



**RESEARCH**

# High-Rise Building Fires

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## **Abstract**

In 2009-2013, U.S. fire departments responded to an estimated average of 14,500 reported structure fires in high-rise buildings per year. These fires caused an average of 40 civilian deaths, 520 civilian injuries, and \$154 million in direct property damage per year. Five property classes account for almost three-quarters of high-rise fires: apartment buildings or multi-family housing, hotels, dormitories, office buildings, and facilities that care for the sick. Automatic fire protection equipment and fire-resistive construction are more common in high-rise buildings that have fires than in other buildings of the same property use that have fires. The fire death rate per 1,000 fires and average loss per fire tend to be lower in high-rise buildings than in shorter buildings of the same property use.

Keywords: fire statistics, high-rise, apartments, care of sick, office, hotel, fire protection, hospital, clinic, doctor's office, dormitory

## **Acknowledgements**

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## U.S. HIGH-RISE BUILDING FIRES FACT SHEET

In 2009-2013, U.S. fire departments responded to an average of **14,500** structure fires per year in high-rise buildings.<sup>1</sup> These fires caused an annual average of:

- 40 civilian fire deaths
- 520 civilian fire injuries
- \$154 million in direct property damage

Five property use groups account for almost three-quarters (73%) of high-rise fires:

- Apartments or other multi-family housing (62% of all high-rise fires)
- Hotels (4% of high-rise fires)
- Dormitories (4% of high-rise fires)
- Offices (2% of high-rise fires)
- Facilities that care for the sick (2% of high-rise fires)

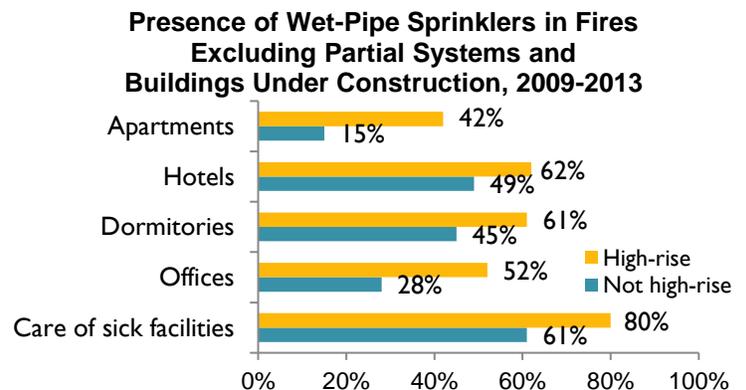
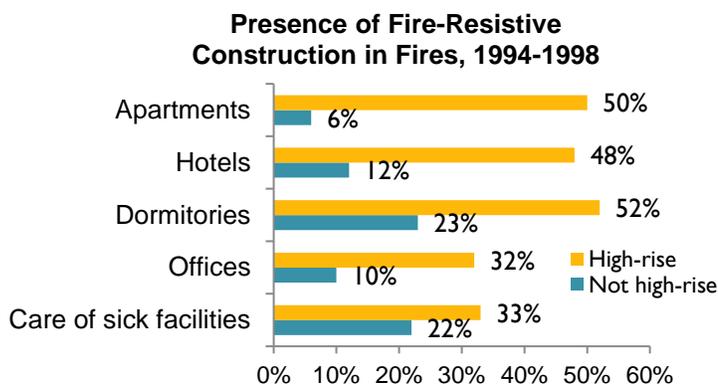
Most of the remaining fires occurred in mixed-use residential or office buildings (such as restaurants, stores, and parking garages) or probable miscodes of properties that cannot be high-rise (such as one- or two-family homes and sheds).

The fire death rate per 1,000 fires and the average loss per fire are generally **lower** in high-rise buildings than in other buildings of the same property use.

High-rise buildings have lower percentages of fires with flame damage beyond room of origin, providing further evidence of impact from fire protection systems and features:

- Apartments (4% of high-rise fires vs. 10% in shorter buildings)
- Hotels (4% of high-rise fires vs. 11% in shorter buildings)
- Dormitories (2% of high-rise vs. 1% in shorter buildings)
- Offices (10% of high-rise fires vs. 21% in shorter buildings)
- Facilities that care for the sick (4% of high-rise fires vs. 9% in shorter buildings)

High-rise buildings are more likely than shorter building to have fire-resistive construction and wet pipe sprinklers. These types of protection help prevent fire spread.



<sup>1</sup> "High-rise" is defined here as 7 stories above grade. This is roughly consistent with the Life Safety Code definition of high rise as 75 feet (23 meters) in height, measured from the lowest level of fire department vehicle access to the floor of the highest occupiable story.

## High-Rise Building Fires

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When American adults think of high-rise fires, we often think first of the September 11, 2001 terrorist attacks on New York City's iconic World Trade Center, the deadliest high-rise fire in world history. As part of a terrorist attack, two hijacked airplanes flew into the 110 story towers, setting them on fire and compromising the towers' structural integrity. The fires and ensuing building collapses killed 2,666 civilians and firefighters. The 157 passengers and crew on the airplanes also perished.<sup>2</sup>

The second deadliest U.S. high-rise fire, and the third deadliest in the world, also resulted from terrorism, in this case domestic terrorism. On April 19, 1995, [a bomb in a rented truck exploded outside a nine-story federal office building in Oklahoma City, Oklahoma](#). The blast and ensuing fire killed 169 people. See Appendix A for a list of the ten deadliest high rise fires in history.

