



Injury Prevention Service

Oklahoma State
Department of Health

Burn and Smoke Inhalation Injuries, Oklahoma, 2005-2009

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Background

Hospitalized and fatal burn and smoke inhalation injuries were made reportable conditions in Oklahoma in November 1986. In September 1987, the Injury Prevention Service (IPS) began collecting burn and smoke inhalation injury data from burn centers and the Office of the Chief Medical Examiner. This report focuses on the most recent five years of available hospital and death data, 2005-2009. Because this report includes only very serious burn and smoke inhalation injuries (burn center admits and deaths), it does not accurately estimate the full burden of these injuries in Oklahoma. Several hundred additional Oklahomans are likely hospitalized in Oklahoma each year in non-burn center acute care hospitals, and many more are treated and released by emergency departments, emergency medical services, or a doctor's office.

Fire/burn-related injuries were the fifth leading cause of unintentional injury death in Oklahoma from 2005-2009 for all ages and the third leading cause of unintentional injury death for children age 1-14. The IPS receives Medical Examiner reports daily for all non-natural deaths in Oklahoma, which include deaths from homicide, suicide, unintentional injury, and undetermined manner. Each report is reviewed, including the narrative of how the injury occurred. If there is mention of a burn or smoke inhalation injury, data are abstracted from the report by an epidemiologist.

The Oklahoma Hospital Discharge Database includes all discharges during the calendar year from state licensed, acute care, non-federal facilities. From this database, discharges with a primary or secondary ICD-9-CM code(s) of 940.0-949.5 or 987.9 were selected. Medical records were requested and reviewed at the three burn centers in the state. If the cause of injury involved smoke inhalation or a burn, detailed information was abstracted from the record. Cases were excluded if miscoded (no burn occurred), the patient was only admitted for skin grafts or debridement, or the patient was not actually admitted to the burn center. Hospitalized and fatal burn or smoke inhalation cases were included if the patient/decedent was an Oklahoma resident, regardless of where the injury occurred.

Table 1. Case Fatality Rates of Burn-Related Injuries by Agent, Oklahoma, 2005-2009

- More than 2,000 Oklahomans were hospitalized in a burn center or died from a burn or smoke inhalation injury from 2005-2009.
- Flame/fire injuries accounted for 71% of burn and smoke inhalation injuries.
- Residential flame/fire injuries accounted for 23% of injuries, but 55% of deaths, and had a much higher case fatality rate than any other type of burn or smoke inhalation injury.

	Total Burns	Percent	Number of Deaths	Percent	CFR*
House fire	475	23%	367	55%	77%
Other flame/fire	978	48%	237	36%	24%
Hot water	125	6%	6	1%	5%
Other hot liquid	198	10%	4	<1%	2%
Hot solid	105	5%	7	1%	7%
Electricity	87	4%	38	6%	44%
Chemical	49	2%	2	<1%	4%
Other/Unknown	35	2%	2	<1%	6%
Total	2,052	100%	663	100%	32%

*Case fatality rate

Figure 1. Burn-related Injury Rates by Age Group* and Gender, Oklahoma, 2005-2009

- Males were 2.5 times more likely to sustain a burn or smoke inhalation injury compared to females (16.3 and 6.6 per 100,000 population, respectively).
- The age range for persons who suffered a burn or smoke inhalation injury was 0 to 98, with a mean age of 38.
- Males age 85 and older had the highest injury rate overall (23.4 per 100,000).
- For females, the highest injury rate was for children age 0-4 (13.2 per 100,000), followed by adults age 75 and older (9.9 per 100,000).

