



**RESEARCH**

# **Structure Fires in Hotels and Motels**

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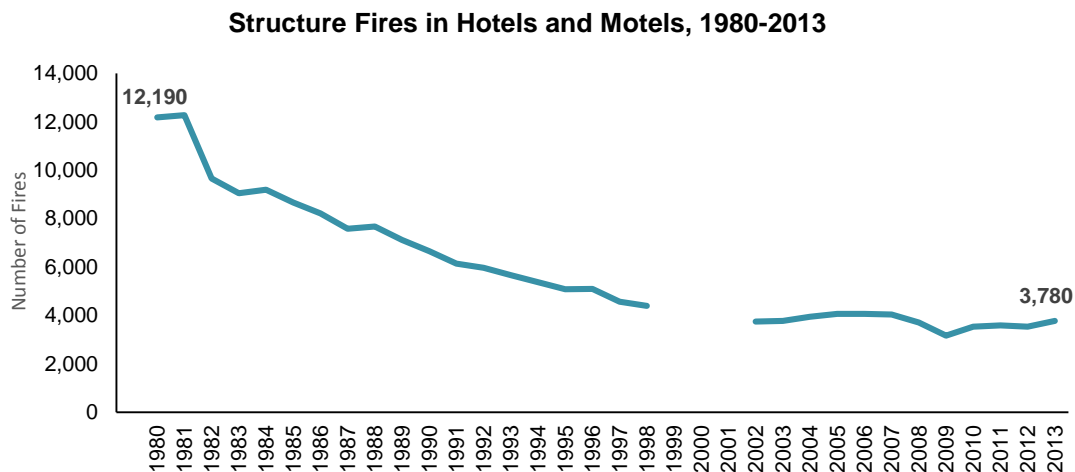
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## Structure Fires in Hotels and Motels

In 2009-2013, U.S. fire departments responded to an estimated average of 3,520 structure fires in hotels and motels each year. These fires resulted in annual losses of 9 civilian deaths, 120 civilian injuries, and \$84 million in direct property damage.

Hotels and motels include facilities for year-round or seasonal use. Many hotels and motels are mixed-use properties with sleeping rooms, restaurants, stores, banquet facilities, meeting spaces, and areas for other use. Cooking may be done by hotel staff in dining facilities or for catered events or by overnight guests who use coffee makers, hot plates, or even ranges or microwave ovens in the rooms. Hotel occupants include staff, guests, and event attendees. Residential hotels that typically serve as primary domiciles are categorized as rooming houses and are not included in this analysis.

**Structure fires in hotel or motel properties have fallen substantially over the past 35 years.** In 1980, there were 12,190 structure fires in hotels and motels in the United States. As the figure below shows, fires fell dramatically through 1998. It should be noted that estimates for 1999-2001 are unstable due to changes in NFIRS reporting and are not shown. Although the trend in the number of fires since 2001 has been uneven, the 3,780 structure fires in 2013 nevertheless represented a 69% decrease from 1980.

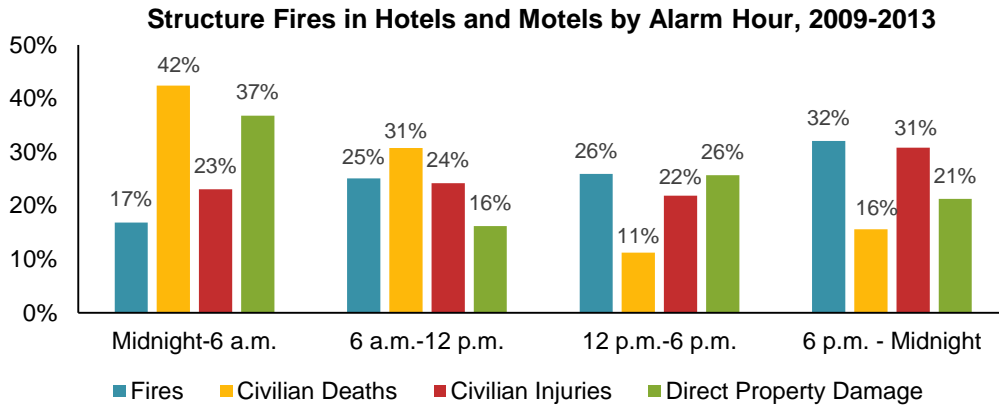


**Timing of Fires** In general, fires in hotel and motel properties do not vary significantly by time of year (See [Table 2](#)). Other than January and March, which each had 9% of fires, fires in 2009-2013 were evenly distributed in the remaining 10 months, each with 8% of the total. Fires were somewhat more prevalent on weekends, with 33% of fires

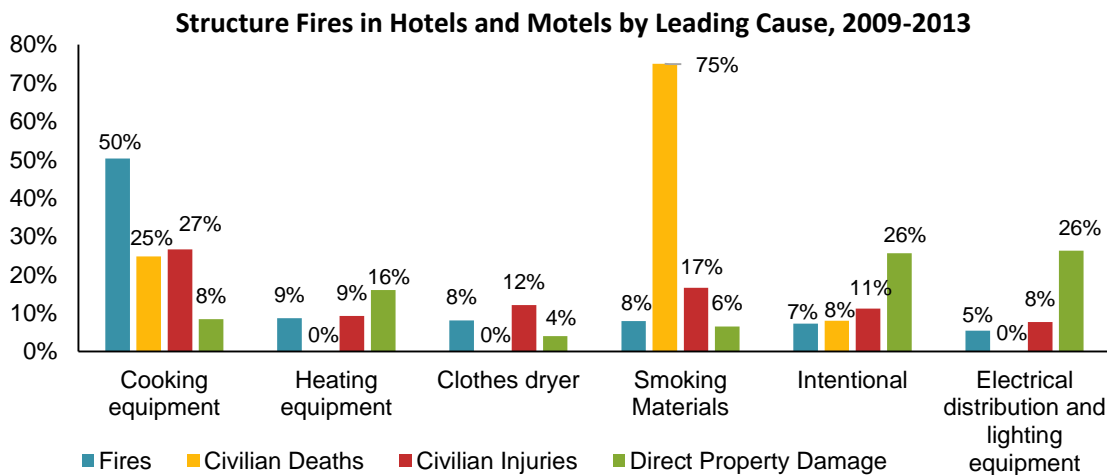
**Note:** The national estimates in this analysis are projections based on fire department assessments of cause, circumstances, and occupancy. These estimates are derived from the National Fire Incident Reporting System (NFIRS), sponsored by the U.S. Fire Administration (USFA) and NFPA's annual fire department survey. The methodology used is described in Appendix A.

taking place on Saturday or Sunday. These fires also accounted for 42% of civilian deaths, 39% of civilian injuries, but 26% of direct property damage.

