Pontotoc	217,175	272	125.2
Garfield	345,669	435	125.8	Pottawatomie	412,182	523	126.9
Garvin	161,921	287	177.2	Pushmataha	69,651	155	222.5
Grady	300,098	308	102.6	Roger Mills	19,764	35	177.1
Grant	27,112	41	151.2	Rogers	493,016	559	113.4
Greer	34,798	61	175.3	Seminole	144,839	202	139.5
Harmon	17,320	54	311.8	Sequoyah	244,493	169	69.1
Harper	20,039	41	204.6	Stephens	257,727	338	131.1
Haskell	72,726	116	159.5	Texas	122,174	54	44.2
Hughes	82,184	131	159.4	Tillman	49,036	73	148.9
Jackson	156,337	240	153.5	Tulsa	3,494,791	4,645	132.9
Jefferson	37,859	52	137.4	Wagoner	396,825	396	99.8
Johnston	62,221	99	159.1	Washington	297,853	372	124.9
Kay	276,380	271	98.1	Washita	69,097	119	172.2
Kingfisher	85,069	138	162.2	Woods	50,764	51	100.5
Kiowa	56,701	95	167.5	Woodward	115,868	158	136.4
Latimer	63,126	103	163.2	State	21,564,813	27,306	126.6

*Rates are calculated per 100,000 population.

**County of residence was unknown for 89 persons.

Table 2. Traumatic Brain Injury Rates* and Proportions by Age Group, Race, Hispanic Ethnicity, Intent, Gender, and Year of Discharge/Death, Oklahoma, 2004-2009

	2004		2005		2006		2007		2008		2009	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total	154.4	95.3	156.7	92.3	157.4	100.0	155.3	95.1	156.3	99.9	154.2	104.6
Age Group												
0-4	118.4	88.1	118.4	72.0	114.8	94.3	109.0	66.8	100.8	70.0	82.8	59.4
5-14	79.8	49.4	59.7	42.1	64.3	36.4	57.5	38.3	48.9	32.8	54.5	36.1
15-24	212.8	75.9	188.4	76.7	196.1	89.4	181.3	72.0	168.7	64.7	157.2	65.4
25-34	138.4	56.1	148.6	46.5	143.6	50.3	134.2	50.2	152.5	48.1	133.5	52.5
35-44	130.0	49.7	142.0	56.8	135.3	57.0	128.1	50.7	135.9	51.3	143.8	50.3
45-54	141.7	60.6	138.8	61.3	158.0	63.1	152.2	56.8	154.4	62.7	164.1	72.8
55-64	125.3	65.8	147.4	71.0	143.1	75.7	144.9	75.9	149.9	90.8	157.9	85.1
65-74	177.1	133.6	205.8	129.6	198.7	144.0	232.6	149.3	214.9	142.6	207.1	165.1
75-84	348.7	351.5	402.4	318.4	379.4	362.3	429.7	372.5	420.6	383.7	445.7	432.6
85+	680.7	587.9	676.1	599.4	651.9	620.1	654.6	608.1	808.2	758.9	753.3	744.8
Race												
White	149.0	97.3	150.3	94.5	151.9	102.9	150.7	101.1	153.2	106.8	153.2	113.2
Black	132.2	41.1	145.8	49.2	143.9	63.4	133.9	53.1	145.6	52.4	138.4	49.4
American Indian	132.2	72.7	136.7	76.6	136.2	76.0	128.9	59.0	123.8	60.0	111.7	63.6
Asian	**	**	**	**	75.8	**	67.4	**	73.0	**	64.5	59.8
Ethnicity												
Hispanic	119.6	43.5	103.7	35.8	110.9	51.4	99.2	28.8	92.1	33.7	89.6	43.9
Intent												
Unintentional	74.7%	86.3%	72.8%	85.7%	76.1%	89.3%	76.0%	88.6%	74.1%	91.0%	73.6%	86.9%
Suicide/Attempt	8.2%	2.2%	8.0%	2.4%	8.8%	2.1%	8.3%	2.4%	9.7%	1.8%	9.8%	2.4%
Homicide/Assault	11.6%	5.2%	11.2%	4.8%	11.4%	4.5%	12.1%	4.9%	12.5%	3.9%	10.6%	4.0%
Legal Intervention/ War	0.1%	0.0%	0.1%	0.0%	<0.1%	0.0%	0.1%	0.0%	0.2%	<0.1%	0.2%	0.0%
Undetermined	0.6%	0.5%	0.5%	0.2%	0.5%	0.2%	0.4%	0.5%	0.5%	0.4%	0.5%	0.4%
Unknown/Missing E Code	4.8%	5.8%	7.2%	6.9%	3.1%	3.9%	3.0%	3.7%	3.0%	2.8%	5.3%	6.3%