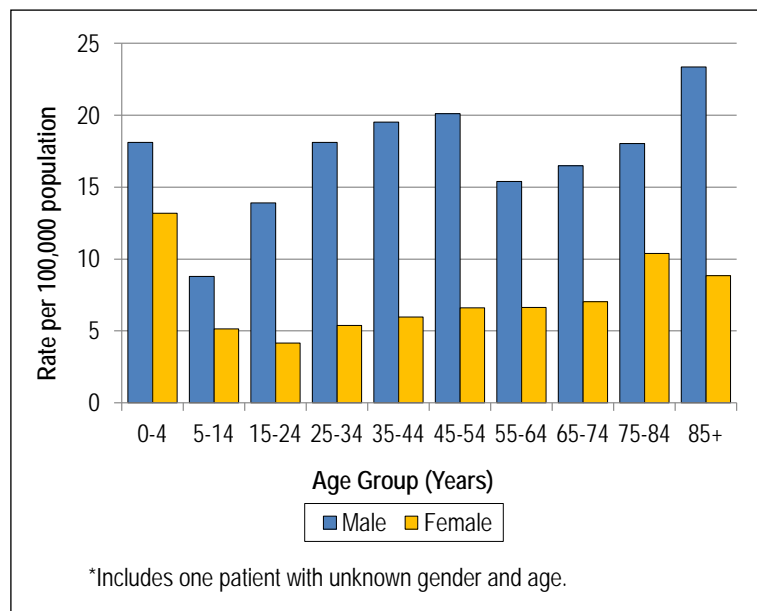


Figure 2. Burn-related Injury Rates by Race* and Gender, Oklahoma, 2005-2009

- The highest rate of injury was seen among African Americans (14.5 per 100,000), followed by whites (11.3), Native Americans (9.2), and Asians (4.7).
- Overall, African American males had the highest rate of injury (18.6), followed by white males (16.2), and Native American males (14.0).
- Native American males had an injury rate three times that of Native American females. All male racial groups had higher rates than their female counterparts.
- Hispanic males had an injury rate twice that of Hispanic females (10.5 and 5.0 per 100,000, respectively; data not shown).

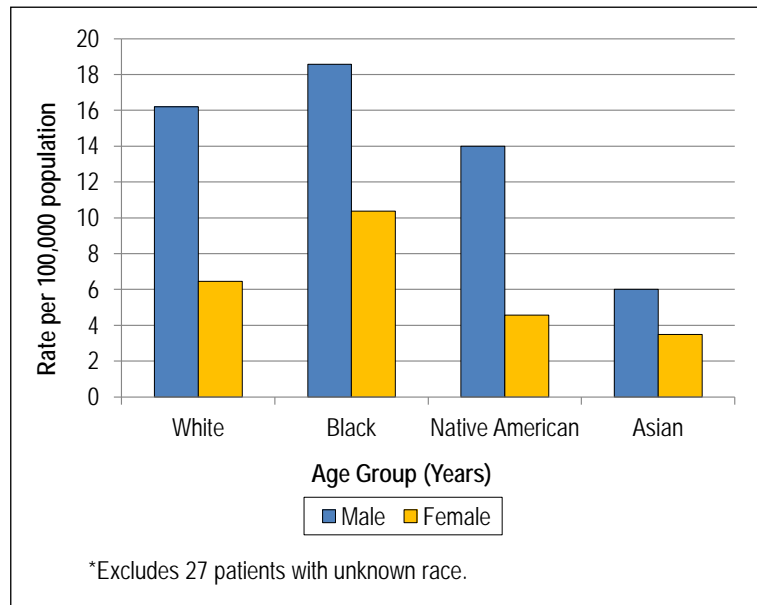


Figure 3. Burn-related Injury Rates by Race* and Age Group, Oklahoma, 2005-2009

- Overall, African Americans age 0-4 and 75 and older had the highest burn-related injury rates (29.4 and 29.7, respectively).
- The injury rate for African American children age 0-4 was twice that of white children of the same age and more than three times that of Native American children.
- African American older adults had an injury rate twice that of whites and nearly three times that of Native Americans.
- In the 15-24 age group, whites had an injury rate nearly twice that of Native Americans and 50% higher than African Americans.