As shown in the figure below, fires were more common in the evening and night-time hours, with nearly one-third of the total. (Table 4 shows that 18% of these were between 6 p.m. and 9 p.m., indicating the influence of cooking fires). Fires that occurred between midnight and 6 a.m. accounted for 17% of the total, but 42% of civilian fatalities, 37% of direct property damage, and 23% of civilian injuries.

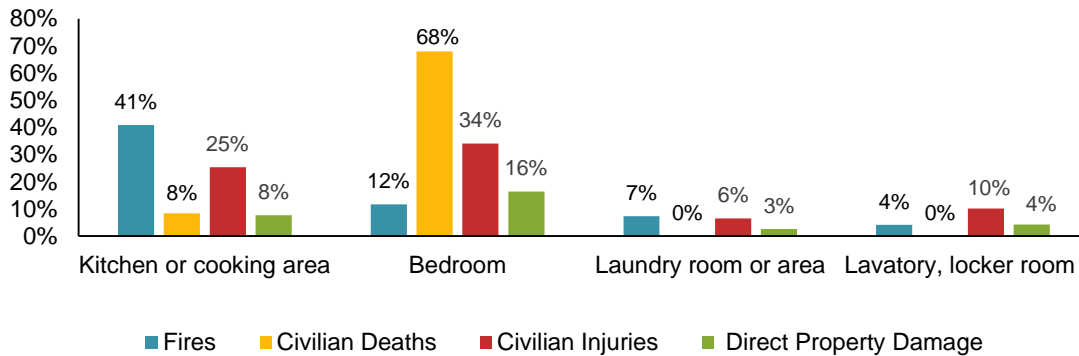


**Cooking equipment was the leading cause of fires in hotels and motels, accounting for one-half of the fires in this property type. (See figure below).** However, these fires caused just 8% of direct property damage, as well as 25% of civilian deaths and 27% of civilian injuries. Heating equipment was responsible for 9% of fires and clothes dryers for 8% of fires. Fires that were intentionally set (7% of fires) or caused by electrical distribution and lighting equipment (5% of fires) accounted for a disproportionate share of direct property damage, each with 26% of the total in this loss category. Smoking materials were involved in 8% of fires, but these fires were responsible for 75% of civilian deaths, although low numbers require that this be interpreted cautiously.



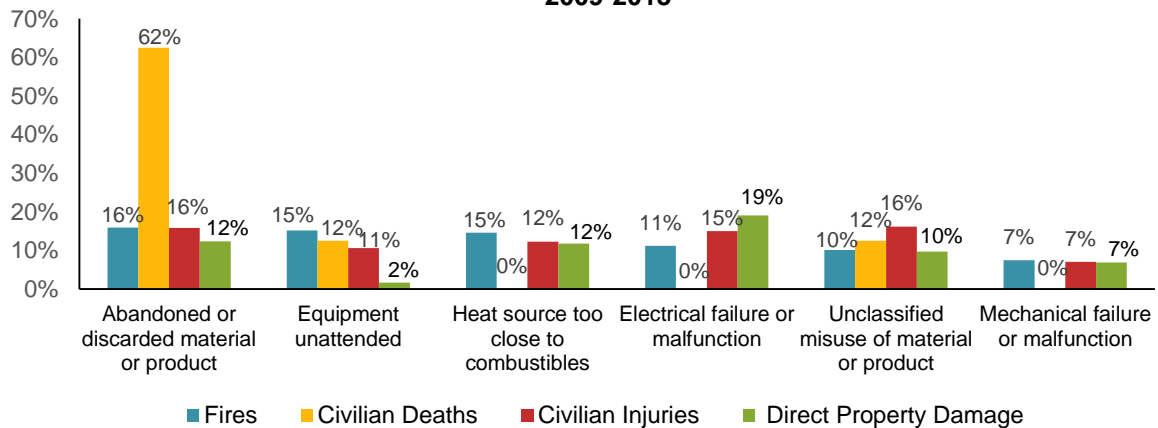
**The leading area of origin for structure fires in hotels and motels is the kitchen, which is the location where two of every five fires (41%) started.** These fires accounted for 8% of civilian deaths, 25% of civilian injuries, and 8% of direct property damage. The second leading area of origin is the bedroom, accounting for 12% of fires, but 68% of civilian deaths and 34% of civilian injuries, as well as 16% of direct property damage. Laundry rooms were the area of origin in 7% of fires and lavatories and locker rooms for 4% of fires.

**Leading areas of origin in hotel and motel structure fires, 2009-2013 (top 4 shown)**



**The leading factors contributing to ignition in hotel and motel structure fires were abandoned or discarded material or product (16% of total), leaving equipment attended (15%), and a heat source too close to combustible materials (15%).** Electrical failure or malfunction was a factor in 11% of fires, but associated with approximately one-fifth (19%) of direct property damage, as well as 15% of injuries. Abandoned or discarded material or product was a factor in fires that accounted for the majority of civilian deaths (62%).

**Structure fires in hotels and motels, by factor contributing to ignition, 2009-2013**



**The vast majority of structure fires in hotels and motels did not extend beyond the room of origin.** More than half of the reported structure fires (55%) in hotels and motels

were identified as confined or contained fire incidents, and another 14% were confined to the object of origin, while 21% were confined to the room of origin. Of the remaining fires, 3% were confined to the floor of origin and 6% to the building of origin, with 1% of the fires extending beyond the building of origin. See [Table 12](#) for data relating to flame spread.