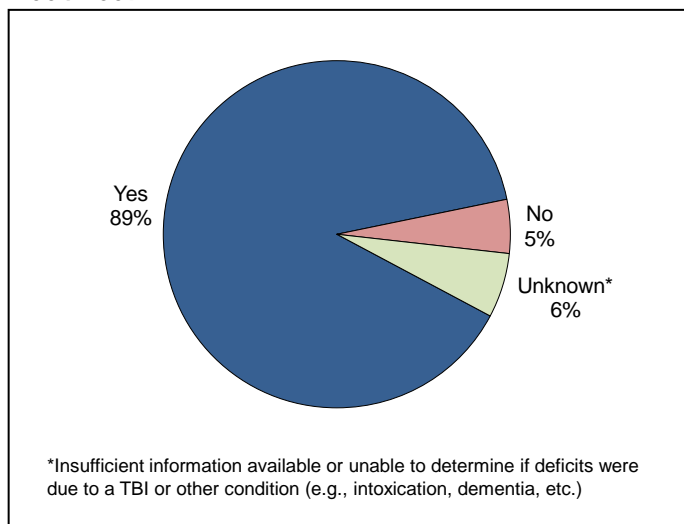
*Rates are calculated per 100,000 population.

**Case count is less than 20; rate not calculated

Section 2: Sampled Hospitalized Traumatic Brain Injuries in Oklahoma, 2004-2009

In order to obtain detailed information on the circumstances and outcomes of traumatic brain injuries (TBI) in Oklahoma, a random sample of cases was selected based on hospital size. The medical records of sampled cases were reviewed by trained abstractors and detailed data were recorded and analyzed. Preadmission deaths and hospitalizations occurring at facilities outside of Oklahoma were not eligible to be selected in the sample. A random sample of 1,200 records was drawn using 2004 discharge data, which resulted in 1,191 successfully abstracted cases. From 2005 data, the random sample consisted of 1,051 records, producing 1,029 successful reviews. The 2006 discharge data produced a random sample of 1,050 records with 1,038 successful reviews. The 2007 discharge data yielded 1,036 successful reviews from a random sample of 1,050 records. From a sample of 1,050 records from 2008, there were 1,037 successful reviews. Finally, the 2009 data had 1,042 successful reviews from a random sample of 1,050 records. The most common reasons that a record could not be reviewed or did not qualify as a successful abstraction included that the medical record was not located by hospital staff, the patient was found not to be an Oklahoma resident, or the record was discovered to be an old injury or a subsequent visit for a previously abstracted injury (e.g., a prevalent case). Since these records were selected randomly stratified by hospital size, the samples are representative of all resident hospitalized TBI cases in Oklahoma.