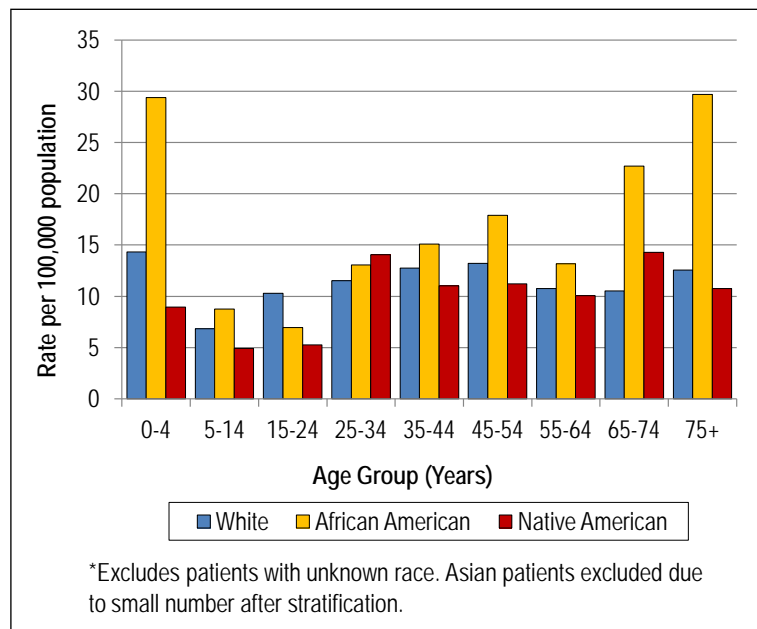


Table 2. Burn-related Injuries by Alcohol or Drug Use* and Agent, Oklahoma, 2005-2009

- Alcohol and/or drug use was highest among those injured in residential fires.
- Sixty-five percent of all persons using alcohol or drugs at the time of injury were 25-44 years of age.
- Thirty percent of all persons age 15-54 were using drugs or alcohol at the time of injury.

Agent	Alcohol/ Drug Use	Total Burns	Percent
House fire	156	475	33%
Other flame/fire	225	978	23%
Hot water	2	125	<1%
Other hot liquid	15	198	8%
Hot solid	7	105	7%
Electricity	9	87	10%
Chemical	4	49	8%
Other/Unknown	6	35	17%
Total	424	2,052	21%

*Includes persons age 15 and older.

Figure 4. Burn Center Hospitalizations by Discharge Status, Oklahoma, 2005-2009

- Eleven percent of burn center admits died in the hospital.
- Three-fourths of patients were discharged to their home/foster care/DHS after being hospitalized.
- Eleven percent of patients were transferred to an inpatient rehab; home health care or hospice; or a residential facility such as a skilled nursing facility or intermediate care facility (nursing home) upon discharge.

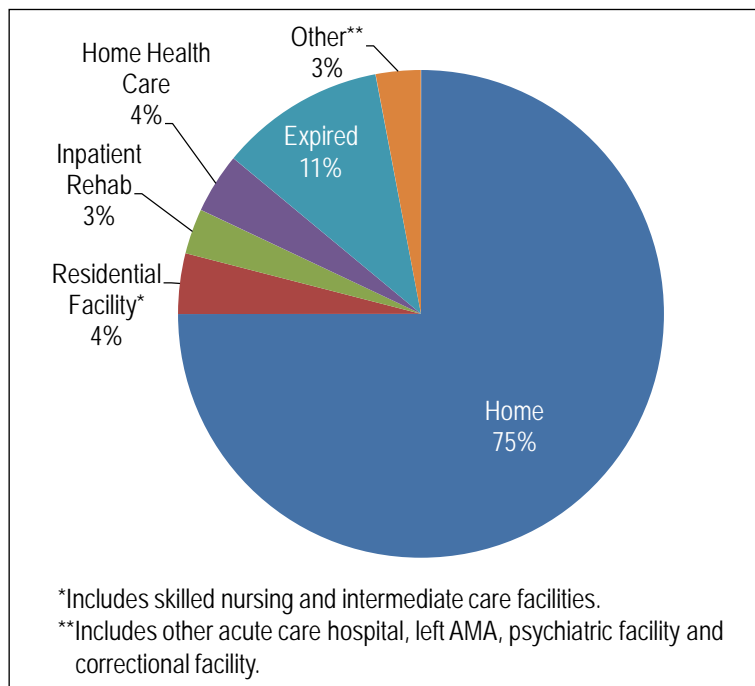


Table 3. Median Length of Stay (LOS) and Median Percentage Total Body Surface Area (TBSA) Burned by Agent, Oklahoma, 2005-2009

Agent	Median LOS (days)	Median TBSA
House fire	9	13.5%
Other flame/fire	8	10%
Hot water	7	6%
Other hot liquid	5	7%
Hot solid	6	3.25%
Electricity	8	4.25%
Chemical	5	4%
Other/Unknown	7	7%
Total	7	8%

- House fire-related injuries had the longest median LOS and the highest percentage TBSA burned.
- Other hot liquid burns and chemical burns had the shortest median LOS, while hot solid burns had the lowest percentage TBSA burned.
- Adults age 75-84 had the longest median LOS for any age group (11 days). Adults age 25-34 had the highest median percentage TBSA burned (10%).
- Females had a slightly longer median LOS compared to males (8 and 7 days, respectively). Males had a slightly higher percentage TBSA burned (8.5% and 8%, respectively).
- Asian patients had the highest percentage TBSA burned (10.5%) and Native American patients had the longest median LOS (9 days).