**Sprinklers provide effective fire protection in hotel and motel properties.** According to the most recent NFPA report on the U.S. experience with automatic extinguishing systems, deaths per thousand reported fires were 100% lower when wet pipe sprinklers were present, compared to fires with no automatic extinguishing equipment.<sup>1</sup> The report also found that:

- In 2007-2011, 52% of reported hotel or motel structure fires indicated some type of sprinkler was present (90% wet pipe, 7% dry pipe, 3% other).\*
- Wet pipe sprinklers operated in 91% of fires and operated effectively in 89% of fires.
- Only one of two sprinklers operated in 95% of reported fires when wet pipe sprinklers operated.

**Additional information.** Information on preventing fires and reducing associated losses in hotels and motels is available in the following codes and standards:

NFPA 101: Life Safety Code®: [www.nfpa.org/101](http://www.nfpa.org/101)

NFPA 13: Standard for the Installation of Sprinkler Systems: [www.nfpa.org/13](http://www.nfpa.org/13)

NFPA 13R: Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height: [www.nfpa.org/13R](http://www.nfpa.org/13R)

\*Estimates of reliability and effectiveness are based only on fires and installations where the fire should have activated and been controlled by an operational system, thereby excluding buildings under construction, fires with sprinklers not in fire area reported as reason for failure or ineffectiveness, fires reported as too small to activate equipment, and fires reported as confined to cooking vessel, chimney or flue, fuel burner or boiler, commercial compactor, incinerator, or trash.

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<sup>1</sup> John R. Hall, Jr., [U.S. Experience with Sprinklers](#), Division of Fire Analysis and Research, June 2013.

**Table 1.**  
**Structure Fires in Hotels and Motels by Year**

<b>Year</b>	<b>Fires</b>	<b>Civilian Deaths</b>	<b>Civilian Injuries</b>	<b>Direct Property Damage (in Millions) (as reported)</b>	<b>Direct Property Damage (in Millions) (in 2013 Dollars)</b>
1980	12,190	62*	705	\$61	\$173
1981	12,270	131	682	\$66	\$169
1982	9,660	39	542	\$40	\$97
1983	9,050	70	517	\$100	\$234
1984	9,200	34	523	\$62	\$139
1985	8,670	80	396	\$70	\$151
1986	8,220	57	386	\$71	\$151
1987	7,580	42	362	\$66	\$135
1988	7,680	32	356	\$82	\$162
1989	7,120	24	293	\$63	\$119
1990	6,650	47	472	\$65	\$116
1991	6,140	18	325	\$69	\$118
1992	5,970	26	380	\$48	\$80
1993	5,660	62	418	\$60	\$97
1994	5,380	26	330	\$56	\$88
1995	5,080	33	249	\$64	\$98
1996	5,100	43	324	\$109	\$162
1997	4,570	15	246	\$69	\$100
1998	4,400	24	243	\$51	\$73
1999	3,590	54	380	\$287	\$401
2000	3,540	33	105	\$78	\$106
2001	3,690	6	141	\$58	\$76
2002	3,750	8	126	\$92	\$119
2003	3,770	10	130	\$57	\$73
2004	3,940	3	167	\$39	\$48
2005	4,060	22	145	\$76	\$90
2006	4,070	14	153	\$74	\$85
2007	4,040	4	162	\$71	\$80
2008	3,710	15	152	\$306	\$332
2009	3,160	9	96	\$90	\$98
2010	3,540	16	152	\$93	\$100
2011	3,590	12	136	\$63	\$65
2012	3,540	3	84	\$80	\$81
2013	3,780	6	117	\$93	\$93

**Table 1.**  
**Structure Fires in Hotels and Motels by Year (Continued)**

\* Estimate does not include MGM Grand fire.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. Inflation adjustments were based on the consumer price index found in the U.S. Census Bureau's Statistical Abstract of the United States: 2013, "Table 724, Purchasing Power of the Dollar."

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.



**Table 2.**  
**Structure Fires in Hotel and Motel Properties, by Month,**  
**2009-2013 Annual Averages**

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	310	(9%)	1	(12%)	11	(10%)	\$9	(10%)
February	290	(8%)	1	(7%)	7	(6%)	\$9	(11%)
March	310	(9%)	1	(8%)	19	(16%)	\$7	(8%)
April	300	(8%)	1	(8%)	9	(7%)	\$6	(7%)
May	300	(8%)	0	(0%)	9	(8%)	\$9	(10%)
June	280	(8%)	2	(23%)	10	(8%)	\$4	(5%)
July	290	(8%)	0	(0%)	7	(6%)	\$6	(7%)
August	300	(8%)	1	(15%)	9	(8%)	\$5	(6%)
September	270	(8%)	0	(4%)	9	(8%)	\$4	(4%)
October	300	(8%)	1	(8%)	12	(11%)	\$10	(12%)
November	300	(8%)	0	(0%)	9	(8%)	\$8	(9%)
December	290	(8%)	1	(15%)	6	(5%)	\$8	(9%)
<b>Totals</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>

Note: Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 3.**  
**Structure Fires in Hotel and Motel Properties, by Day of Week,**  
**2009-2013 Annual Average**

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	580	(17%)	2	(27%)	26	(22%)	\$9	(11%)
Monday	450	(13%)	1	(11%)	14	(12%)	\$8	(9%)
Tuesday	460	(13%)	2	(20%)	18	(15%)	\$9	(11%)
Wednesday	460	(13%)	1	(15%)	9	(8%)	\$17	(20%)
Thursday	480	(13%)	0	(4%)	14	(12%)	\$15	(18%)
Friday	510	(14%)	1	(8%)	17	(14%)	\$14	(16%)
Saturday	580	(16%)	1	(16%)	19	(16%)	\$12	(15%)
<b>Totals</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>

Note: Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 4.**  
**Structure Fires in Hotel and Motel Properties, by Alarm Hour,**  
**2009-2013 Annual Averages**