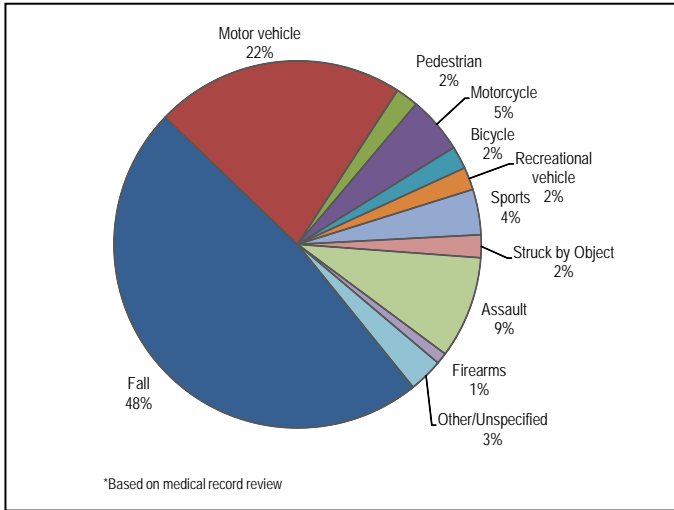
Figure 7. Sampled Hospitalized Traumatic Brain Injuries Meeting the Clinical Case Definition, Oklahoma, 2004-2009



- All sampled injuries met the case inclusion criteria, which are the code-based definitions provided in the Section 1 background.
- The Centers for Disease Control and Prevention has also published a clinical case definition for traumatic brain injuries.
- To meet the clinical case definition, one or more of the following conditions must be documented in the medical record and attributed to the head injury:
 - Decreased level of consciousness
 - Amnesia
 - Skull fracture
 - Intracranial lesion
 - Neurological or neuropsychological abnormality

- The majority of sampled records (89%) met the clinical case definition.
- Subsequent analyses, however, include all cases meeting the code-based inclusion criteria (n = 6,373).

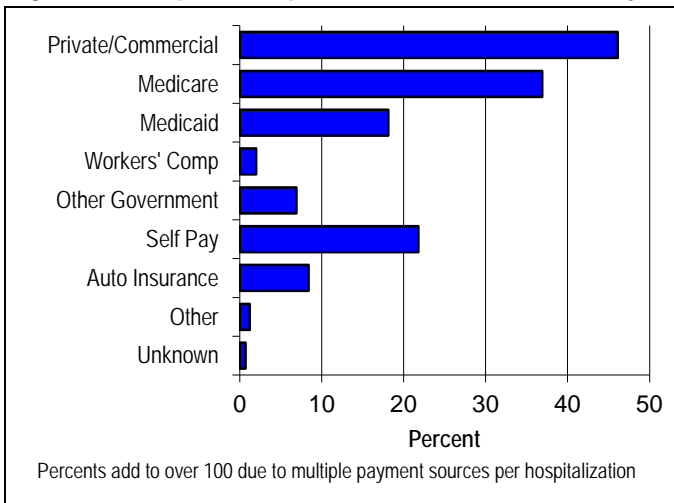
Figure 8. Sampled Hospitalized Traumatic Brain Injuries by Etiology,* Oklahoma, 2004-2009



- Falls and motor vehicle crashes were the primary mechanisms of TBI.
- Of the motor vehicle crash-related injuries, 66% were drivers, 29% were passengers, and the remaining 5% had an unknown seating position. Forty-six percent of injured patients were reported to be using a safety belt or child safety seat.
- The majority of falls (58%) occurred in a home or yard, followed by 16% in a residential institution, such as a nursing home or hospital.
- Of the motorcycle injuries, 20% of patients were reported to be wearing a helmet. Eight percent of patients injured in bicycle-related incidents were reported to be wearing a helmet.

- Forty-seven percent of the sports-related injuries resulted from horseback riding.
- Of the assaults, 7% were the result of intimate partner violence and 6% were shaken babies. Overall, the most common methods of assault were blunt instruments (35%) and fists/kicks (28%).
- The majority of hospitalized TBIs (88%) occurred unintentionally; 9% were caused intentionally by another person; 1% were self-inflicted injuries; and 1% had an unknown intentionality.
- The total number of days in the hospital ranged from 1 to 148; the average stay was 7 days.