Figure 5. Leading Causes of Flame/Fire-related Burns (Excluding House Fires), Oklahoma, 2005-2009

- Flammable substances accounted for approximately one-half of all flame/fire-related burns (excluding house fires).
- Gasoline accounted for 55% of burns in the flammable substances category.
- Natural gas, diesel, propane, and butane accounted for 15% of the flammable substances category.
- The "Other" category included arson, electricity, and other injuries such as falling into a fire, candle-related fires, vehicle fires [not motor vehicle crashes (MVC)], etc.

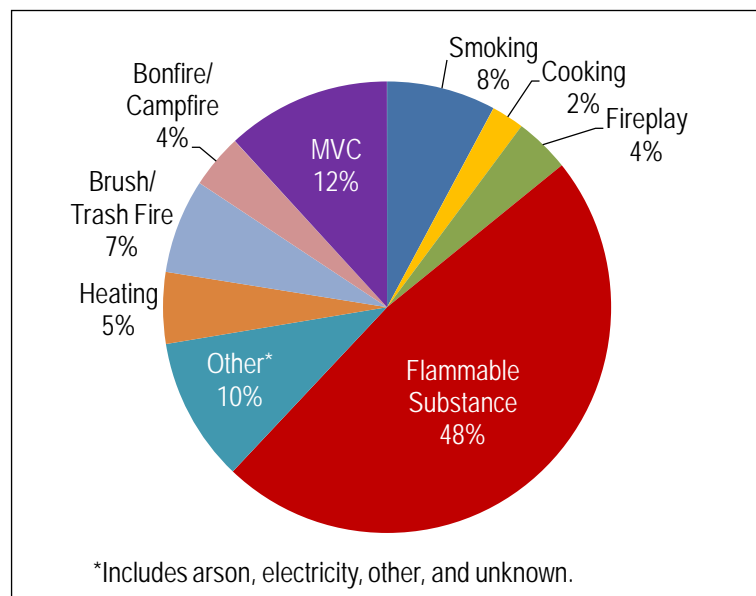


Figure 6. Leading Causes of House Fire-related Flame/Fire Burns, Oklahoma, 2005-2009

- Unlike non-house fire-related flame/fire injuries, flammable substances accounted for only 10% of house fire-related burn and smoke inhalation injuries.
- The leading causes of house fire-related injuries were smoking, heating devices, electricity, and flammable substances.
- Four percent of injuries were due to known or suspected methamphetamine labs.
- “Other” category injuries included fires and explosions of undetermined cause. It also included fireplay injuries due to the small number.

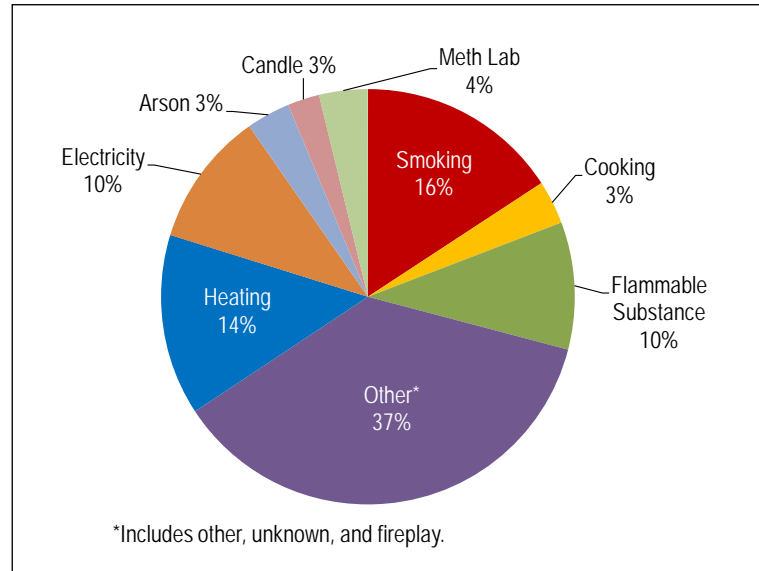


Figure 7. Flame/Fire-related Burn Injury Rates by Year of Injury and Outcome, Oklahoma, 2005-2009

- The overall rate of house fire injuries decreased 16% from 2005-2009.
- The rate of non-fatal house fire injuries decreased 39%, but the rate of fatal house fire injuries decreased only 8% from 2005-2009.
- Non-fatal other flame/fire-related injuries increased 15% during the same time period.
- Males had higher rates of non-fatal and fatal injury every year.