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Midnight-12:59 a.m.	130	(4%)	1	(8%)	3	(3%)	\$7	(8%)
1:00-1:59 a.m.	110	(3%)	0	(0%)	6	(5%)	\$4	(4%)
2:00-2:59 a.m.	110	(3%)	1	(8%)	7	(6%)	\$8	(9%)
3:00-3:59 a.m.	80	(2%)	1	(16%)	4	(3%)	\$4	(5%)
4:00-4:59 a.m.	80	(2%)	1	(7%)	2	(2%)	\$6	(7%)
5:00-5:59 a.m.	80	(2%)	0	(4%)	5	(4%)	\$2	(3%)
6:00-6:59 a.m.	100	(3%)	0	(4%)	4	(4%)	\$1	(1%)
7:00-7:59 a.m.	130	(4%)	0	(0%)	3	(3%)	\$2	(3%)
8:00-8:59 a.m.	160	(5%)	1	(8%)	7	(6%)	\$1	(2%)
9:00-9:59 a.m.	170	(5%)	1	(8%)	5	(4%)	\$3	(3%)
10:00-10:59 a.m.	160	(4%)	0	(0%)	6	(5%)	\$1	(1%)
11:00-11:59 a.m.	160	(4%)	1	(11%)	3	(2%)	\$5	(6%)
12:00-12:59 p.m.	150	(4%)	0	(0%)	4	(4%)	\$4	(5%)
1:00-1:59 p.m.	150	(4%)	0	(0%)	4	(3%)	\$3	(4%)
2:00-2:59 p.m.	140	(4%)	0	(4%)	3	(3%)	\$4	(4%)
3:00-3:59 p.m.	140	(4%)	0	(0%)	6	(5%)	\$4	(5%)
4:00-4:59 p.m.	150	(4%)	1	(7%)	5	(4%)	\$4	(4%)
5:00-5:59 p.m.	180	(5%)	0	(0%)	3	(3%)	\$3	(3%)
6:00-6:59 p.m.	200	(6%)	1	(8%)	6	(5%)	\$3	(4%)
7:00-7:59 p.m.	230	(7%)	0	(0%)	6	(5%)	\$3	(3%)
8:00-8:59 p.m.	210	(6%)	0	(4%)	7	(6%)	\$4	(5%)
9:00-9:59 p.m.	190	(5%)	0	(0%)	5	(4%)	\$2	(2%)
10:00-10:59 p.m.	170	(5%)	0	(0%)	9	(7%)	\$4	(5%)
11:00-11:59 p.m.	130	(4%)	0	(4%)	4	(3%)	\$2	(2%)
<b>Totals</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>

Note: Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 5.**  
**Structure Fires in Hotels and Motels, by Leading Cause,**  
**2009-2013 Annual Averages**

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	1,770	(50%)	2	(25%)	31	(27%)	\$7	(8%)
Heating equipment	300	(9%)	0	(0%)	11	(9%)	\$13	(16%)
Clothes dryer	290	(8%)	0	(0%)	14	(12%)	\$3	(4%)
Smoking materials	280	(8%)	7	(75%)	19	(17%)	\$5	(6%)
Intentional	260	(7%)	1	(8%)	13	(11%)	\$21	(26%)
Electrical distribution and lighting equipment	190	(5%)	0	(0%)	9	(8%)	\$22	(26%)
Candle	60	(2%)	0	(0%)	2	(2%)	\$1	(2%)

Note: Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars. This table summarizes findings from multiple fields, meaning that the same fire may be listed under multiple causes. Property damage has not been adjusted for inflation. The methodology used is described in Appendix B.

Source: NFIRS 5.0 and NFPA Fire Experience Survey, 2009-2013.

**Table 6.**  
**Structure Fires in Hotels and Motels by Equipment Involved,**  
**2009-2013 Annual Averages**

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	1,770	(50%)	2	(25%)	31	(27%)	\$7	(8%)
Confined cooking fire	1,570	(44%)	0	(0%)	16	(14%)	\$1	(1%)
Range with or without oven, cooking surface	140	(4%)	2	(25%)	13	(11%)	\$5	(6%)
Other known cooking equipment	40	(1%)	0	(0%)	1	(1%)	\$1	(1%)
No equipment involved in ignition	360	(10%)	7	(75%)	26	(22%)	\$25	(30%)
Heating equipment	300	(9%)	0	(0%)	11	(9%)	\$13	(16%)
Fixed or portable space heater	110	(3%)	0	(0%)	4	(4%)	\$7	(9%)
Confined fuel burner or boiler fire	70	(2%)	0	(0%)	1	(1%)	\$0	(0%)
Confined chimney or flue fire	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Other known heating equipment	40	(1%)	0	(0%)	6	(5%)	\$5	(7%)
Clothes dryer	290	(8%)	0	(0%)	14	(12%)	\$3	(4%)
Contained trash or rubbish fire	220	(6%)	0	(0%)	2	(2%)	\$0	(0%)
Electrical distribution and lighting equipment	190	(5%)	0	(0%)	9	(8%)	\$22	(26%)
Wiring and related equipment	80	(2%)	0	(0%)	4	(4%)	\$13	(16%)
Lamp, bulb or lighting	70	(2%)	0	(0%)	2	(1%)	\$7	(8%)
Transformers and power supplies	20	(1%)	0	(0%)	2	(2%)	\$1	(1%)
Air conditioner	100	(3%)	0	(0%)	4	(4%)	\$2	(3%)
Fan	70	(2%)	0	(0%)	7	(6%)	\$1	(1%)
Unclassified equipment involved in ignition	40	(1%)	0	(0%)	0	(0%)	\$0	(1%)
Torcher, burner or soldering iron	30	(1%)	0	(0%)	2	(2%)	\$3	(4%)
Other known equipment involved in ignition	150	(5%)	0	(0%)	12	(18%)	\$6	(7%)
<b>Total</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>

Note: Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars. Totals may not equal sums due to rounding errors. NFPA treats fires in which EII=NNN and heat source is not in the range of 40-99 as an additional unknown.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 7.**  
**Structure Fires in Hotels and Motels by Cause of Ignition,**  
**2009-2013 Annual Averages**