Figure 9. Sampled Hospitalized Traumatic Brain Injuries by Payment Source, Oklahoma, 2004-2009



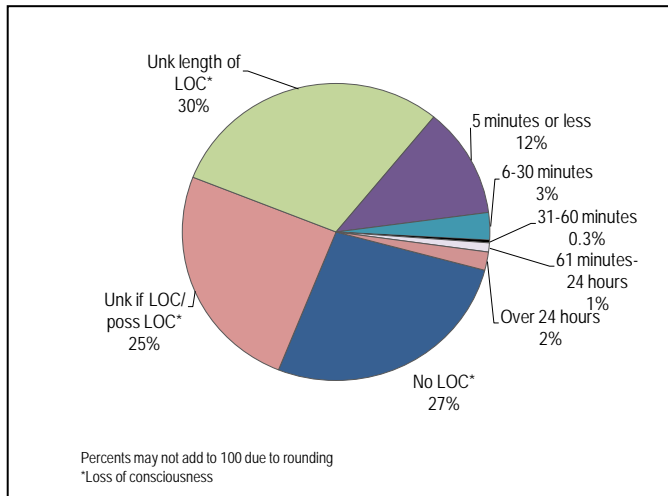
- Nearly one-half of all hospitalizations were paid at least in part by private or commercial insurance.
- Medicare, Medicaid, or other government programs paid at least a part of 60% of the hospitalizations.
- Just over 20% of the hospitalizations were self pay (uninsured).

Table 3. Imaging Characteristics of Sampled Hospitalized Traumatic Brain Injuries, Oklahoma, 2004-2009

Variable	Level	Percentage
CT*/MRI** of head performed	Yes	96%
	No/Unknown	4%
CT*/MRI** results	Abnormal (likely due to TBI)	55%
	Normal	44%
	Unknown	1%
Skull fracture	Diagnosed, with imaging/surgery	19%
	Diagnosed, not confirmed by imaging	1%
	No/Unknown	81%
Intracranial lesion	Lesion documented by imaging/surgery	48%
	No lesion found on imaging	47%
	No imaging/Unknown	5%
*Computed tomography scan		
**Magnetic resonance imaging		
Percents may not add to 100 due to rounding.		

- Nearly all of the sampled TBI cases had a CT scan or MRI of the head performed; 55% had documented abnormalities likely due to the TBI.
- Nearly one-fifth of the sample suffered a skull fracture and 48% had an intracranial lesion.

Figure 10. Sampled Hospitalized Traumatic Brain Injuries by Length of Time of Unconsciousness, Oklahoma, 2004-2009



- Nearly one-half of the patients were documented to have lost consciousness for some length of time as a result of their injury, and another one-fourth had possible, questionable, or unknown unconsciousness.
- Just under 30% had no reported loss of consciousness.
- One-fourth of persons with a TBI experienced some form of amnesia and did not remember events preceding, during and/or after their injury.

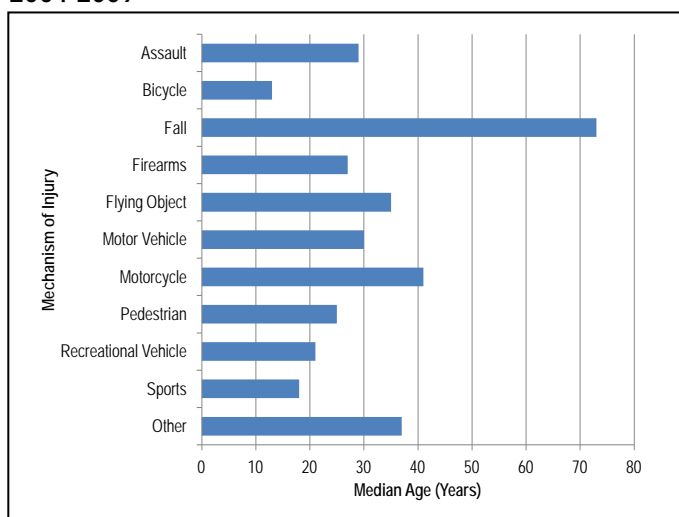
Table 4. Sampled Hospitalized Traumatic Brain Injuries by Etiology and Glasgow Coma Scale Score, Oklahoma, 2004-2009