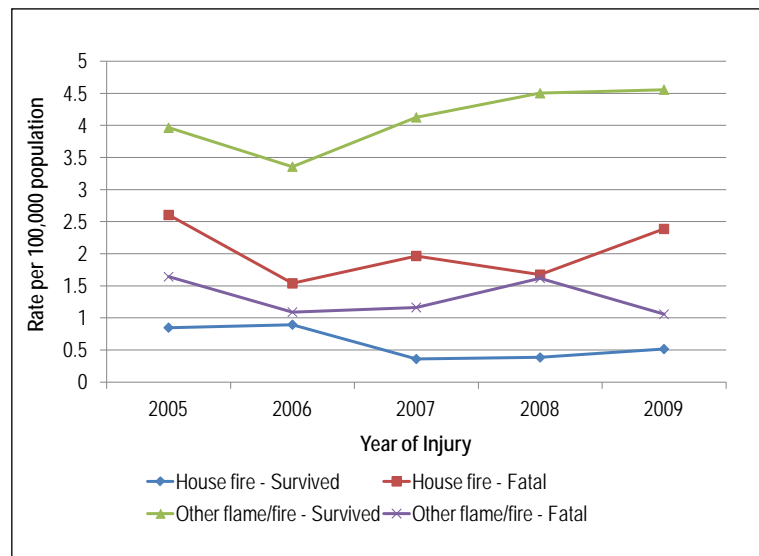


Figure 8. Scald Injury Rates by Type of Liquid, Oklahoma, 2005-2009

- Nearly three-fourths of scald injuries were caused by food, drinks, or cooking.
- The “food” category includes broth, hot noodles, and soup.
- The “drinks” category includes hot tea, hot coffee, and hot chocolate.
- Almost all hot tap water burns were while bathing or when a small child turned on a hot water faucet.
- Half of all hot water burns (heated or tap) were to children under age 5.
- Forty-nine percent of all scald injuries to adults age 18-44 were work related, and nearly 60% of those workers were in the restaurant/service, oil and gas, or construction industries.

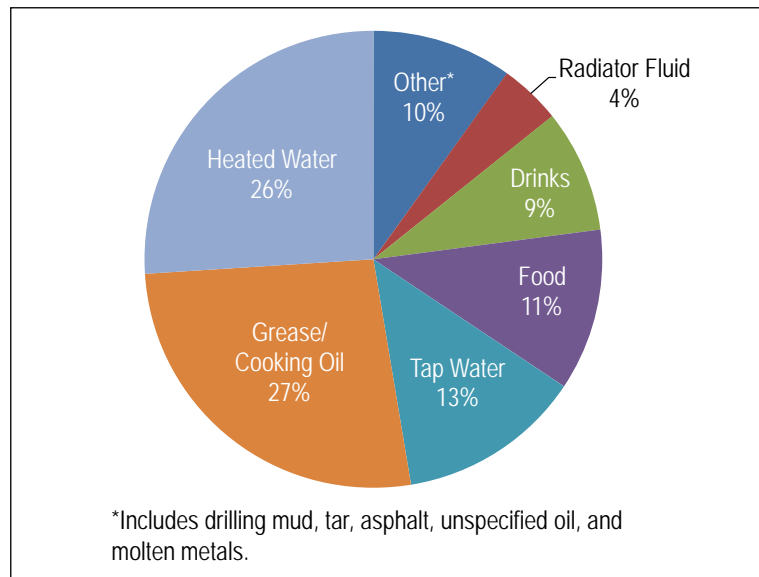


Figure 9. Hot Solid Burns by Type of Solid, Oklahoma, 2005-2009

- Nearly one-fifth of hot solid burns involved contact with food (beans, pasta, oatmeal, etc).
- Thirty percent of hot solid burns were to children age 5 and under and most commonly involved food, ashes/coins, and irons.
- Eighty-six percent of patients with hot solid burns had burns on less than 10% of their body.