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Unintentional	2,680	(76%)	8	(92%)	87	(75%)	\$37	(44%)
Non-confined	970	(28%)	8	(92%)	71	(61%)	\$36	(43%)
Confined	1,710	(49%)	0	(0%)	16	(14%)	\$1	(1%)
Failure of equipment or heat source	500	(14%)	0	(0%)	16	(14%)	\$16	(19%)
Non-confined	400	(11%)	0	(0%)	14	(12%)	\$16	(19%)
Confined	110	(3%)	0	(0%)	2	(2%)	\$0	(0%)
Intentional	260	(7%)	1	(8%)	13	(11%)	\$21	(26%)
Non-confined	160	(4%)	1	(8%)	12	(10%)	\$21	(26%)
Confined	100	(3%)	0	(0%)	1	(1%)	\$0	(0%)
Unclassified cause	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Non-confined	40	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Other Known Cause	40	(2%)	0	(0%)	0	(0%)	\$10	(11%)
Non-confined	20	(2%)	0	(0%)	0	(0%)	\$10	(11%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Total</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>
Non-confined	1,580	(45%)	9	(100%)	100	(83%)	\$83	(99%)
Confined	1,940	(55%)	0	(0%)	20	(17%)	\$1	(1%)

Note: Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 8.  
Structure Fires in Hotels and Motels by Factor Contributing to Ignition,  
2009-2013 Annual Averages**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Abandoned or discarded material or product	560	(16%)	6	(62%)	18	(16%)	\$10	(12%)
Non-confined	210	(6%)	6	(62%)	15	(13%)	\$10	(12%)
Confined	350	(10%)	0	(0%)	4	(3%)	\$0	(0%)
Equipment unattended	530	(15%)	1	(12%)	12	(11%)	\$1	(2%)
Non-confined	70	(2%)	1	(12%)	4	(4%)	\$1	(1%)
Confined	470	(13%)	0	(0%)	8	(7%)	\$0	(0%)
Heat source too close to combustibles	510	(15%)	0	(0%)	14	(12%)	\$10	(12%)
Non-confined	210	(6%)	0	(0%)	14	(12%)	\$10	(12%)
Confined	300	(9%)	0	(0%)	0	(0%)	\$0	(0%)
Electrical failure or malfunction	390	(11%)	0	(0%)	17	(15%)	\$16	(19%)
Non-confined	360	(10%)	0	(0%)	15	(13%)	\$16	(19%)
Confined	30	(1%)	0	(0%)	3	(2%)	\$0	(0%)
Unclassified misuse of material or product	350	(10%)	1	(12%)	19	(16%)	\$8	(10%)
Non-confined	140	(4%)	1	(12%)	15	(13%)	\$8	(10%)
Confined	210	(6%)	0	(0%)	4	(3%)	\$0	(0%)
Mechanical failure or malfunction	260	(7%)	0	(0%)	8	(7%)	\$6	(7%)
Non-confined	180	(5%)	0	(0%)	8	(7%)	\$6	(7%)
Confined	80	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Failure to clean	210	(6%)	0	(0%)	3	(3%)	\$1	(1%)
Non-confined	80	(2%)	0	(0%)	3	(3%)	\$1	(1%)
Confined	130	(4%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified factor contributed to ignition	190	(6%)	1	(13%)	9	(7%)	\$7	(9%)
Non-confined	100	(3%)	1	(13%)	9	(7%)	\$7	(9%)
Confined	90	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Accidentally turned on, not turned off	110	(3%)	0	(0%)	3	(2%)	\$1	(1%)
Non-confined	30	(1%)	0	(0%)	3	(2%)	\$1	(1%)
Confined	80	(2%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 8.**  
**Structure Fires in Hotels and Motels by Factor Contributing to Ignition,**  
**2009-2013 Annual Averages (Continued)**

<b>Factor</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Equipment not being operated properly	80	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Non-confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified operational deficiency	60	(2%)	0	(0%)	2	(1%)	\$1	(1%)
Non-confined	30	(1%)	0	(0%)	2	(1%)	\$1	(1%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Improper container or storage	50	(2%)	0	(0%)	3	(3%)	\$2	(2%)
Non-confined	20	(1%)	0	(0%)	2	(1%)	\$2	(2%)
Confined	30	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Other known factor contributing to ignition	310	(9%)	0	(0%)	10	(12%)	\$25	(30%)
Non-confined	210	(6%)	0	(0%)	10	(12%)	\$25	(30%)
Confined	100	(3%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Total Fires</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>
Non-confined	1,580	(45%)	9	(100%)	100	(83%)	\$83	(99%)
Confined	1,940	(55%)	0	(0%)	20	(17%)	\$1	(1%)
<b>Total Factors*</b>	<b>3,640</b>	<b>(103%)</b>	<b>9</b>	<b>(100%)</b>	<b>123</b>	<b>(106%)</b>	<b>\$88</b>	<b>(105%)</b>
Non-confined	1,660	(47%)	9	(100%)	104	(89%)	\$87	(104%)
Confined	1,980	(56%)	0	(0%)	20	(17%)	\$1	(1%)

\* Multiple entries allowed in this field, so total factors add up to more than total fires.

Note: Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars. Fires in which the factor contributing to ignition was coded as none, unknown, or not reported were allocated proportionally among fires with known factor(s) contributing to ignition.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.



**Table 9.**  
**Structure Fires in Hotels and Motels by Heat Source,**  
**2009-2013 Annual Averages**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Radiated or conducted heat from operating equipment	850	(24%)	1	(8%)	23	(20%)	\$9	(10%)
Non-confined	260	(7%)	1	(8%)	17	(15%)	\$8	(10%)
Confined	590	(17%)	0	(0%)	6	(5%)	\$0	(0%)
Unclassified heat from powered equipment	800	(23%)	0	(0%)	22	(19%)	\$10	(12%)
Non-confined	310	(9%)	0	(0%)	15	(13%)	\$10	(11%)
Confined	490	(14%)	0	(0%)	7	(6%)	\$0	(0%)
Smoking Materials	280	(8%)	7	(75%)	19	(17%)	\$5	(6%)
Non-confined	160	(5%)	7	(75%)	19	(17%)	\$5	(6%)
Confined	120	(3%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified heat source	270	(8%)	0	(0%)	5	(4%)	\$6	(7%)
Non-confined	80	(2%)	0	(0%)	3	(3%)	\$6	(7%)
Confined	190	(6%)	0	(0%)	2	(2%)	\$0	(0%)
Arcing	240	(7%)	0	(0%)	12	(10%)	\$11	(13%)
Non-confined	230	(6%)	0	(0%)	10	(9%)	\$11	(13%)
Confined	20	(0%)	0	(0%)	1	(1%)	\$0	(0%)
Unclassified hot or smoldering object	240	(7%)	1	(8%)	7	(6%)	\$6	(7%)
Non-confined	120	(3%)	1	(8%)	7	(6%)	\$6	(7%)
Confined	120	(4%)	0	(0%)	0	(0%)	\$0	(0%)
Spark, ember or flame from operating equipment	220	(6%)	0	(0%)	5	(4%)	\$7	(8%)
Non-confined	80	(2%)	0	(0%)	5	(4%)	\$7	(8%)
Confined	140	(4%)	0	(0%)	0	(0%)	\$0	(0%)
Hot ember or ash	130	(4%)	1	(8%)	4	(3%)	\$7	(9%)
Non-confined	70	(2%)	1	(8%)	4	(3%)	\$7	(8%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Heat from direct flame or convection currents	110	(3%)	0	(0%)	2	(2%)	\$3	(3%)
Non-confined	20	(1%)	0	(0%)	1	(1%)	\$3	(3%)
Confined	80	(2%)	0	(0%)	1	(1%)	\$0	(0%)