Etiology	Glasgow Coma Scale (GCS)				
	≤8 Coma	9-12 Moderate Impairment	13-14 Minimal Impairment	15 No Impairment	Invalid or Unknown
Fall	5%	6%	16%	38%	35%
Motor Vehicle	15%	10%	25%	35%	16%
Assault	8%	8%	16%	31%	37%
Motorcycle	19%	10%	27%	31%	11%
Sports	5%	8%	23%	38%	26%
Recreational Vehicle	12%	7%	24%	39%	22%
Bicycle	11%	9%	12%	43%	25%
Flying Object	5%	1%	25%	50%	19%
Pedestrian	21%	8%	26%	33%	11%
Firearms	45%	4%	4%	28%	20%
Other	13%	7%	12%	29%	40%
TOTAL	10%	7%	19%	36%	28%

Percents may not add to 100 due to rounding.

- Lower Glasgow Coma Scale (GCS) scores indicate a lower level of consciousness. Scores are based on three elements: best eye response, best verbal response, and best motor response. Scores are invalid or not applicable in situations where each component cannot be accurately assessed (e.g., the patient is intubated, sedated, intoxicated, not fully resuscitated, mentally impaired, etc.).
- The lowest valid score assigned prior to or immediately upon hospital admission was abstracted and included in this analysis.
- Motorcycle, motor vehicle, pedestrian, and firearm injuries had the lowest proportions of invalid or unknown scores and also had the largest proportions of coma or severely impaired levels of consciousness.

Figure 11. Sampled Hospitalized Traumatic Brain Injuries by Etiology and Median Age, Oklahoma, 2004-2009



- The median age of all injuries combined was 50 years; all mechanisms of injury were below this overall median, except for falls.
- Bicycle and sports-related injuries occurred more often in younger ages (median ages 13 and 18 years, respectively).
- Falls were more likely to occur in the older population (median age 73 years).

Table 5. Sampled Hospitalized Traumatic Brain Injuries by Etiology and Drug and Alcohol Use, Oklahoma, 2004-2009

Etiology	Definite/Likely Alcohol Use Prior to Injury	Definite/Likely Drug Use Prior to Injury
Fall	7%	4%
Motor Vehicle	22%	14%
Assault	45%	27%
Motorcycle	32%	14%
Sports	5%	4%
Recreational Vehicle	19%	7%
Bicycle	7%	7%
Flying Object	1%	4%
Pedestrian	21%	11%
Firearms	31%	23%
Other	14%	17%
TOTAL	16%	10%

- There was a higher proportion of alcohol use among those injured in assaults, motorcycle crashes, and firearm incidents, while alcohol use was less prevalent in bicycle, sports, and fall-related injuries.
- Of those with a positive blood alcohol concentration, 84% tested above the legal limit of 0.08 g/dL; positive results ranged from 0.01 to 0.53 g/dL.
- Over one-fourth of all assaults and firearm-related injuries involved definite or likely illicit drug use prior to the injury.
- Motorcycle and motor vehicle crashes were the third highest mechanism of injury to involve drug use.

