



RESEARCH

Structure Fires in Hotels and Motels

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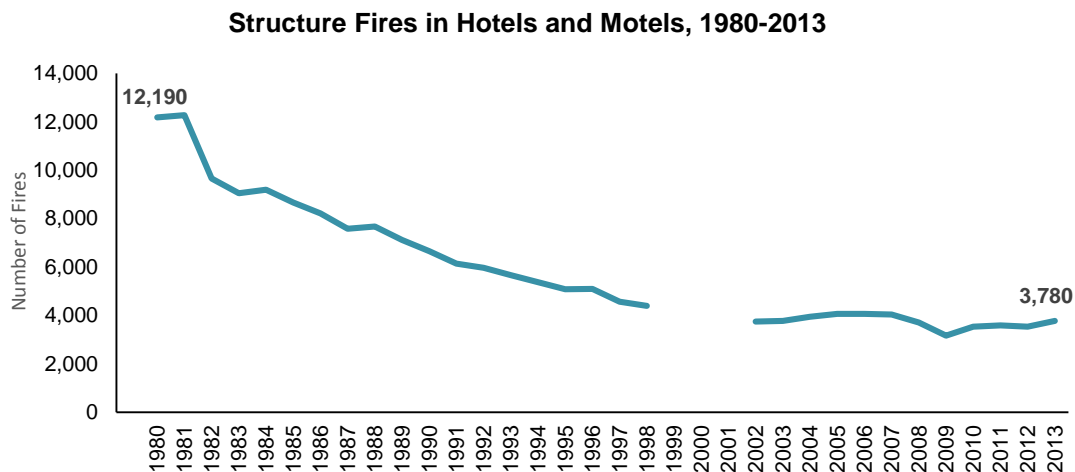
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Structure Fires in Hotels and Motels

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.

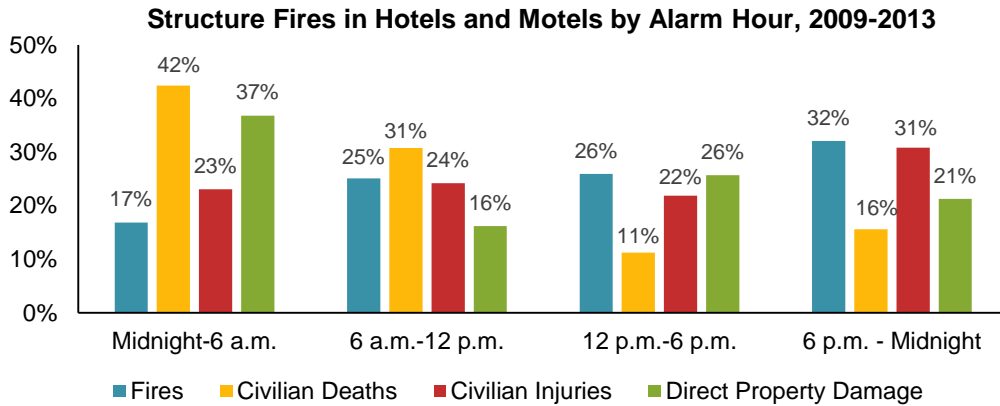


Timing of Fires In general, fires in hotel and motel properties do not vary significantly by time of year (See Table 2). Other than January and March, which each had 9% of fires, fires in 2009-2013 were evenly distributed in the remaining 10 months, each with 8% of the total. Fires were somewhat more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