**Table 9.**  
**Structure Fires in Hotels and Motels by Heat Source,**  
**2009-2013 Annual Averages (Continued)**

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Lighter	70	(2%)	0	(0%)	5	(5%)	\$4	(5%)
Non-confined	50	(1%)	0	(0%)	4	(4%)	\$4	(5%)
Confined	20	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Candle	60	(2%)	0	(0%)	2	(2%)	\$1	(2%)
Non-confined	50	(2%)	0	(0%)	2	(2%)	\$1	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Spontaneous combustion or chemical reaction	50	(2%)	0	(0%)	4	(3%)	\$2	(3%)
Non-confined	30	(1%)	0	(0%)	4	(3%)	\$2	(3%)
Confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known heat source	190	(5%)	0	(0%)	10	(5%)	\$13	(15%)
Non-confined	110	(3%)	0	(0%)	0	(4%)	\$13	(15%)
Confined	70	(2%)	0	(0%)	0	(1%)	\$0	(0%)
<b>Total</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>
Non-confined	1,580	(45%)	9	(100%)	100	(83%)	\$83	(99%)
Confined	1,940	(55%)	0	(0%)	20	(17%)	\$1	(1%)

Sums may not equal totals due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars. Estimates of matches, lighters, smoking materials, and candles included a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 10.**  
**Structure Fires in Hotels and Motels, by Area of Origin,**  
**2009-2013 Annual Averages**

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Kitchen or cooking area	1,440	(41%)	1	(8%)	30	(25%)	\$6	(8%)
Non-confined	180	(5%)	1	(8%)	14	(12%)	\$6	(7%)
Confined	1,260	(36%)	0	(0%)	16	(13%)	\$1	(1%)
Bedroom	410	(12%)	6	(68%)	40	(34%)	\$14	(16%)
Non-confined	330	(9%)	6	(68%)	38	(33%)	\$14	(16%)
Confined	80	(2%)	0	(0%)	1	(1%)	\$0	(0%)
Laundry room or area	260	(7%)	0	(0%)	8	(6%)	\$2	(3%)
Non-confined	200	(6%)	0	(0%)	8	(6%)	\$2	(3%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Lavatory, bathroom, locker room or check room	150	(4%)	0	(0%)	12	(10%)	\$4	(4%)
Non-confined	110	(3%)	0	(0%)	11	(9%)	\$4	(4%)
Confined	40	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Common room, living room, family room, lounge or den	80	(2%)	1	(12%)	4	(4%)	\$1	(2%)
Non-confined	50	(2%)	1	(12%)	4	(4%)	\$1	(2%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Heating equipment room	70	(2%)	0	(4%)	3	(3%)	\$2	(3%)
Non-confined	30	(1%)	0	(4%)	2	(2%)	\$2	(3%)
Confined	40	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Unclassified area of origin	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Non-confined	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Confined	40	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Trash or rubbish chute, area or container	60	(2%)	0	(0%)	0	(0%)	\$0	(1%)
Non-confined	10	(0%)	0	(0%)	0	(0%)	\$0	(1%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified function area	60	(2%)	0	(4%)	3	(2%)	\$1	(1%)
Non-confined	50	(1%)	0	(4%)	3	(2%)	\$1	(1%)
Confined	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)

**Table 10.  
Structure Fires in Hotels and Motels, by Area of Origin,  
2009-2013 Annual Averages (Continued)**

<b>Area of Origin</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Confined chimney or flue fire	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Non-confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Confined	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified outside area	60	(2%)	0	(0%)	0	(0%)	\$2	(3%)
Non-confined	20	(1%)	0	(0%)	0	(0%)	\$2	(3%)
Confined	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known area of origin	810	(23%)	0	(4%)	17	(15%)	\$50	(60%)
Non-confined	570	(16%)	0	(4%)	17	(15%)	\$50	(60%)
Confined	230	(7%)	0	(0%)	0	(0%)	\$0	(0%)
<b>Total</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>
Non-confined	1,580	(45%)	9	(100%)	100	(83%)	\$83	(99%)
Confined	1,940	(55%)	0	(0%)	20	(17%)	\$1	(1%)

Note: Totals may not equal sums due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars. Non-confined and non-contained structure fires in which the area of origin was unknown or not reported have been allocated proportionally among fires with known area of origin.

Source: NFIRS 5.0 and NFPA Fire Experience Survey, 2009-2013.