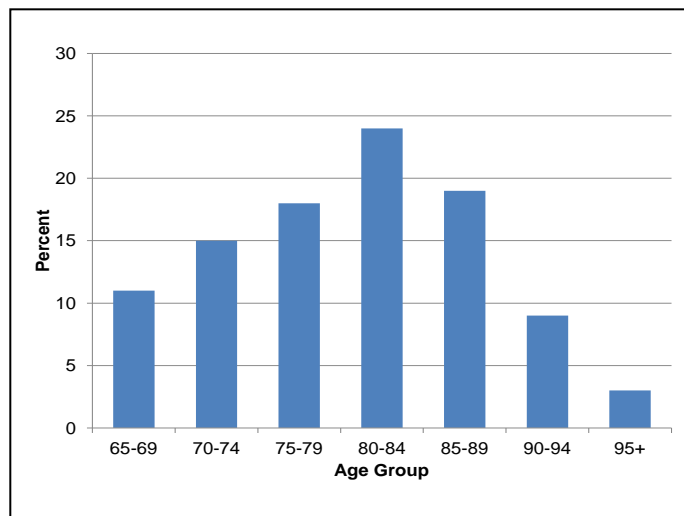
Table 6. Characteristics of Sampled Hospitalized Traumatic Brain Injuries by Gender, Oklahoma, 2004-2009

	Male	Female
Number of records sampled	3714	2659
Percent of total sampled	58.3%	41.7%
Median age (years)	41	64
Mean age (years)	43	57
Age range (years)	<1-99	<1-103
Percent by age group (years)		
0-4	6%	5%
5-14	7%	4%
15-24	19%	9%
25-34	12%	6%
35-44	10%	7%
45-54	12%	9%
55-64	10%	9%
65-74	9%	12%
75-84	10%	22%
85+	6%	16%
Percent by etiology		
Fall	38%	62%
Motor vehicle	22%	22%
Assault	13%	4%
Motorcycle	7%	2%
Sports	4%	3%
Recreational vehicle	3%	1%
Bicycle	3%	1%
Flying Object	3%	1%
Pedestrian	3%	1%
Firearms	2%	1%
Other	3%	2%
Percent by intent		
Unintentional	84%	94%
Self-inflicted	1%	1%
Intentional by other	13%	4%
Unknown	1%	1%
Percent definitely/likely using alcohol or drugs prior to injury		
Alcohol	22%	7%
Illicit drugs	12%	6%
Percent of injuries work-related	6%	2%
Percent with a skull fracture	24%	13%
Percent with an intracranial lesion	50%	43%
Percent with amnesia	26%	24%
Percent by Glasgow Coma Scale score		
<= 8 (coma)	11%	8%
9-12 (moderate)	8%	6%
13-14 (minimal)	19%	19%
15 (no impairment)	34%	39%
Invalid/unknown	28%	28%
Median days in the hospital (acute care)	4	4
Mean days in the hospital (acute care)	7	6
Range of days in the hospital (acute care)	1-148	1-84

Section 3: Profile of Sampled Hospitalized Traumatic Brain Injuries Resulting from Falls among Persons 65 Years of Age and Older in Oklahoma, 2005-2009

Falls among the older population, both nationally and in Oklahoma, are a growing public health problem. As the country's older adult population grows in number, the problem will likely continue to worsen. Of the 22,920 TBIs in Oklahoma in 2005-2009, 7,679 (34%) occurred in persons 65 years of age or older. Seventy-five percent of these injuries were falls. In order to obtain more detailed information surrounding these incidents, supplemental data were abstracted from all 2005 through 2009 sampled records that involved a patient 65 years of age or older who was injured in a fall. Of the 1,029 successfully abstracted records from 2005, 290 (28%) met this fall criteria. Of the 1,038 successfully reviewed records from 2006, 280 (27%) met the criteria. In 2007, the criteria were met by 327 of the 1,036 successfully abstracted records (32%). In 2008, the 1,037 successful reviews yielded 364 fall-related records (35%). Finally, of the 1,042 successfully abstracted 2009 records, 366 (35%) were fall-related.