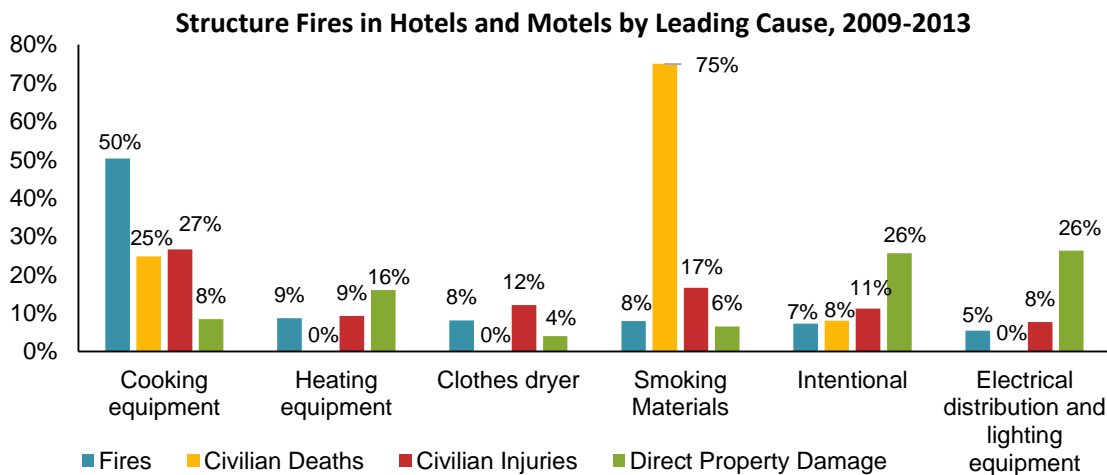
Note: The national estimates in this analysis are projections based on fire department assessments of cause, circumstances, and occupancy. These estimates are derived from the National Fire Incident Reporting System (NFIRS), sponsored by the U.S. Fire Administration (USFA) and NFPA's annual fire department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

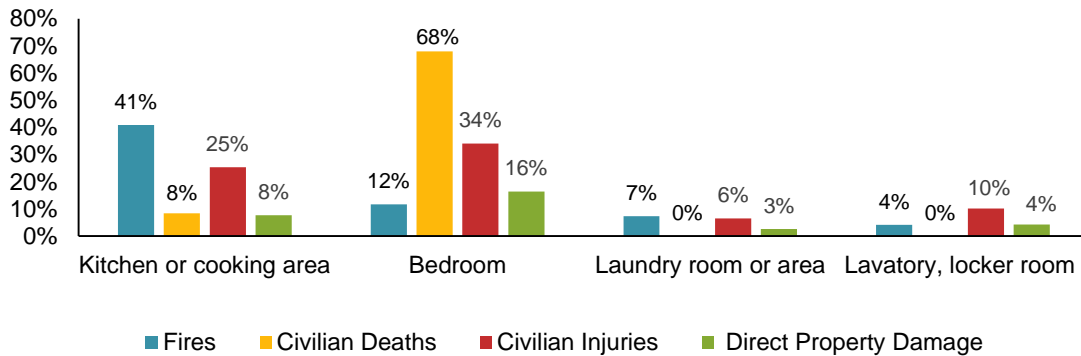


Cooking equipment was the leading cause of fires in hotels and motels, accounting for one-half of the fires in this property type. (See figure below). However, these fires caused just 8% of direct property damage, as well as 25% of civilian deaths and 27% of civilian injuries. Heating equipment was responsible 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.



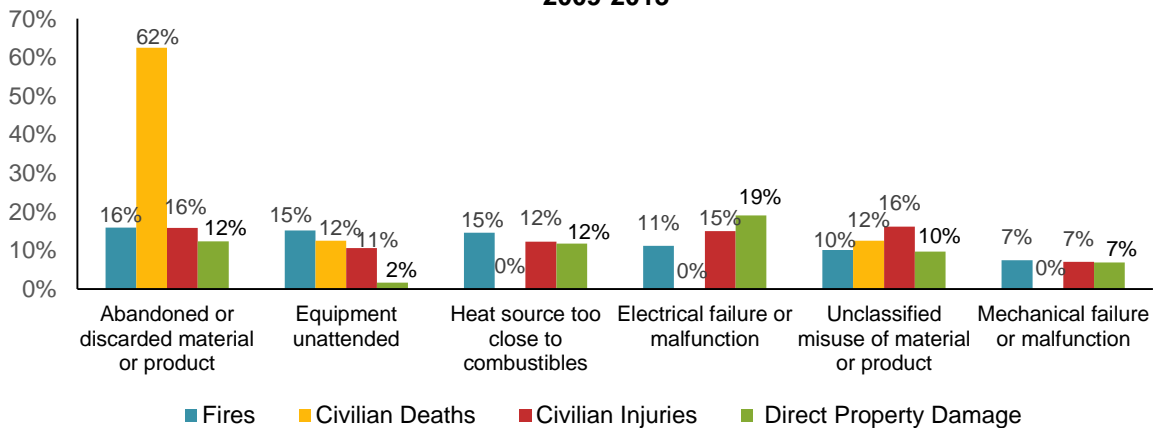
The leading area of origin for structure fires in hotels and motels is the kitchen, which is the location where two of every five fires (41%) started. These fires accounted for 8% of civilian deaths, 25% of civilian injuries, and 8% of direct property damage. The second leading area of origin is the 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.¹ 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