**Table 11.**  
**Structure Fires in Hotel and Motel Properties, by Item First Ignited,**  
**2009-2013 Annual Averages**

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Cooking materials, including food	1,210	(34%)	1	(9%)	22	(19%)	\$2	(2%)
Non-confined	90	(3%)	1	(9%)	8	(6%)	\$2	(2%)
Confined	1,120	(32%)	0	(0%)	15	(12%)	\$0	(1%)
Unclassified item first ignited	240	(7%)	0	(0%)	7	(6%)	\$3	(4%)
Non-confined	100	(3%)	0	(0%)	6	(5%)	\$3	(4%)
Confined	140	(4%)	0	(0%)	1	(1%)	\$0	(0%)
Mattress or bedding	200	(6%)	6	(64%)	18	(16%)	\$6	(7%)
Non-confined	180	(5%)	6	(64%)	18	(16%)	\$6	(7%)
Confined	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Rubbish, trash, or waste	190	(6%)	0	(0%)	6	(5%)	\$2	(3%)
Non-confined	40	(1%)	0	(0%)	5	(4%)	\$2	(3%)
Confined	150	(4%)	0	(0%)	1	(1%)	\$0	(0%)
Linen (other than bedding)	190	(5%)	0	(0%)	6	(5%)	\$3	(4%)
Non-confined	140	(4%)	0	(0%)	5	(5%)	\$3	(4%)
Confined	50	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Electrical wire or cable insulation	180	(5%)	0	(0%)	8	(6%)	\$6	(7%)
Non-confined	160	(5%)	0	(0%)	6	(5%)	\$6	(7%)
Confined	20	(1%)	0	(0%)	1	(1%)	\$0	(0%)
Flammable or combustible liquids or gases, piping or filter	120	(3%)	0	(0%)	8	(7%)	\$2	(3%)
Non-confined	50	(1%)	0	(0%)	8	(7%)	\$2	(2%)
Confined	70	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Appliance housing or casing	90	(3%)	0	(0%)	3	(2%)	\$2	(3%)
Non-confined	50	(2%)	0	(0%)	3	(2%)	\$2	(3%)
Confined	40	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Structural member or framing	80	(2%)	0	(0%)	2	(2%)	\$14	(17%)
Non-confined	80	(2%)	0	(0%)	2	(2%)	\$14	(17%)
Confined	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Household utensils	70	(2%)	0	(0%)	1	(1%)	\$0	(0%)
Non-confined	10	(0%)	0	(0%)	1	(1%)	\$0	(0%)
Confined	50	(2%)	0	(0%)	1	(1%)	\$0	(0%)

**Table 11.**  
**Structure Fires in Hotel and Motel Properties, by Item First Ignited,**  
**2009-2013 Annual Averages (Continued)**

<b>Item First Ignited</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Box, carton, bag, basket, or barrel	60	(2%)	0	(0%)	0	(0%)	\$1	(1%)
Non-confined	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)
Confined	40	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Dust, fiber, lint, including sawdust or excelsior	60	(2%)	0	(0%)	1	(1%)	\$1	(1%)
Non-confined	50	(1%)	0	(0%)	1	(1%)	\$1	(1%)
Confined	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Clothing	60	(2%)	0	(0%)	4	(3%)	\$1	(1%)
Non-confined	40	(1%)	0	(0%)	4	(3%)	\$1	(1%)
Confined	20	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Unclassified organic materials	60	(2%)	0	(0%)	0	(0%)	\$2	(3%)
Non-confined	20	(1%)	0	(0%)	0	(0%)	\$2	(3%)
Confined	40	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known item first ignited	710	(20%)	2	(27%)	30	(26%)	\$38	(45%)
Non-confined	540	(15%)	2	(27%)	30	(26%)	\$38	(45%)
Confined	170	(5%)	0	(0%)	1	(1%)	\$0	(0%)
<b>Total</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>
Non-confined	1,580	(45%)	9	(100%)	100	(83%)	\$83	(99%)
Confined	1,940	(55%)	0	(0%)	20	(17%)	\$1	(1%)

Note: Totals may not equal sums due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

**Table 12.**  
**Structure Fires in Hotel and Motel Properties, by Extent of Flame Damage,**  
**2009-2013 Annual Averages**

Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined or contained fire identified by incident type	1,940	(55%)	0	(0%)	20	(17%)	\$1	(1%)
Confined to room of origin	750	(21%)	5	(58%)	59	(50%)	\$15	(18%)
Confined to object of origin	490	(14%)	0	(4%)	18	(15%)	\$4	(4%)
Confined to building of origin	220	(6%)	2	(27%)	12	(11%)	\$47	(56%)
Confined to floor of origin	100	(3%)	1	(8%)	7	(6%)	\$12	(14%)
Beyond building of origin	20	(1%)	0	(4%)	1	(1%)	\$6	(7%)
<b>Total Fires</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>120</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>

Note: Totals may not equal sums due to rounding errors. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA Fire Experience Survey, 2009-2013.

## Appendix A.

### How National Estimates Statistics Are Calculated

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The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual fire experience survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from [http://www.nfirs.fema.gov/documentation/design/NFIRS\\_Paper\\_Forms\\_2008.pdf](http://www.nfirs.fema.gov/documentation/design/NFIRS_Paper_Forms_2008.pdf).

NFIRS has a wide variety of data elements and code choices. The NFIRS database contains coded information. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is impossible to tell the portion of each from the coded data.

#### **Methodology may change slightly from year to year.**

NFPA is continually examining its methodology to provide the best possible answers to specific questions, methodological and definitional changes can occur. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.*

#### **NFPA's annual fire experience of U.S. fire departments survey provides estimates of the big picture.**

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.



The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; 3) the number and nature of non-fire incidents; and (4) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

### **Projecting NFIRS to National Estimates**

As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database -- the NFPA survey -- is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios. Reports for incidents in which mutual aid was given are excluded from NFPA's analyses.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the specific basic analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others. The essentials of the approach described by Hall and Harwood are still used, but some modifications have been necessary to accommodate the changes in NFIRS 5.0.

Figure A.1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

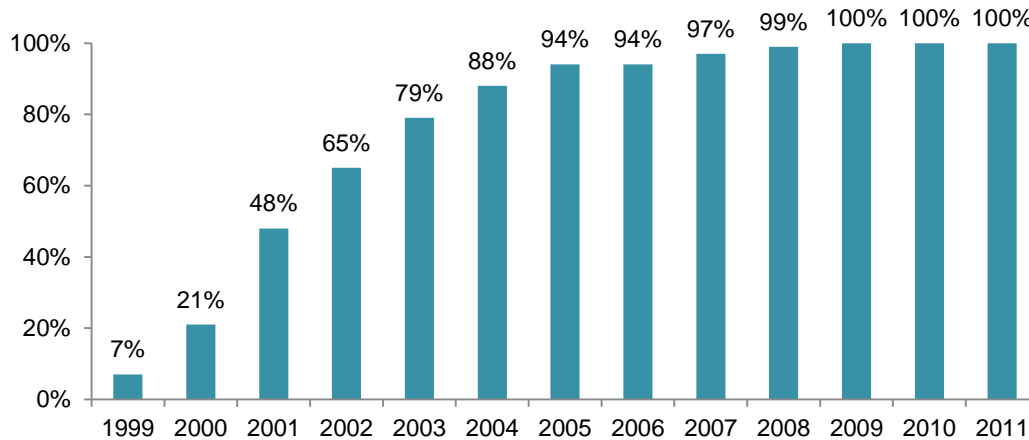
From 1999 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

$$\frac{\text{NFPA survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed

with extreme caution.