Figure 12. Sampled Hospitalized Fall-Related Traumatic Brain Injuries by Age Group, 65 Years and Older, Oklahoma, 2005-2009



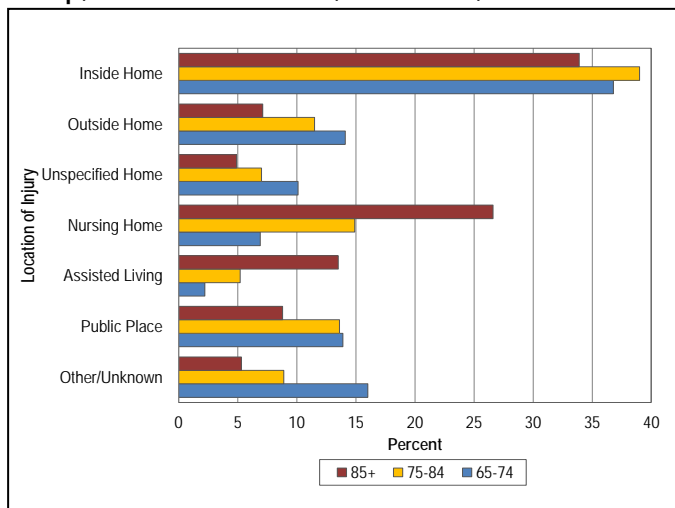
- The majority of fall-related injuries occurred among persons between the ages of 75 and 89 years.
- Sixty percent of patients were female.
- The median age of males was 79 years and the median for females was 82 years.
- Eighty-five percent of patients had one or more of the following conditions documented in the record: skull fracture, intracranial lesion, amnesia, decreased level of consciousness, or neurological/neuropsychological abnormalities.
- Over fifty percent of patients had abnormal imaging results that were likely due to the TBI; 5% were diagnosed with a skull fracture, while 51% had an intracranial lesion.

Table 7. Sampled Hospitalized Fall-Related Traumatic Brain Injuries by Health History, 65 Years and Older, Oklahoma, 2005-2009

Health Condition	Percent of Patients with a Documented History of the Condition		
	Male	Female	Total
Alzheimer's disease/dementia	23%	33%	29%
Arthritis	27%	39%	34%
Atrial fibrillation/pacemaker	30%	21%	25%
Cerebrovascular accident/stroke	21%	23%	22%
Depression/bipolar disorder	15%	24%	20%
Diabetes	32%	25%	28%
Hypertension	67%	78%	73%
Osteoporosis	2%	19%	12%
Parkinson's disease	4%	4%	4%
Recent acute illness	20%	26%	24%
Vision problems	24%	27%	26%

- Four percent of the sampled records had no documentation of any of the listed health conditions; 96% had a history of one or more.
- Taking multiple medications has been shown to increase one's risk of falling. Eighty percent of patients were on four or more prescription medications at the time of the fall.
- The use of anticoagulant and antiplatelet medications may put TBI patients at increased risk of hemorrhagic complications. Over one-half (57%) of the sampled patients were on anticoagulant therapy at the time of the fall. Twenty-four percent were on aspirin only; 19% were on a prescription medication; and 14% were on both aspirin and a prescription medication.
- Forty percent of patients had a documented history of one or more falls, which may or may not have required medical treatment.

Figure 13. Sampled Hospitalized Fall-Related Traumatic Brain Injuries by Location of Injury and Age Group, 65 Years and Older, Oklahoma, 2005-2009



- Most patients (74%) resided in a private home prior to hospital admission; 17% lived in a nursing home and 8% at an assisted living facility.
- More injuries occurred at home than any other location. The most common areas where injuries occurred inside the home were the bedroom, bathroom, and kitchen.
- Males were more likely to be injured outside their home than females (17% and 7%, respectively), while females were more likely to be injured in a nursing home than males (20% and 11%, respectively).
- Of those injured in a public area, the most common sites were hospitals (22%), parking lots (22%), retail stores (14%), and streets (9%).
- Of those injuries with a known time of occurrence, two-thirds occurred during the morning and afternoon hours; falls were least likely during the overnight hours (12%, midnight-5:59 a.m.).