NFPA 13: Standard for the Installation of Sprinkler Systems: 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

*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.

¹ 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

| Year | Fires | Civilian Deaths | Civilian Injuries | Direct Property Damage (in Millions) (as reported) | Direct Property Damage (in Millions) (in 2013 Dollars) |
|-------------|--------------|------------------------|--------------------------|---|---|
| 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%) |
| Totals | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |

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%) |
| Totals | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |

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%) |
| Totals | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |

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%) |
| Total | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |

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%) |
| Total | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |
| 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 | (%) | Count | (%) | Count | (%) | Count | (%) |
| 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)

| Factor | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|--------------|---------------|-----------------|---------------|-------------------|---------------|--------------------------------------|---------------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| 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%) |
| Total Fires | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |
| Non-confined | 1,580 | (45%) | 9 | (100%) | 100 | (83%) | \$83 | (99%) |
| Confined | 1,940 | (55%) | 0 | (0%) | 20 | (17%) | \$1 | (1%) |
| Total Factors* | 3,640 | (103%) | 9 | (100%) | 123 | (106%) | \$88 | (105%) |
| 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) | |
|---|-------|-------|-----------------|-------|-------------------|-------|--------------------------------------|-------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| 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%) |
| Total | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |
| 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)

| Area of Origin | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|-------------------------------|--------------|---------------|------------------------|---------------|--------------------------|---------------|---|---------------|
| 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%) |
| Total | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |
| 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

| Item First Ignited | Fires | | Civilian Deaths | | Civilian Injuries | | Direct Property Damage (in Millions) | |
|---|--------------|---------------|------------------------|---------------|--------------------------|---------------|---|---------------|
| 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%) |
| Total | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |
| 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%) |
| Total Fires | 3,520 | (100%) | 9 | (100%) | 120 | (100%) | \$84 | (100%) |

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

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.

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.

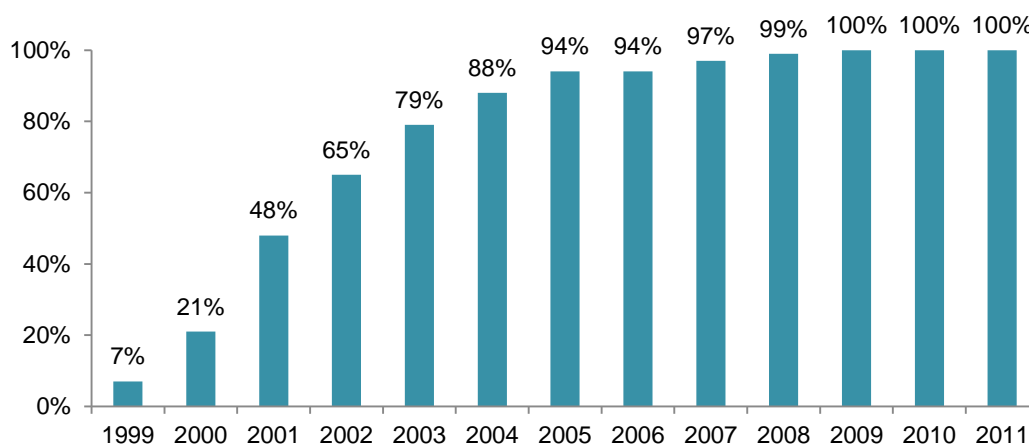
From 1999 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

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

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

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

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) |
| Code Grouping | EII Code | NFIRS definitions |
| 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.