**Figure A.1. Fires Originally Collected in NFIRS 5.0 by Year**



NFIRS 5.0 introduced six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Because this analysis focused on fatalities only, no distinction was made between confined and non-confined fires.

For most fields other than Property Use and Incident Type, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields. *Casualty and loss projections can be heavily influenced by the inclusion or exclusion of unusually serious fire.*

In the formulas that follow, the term “all fires” refers to all fires in NFIRS on the dimension studied. The percentages of fires with known or unknown data are provided for non-confined fires and associated losses, and for confined fires only.

**Rounding and percentages.** The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100% even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.

In the formulas that follow, the term “all fires” refers to all fires in NFIRS on the dimension studied. The percentages of fires with known or unknown data are provided for non-confined fires and associated losses, and for confined fires only.

**Cause of Ignition:** This field is used chiefly to identify intentional fires. “Unintentional” in this field is a specific entry and does not include other fires that were not intentionally set: failure of equipment or heat source, act of nature, or “other” (unclassified).” The last should be used for exposures but has been used for other situations as well. Fires that were coded as under investigation and those that were coded as undetermined after investigation were treated as unknown.

**Factor Contributing to Ignition:** In this field, the code “none” is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for “not reported” when no factors are recorded. “Not reported” is treated as an unknown, but the code “none” is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Although Factor Contributing to Ignition is only required when the cause of ignition was coded as: 2) unintentional, 3) failure of equipment or heat source; or 4) act of nature, data is often present when not required. Consequently, any fire in which no factor contributing to ignition was entered was treated as unknown.

In some analyses, all entries in the category of mechanical failure, malfunction (factor contributing to ignition 20-29) are combined and shown as one entry, “mechanical failure or malfunction.” This category includes:

21. Automatic control failure;
22. Manual control failure;
23. Leak or break. Includes leaks or breaks from containers or pipes. Excludes operational deficiencies and spill mishaps;
25. Worn out;
26. Backfire. Excludes fires originating as a result of hot catalytic converters;
27. Improper fuel used; Includes the use of gasoline in a kerosene heater and the like; and
20. Mechanical failure or malfunction, other.

Entries in “electrical failure, malfunction” (factor contributing to ignition 30-39) may also be combined into one entry, “electrical failure or malfunction.” This category includes:

31. Water-caused short circuit arc;
32. Short-circuit arc from mechanical damage;
33. Short-circuit arc from defective or worn insulation;
34. Unspecified short circuit arc;
35. Arc from faulty contact or broken connector, including broken power lines and loose connections;
36. Arc or spark from operating equipment, switch, or electric fence;
37. Fluorescent light ballast; and
30. Electrical failure or malfunction, other.

**Heat Source.** In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: “Heat from open flame or smoking material, other.” NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range, shown below.

61. Cigarette;
62. Pipe or cigar;
63. Heat from undetermined smoking material;

- 64. Match;
- 65. Lighter: cigarette lighter, cigar lighter;
- 66. Candle;
- 67. Warning or road flare, fuse;
- 68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
- 69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping “smoking materials” includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

**Equipment Involved in Ignition (EII).** NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to “the piece of equipment that provided the principal heat source to cause ignition.” However, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

$$\frac{\text{All fires}}{(\text{All fires} - \text{blank} - \text{undetermined} - [\text{fires in which EII} = \text{NNN and heat source} < 40-99])}$$

In addition, the partially unclassified codes for broad equipment groupings (i.e., code 100 - heating, ventilation, and air conditioning, other; code 200 - electrical distribution, lighting and power transfer, other; etc.) were allocated proportionally across the individual code choices in their respective broad groupings (heating, ventilation, and air conditioning; electrical distribution, lighting and power transfer, other; etc.). Equipment that is totally unclassified is not allocated further. This approach has the same downside as the allocation of heat source 60 described above. Equipment that is truly different is erroneously assigned to other categories.

In some analyses, various types of equipment are grouped together.

Code Grouping	EII Code	NFIRS definitions
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove

	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	120	Fireplace or chimney
	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Fixed wiring and related equipment	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	213	Electric meter or meter box
	214	Wiring from meter box to circuit breaker
	215	Panel board, switch board or circuit breaker board
	216	Electrical branch circuit
	217	Outlet or receptacle
	218	Wall switch
	219	Ground fault interrupter
Transformers and power supplies	221	Distribution-type transformer
	222	Overcurrent, disconnect equipment
	223	Low-voltage transformer
	224	Generator
	225	Inverter
	226	Uninterrupted power supply (UPS)
	227	Surge protector
	228	Battery charger or rectifier
	229	Battery (all types)
<b>Code Grouping</b>	<b>EII Code</b>	<b>NFIRS definitions</b>
Lamp, bulb or lighting	230	Unclassified lamp or lighting
	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture
	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign

Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord
Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top broiler
	638	Waffle iron, griddle
	639	Wok, frying pan, skillet
	641	Breadmaking machine

Equipment was not analyzed separately for confined fires. Instead, each confined fire incident type was listed with the equipment or as other known equipment.

**Item First Ignited.** In most analyses, mattress and pillows (item first ignited 31) and bedding, blankets, sheets, and comforters (item first ignited 32) are combined and shown as “mattresses and bedding.” In many analyses, wearing apparel not on a person (code 34) and wearing apparel on a person (code 35) are combined and shown as “clothing.” In some analyses, flammable and combustible liquids and gases, piping and filters (item first ignited 60-69) are combined and shown together.

**Area of Origin.** Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply “bedroom.” Chimney is no longer a valid area of origin code for non-confined fires.

**Rounding and percentages.** The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100% even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.