Table 8. Sampled Hospitalized Fall-Related Traumatic Brain Injuries by Body Position at the Time of the Fall and Gender, 65 Years and Older, Oklahoma, 2005-2009

Body Position/ Mechanics	Male	Female	Total
Lying down	3%	3%	3%
Sitting	6%	5%	6%
Standing	16%	12%	14%
Walking	24%	30%	28%
Running	0.3%	0.1%	0.2%
Climbing	2%	1%	1%
Transitioning from lying down/sitting to standing	7%	8%	7%
Transitioning from standing to lying down/sitting	1%	1%	1%
Other/Unknown	40%	39%	40%

Percents may not add to 100 due to rounding.

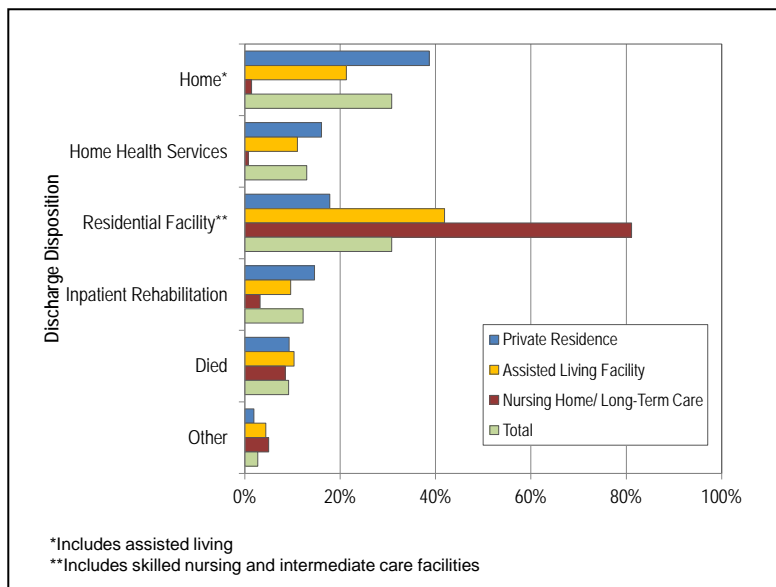
- Forty-two percent of falls occurred while the patient was standing or walking. Slipping, tripping, and experiencing a syncopal episode were the factors most commonly associated with all falls.
- Thirty-one percent of falls were known to involve a loss of consciousness; of these cases, 33% had a time of unconsciousness of 5 minutes or less.
- Over one-third of all falls were known to involve some type of object and 5% had documented involvement of more than one object. The most common objects included beds, chairs, walkers, and wheelchairs.

Table 9. Characteristics of Sampled Hospitalized Fall-Related Traumatic Brain Injuries by History of Falls, 65 Years and Older, Oklahoma, 2005-2009

	History of Falls	No or Unknown History of Falls
Median age	81 years	80 years
Assisted living/nursing home residence prior to admission	30%	23%
GCS* ≤8	4%	6%
Acute intracranial lesion diagnosed***	55%	52%
Skull fracture diagnosed	4%	6%
Documented loss of consciousness	27%	34%
Amnesia occurred	20%	21%
Discharged home	24%	35%
Died in the hospital	8%	10%
*Initial lowest Glasgow Coma Scale score (≤8 indicates coma)		
** Of those with a CT scan or MRI of the head (96%)		

- Persons with a history of falls (with or without medical treatment) were slightly older and more likely to have resided in an assisted living facility or a nursing home than those with no fall history.
- Those with a history of falls were less likely to be discharged home than those without such a history.

Figure 14. Sampled Hospitalized Fall-Related Traumatic Brain Injuries by Patient’s Residence at the Time of Admission and Disposition of the Patient at the Time of Acute Care Discharge, 65 Years and Older, Oklahoma, 2005-2009



- The majority of nursing home residents returned to a residential facility upon discharge, while less than one-half of patients who had been living at home were able to return there independently.
- Nursing home residents were least likely to be discharged to an inpatient rehabilitation facility.
- Overall, and regardless of prior residence, about 10% of the sample died while in the hospital.