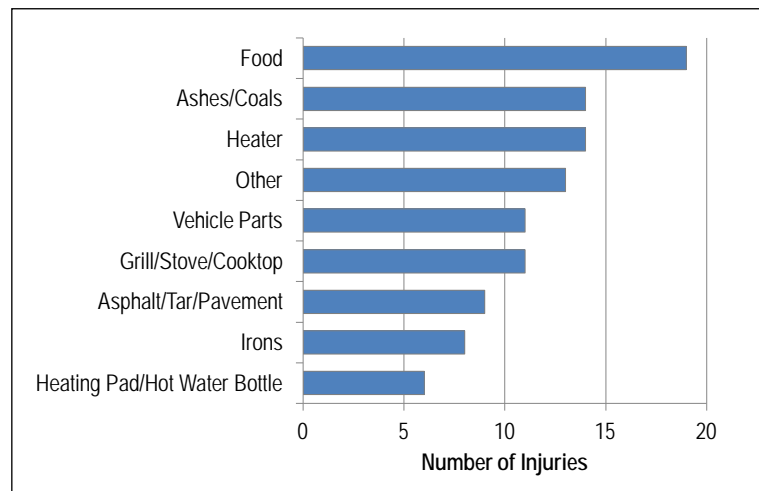


Figure 10. Burn and Smoke Inhalation Injury Rates* by County of Residence**, Oklahoma, 2005-2009

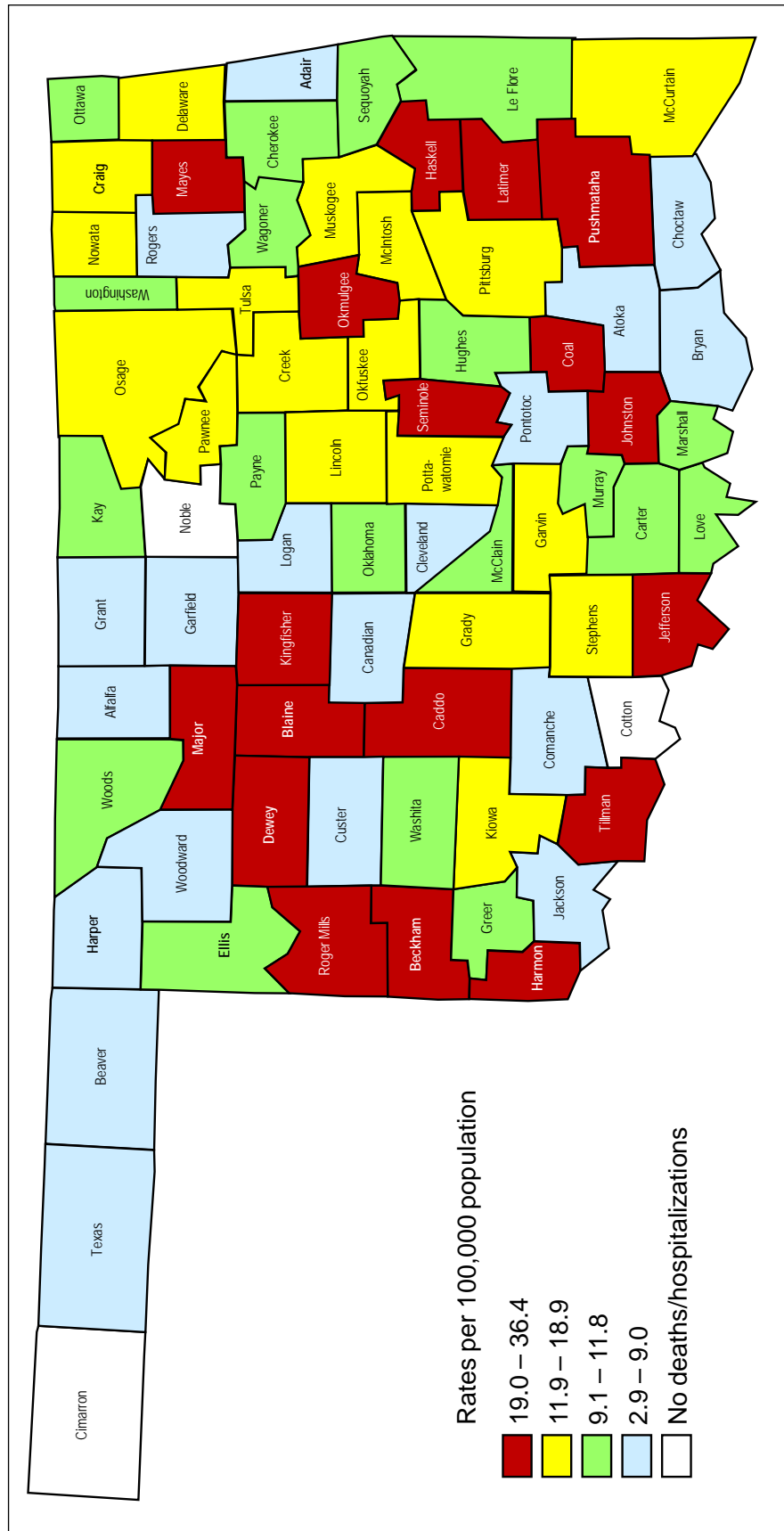


Table 5. Burn and Smoke Inhalation Injury Rates* by County of Residence**, Oklahoma, 2005-2009

County	2005-2009 Population	Number of Cases	Annual Rate
Dewey	21,955	8	36.4
Roger Mills	16,552	6	36.2
Coal	28,485	10	35.1
Tillman	40,449	12	29.7
Latimer	52,611	15	28.5
Harmon	14,381	4	27.8
Major	35,876	9	25.1
Pushmataha	58,092	13	22.4
Jefferson	31,442	7	22.3
Okmulgee	196,149	43	21.9
Beckham	101,342	22	21.7
Seminole	120,659	25	20.7
Blaine	63,125	13	20.6
Haskell	60,771	12	19.7
Kingfisher	71,095	14	19.7
Johnston	51,978	10	19.2
Mayes	198,328	38	19.2
Caddo	147,527	28	19.0
Craig	75,396	14	18.6
Creek	344,868	64	18.6
Garvin	135,134	25	18.5
Lincoln	160,676	29	18.0
Stephens	215,281	37	17.2
McIntosh	97,953	16	16.3
Pittsburg	222,569	36	16.2
Osage	225,408	36	16.0
Pawnee	82,201	13	15.8
Muskogee	353,489	54	15.3
Nowata	53,232	8	15.0
Kiowa	46,958	7	14.9
McCurtain	167,256	23	13.8
Tulsa	2,927,096	393	13.4
Delaware	200,382	26	13.0
Grady	252,169	32	12.7
Okfuskee	55,671	7	12.6
Pottawatomie	344,777	41	11.9
Ottawa	160,739	19	11.8
Carter	236,941	28	11.8
Washington	248,963	29	11.6

County	2005-2009 Population	Number of Cases	Annual Rate
Wagoner	334,844	39	11.6
State of Oklahoma	18,050,364	2048	11.3
Love	45,359	5	11.0
Murray	63,644	7	11.0
Marshall	73,802	8	10.8
Cherokee	226,205	24	10.6
Le Flore	247,398	26	10.5
Payne	392,671	41	10.4
Ellis	19,277	2	10.4
Washita	57,863	6	10.4
Greer	28,991	3	10.3
Hughes	68,422	7	10.2
Sequoyah	204,429	20	9.8
Kay	229,790	22	9.6
Woods	42,198	4	9.5
McClain	158,379	15	9.5
Oklahoma	3,501,221	325	9.3
Rogers	414,451	37	8.9
Custer	130,059	11	8.5
Atoka	72,120	6	8.3
Garfield	288,500	24	8.3
Adair	109,109	9	8.3
Choctaw	74,937	6	8.0
Comanche	564,139	43	7.6
Bryan	197,334	15	7.6
Beaver	26,553	2	7.5
Jackson	129,156	9	7.0
Canadian	517,939	34	6.6
Woodward	97,148	6	6.2
Pontotoc	181,941	11	6.1
Harper	16,698	1	6.0
Logan	186,210	11	5.9
Grant	22,416	1	4.5
Alfalfa	27,857	1	3.6
Cleveland	1,179,277	38	3.2
Texas	101,976	3	2.9
Cimarron	13,262	0	0
Cotton	31,757	0	0
Noble	55,056	0	0

*Rates are calculated per 100,000 population.

**County of residence was unknown for 4 persons.