**While these tragic events are etched in our memory, high-rise buildings are more likely to have fire protection that makes them safer than other buildings in the event of fire.** This analysis focuses on the causes and circumstances of high-rise building fires compared to shorter buildings. The estimates in this report were derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual fire experience survey. In this analysis, any structure (NFIRS incident type codes 110-123) with seven stories or more above ground is considered high-rise. Shorter, non-high-rise buildings have one to six stories above ground. Stories below ground were not included in these definitions. Fires in which the number of stories above ground were coded as zero, or more than 100, were considered to have unknown data. Unknowns were allocated proportionally. Only fires reported to local fire departments are included. See Appendix B for a description of the methodology used.

**In 2009-2013, U.S. fire departments responded to an estimated average of 14,500 reported structure fires in high-rise buildings per year.** These fires caused an average of 40 civilian deaths, 520 civilian injuries, and \$154 million in direct property damage per year. Three percent of structure fires reported in 2009-2013 occurred in high-rise buildings. In this analysis, structures are considered high-rise if they have at least seven stories above grade.

**Five property classes account for three-quarters (73%) of high-rise fires: apartments or other multi-family housing, hotels, dormitories or dormitory-type properties, offices, and facilities that care for the sick.** Some property uses – such as stores, restaurants or one- or two-family homes – may represent only a single floor or part of a floor in a tall building primarily devoted to other uses. Some property uses – such as grain elevators and factories – can be as tall as a high-rise building even though they do not have a large number of separate floors or stories. This report focuses on the five property classes mentioned above. In these five property classes combined, an average of 10,600 high-rise structure fires were reported per year during 2009-2013. These fires caused an average of 27 civilian deaths (65% of high-rise fire deaths), 418 civilian injuries (81%), and \$54 million (35%) in direct property damage per year. These five

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<sup>2</sup> Robert S. McCarthy. *Catastrophic Multiple-Death Fires in the United States – 2001*, Quincy, MA: NFPA, 2002, p. 19.

property classes are the focus of this analysis. In this report, the term “apartment” also includes other multi-family housing.

**Figure 1.**  
**High-rise fires by occupancy**  
**2009-2013 annual averages**

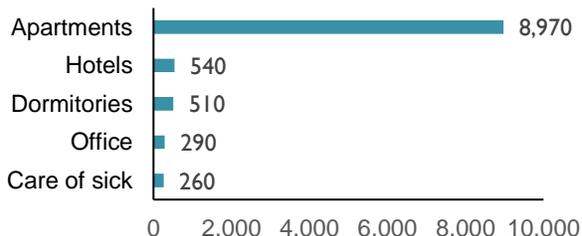


Figure 1 shows the average number of high-rise fires in these properties per year during 2009-2013. More than three out of five (62%) high-rise fires occurred in apartments or other multi-family housing. Hotels and dormitories or related properties each accounted for 4%, and office buildings and facilities that care for the sick each accounted for 2%. Table 1 also shows the average civilian deaths, civilian injuries, and direct property damage per year from these fires.

Figure 2 shows that 15% of hotel fires occurred in high-rise buildings, as did 14% of the fires in facilities that care for the sick, 13% of dormitory fires, 9% of office building fires, and 8% of fires in apartments or multi-family homes. Table 2 also shows the percent of casualties and property damage from high-rise fires in each of the five property classes.

**Figure 2.**  
**Percent of high-rise fires and losses by occupancy: 2009-2013**

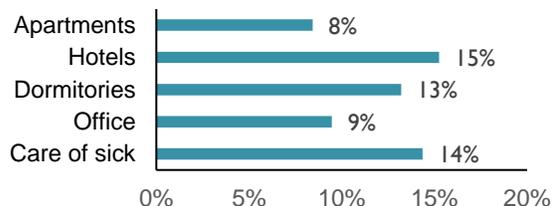
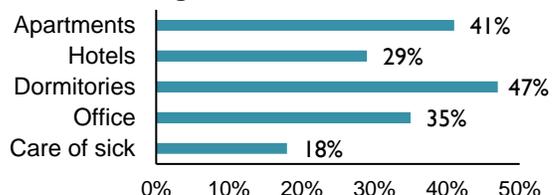


Table 3 shows that the risk of fire death per 1,000 fires was lower in high-rise buildings overall and in four of the five specific property groups. Average direct property damage loss per fire was lower in high-rise buildings overall and in all five property groups than in comparable lower-rise buildings. Hotels were the only occupancy of the five studied to have a lower fire injury rate in high-rise buildings than in shorter properties.

Most high-rise building fires begin on floors no higher than the 6<sup>th</sup> story. Figure 3 and Table 4 show that 47% of dormitory high-rise fires began on the 7<sup>th</sup> floor or higher, as did 41% of the apartment high-rise fires, 35% of the office building high-rise fires, 31% of the hotel high-rise fires, and 19% of the high-rise fires in facilities that care for the sick.

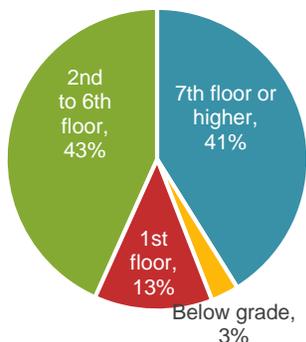
**Figure 3.**  
**High-rise fires starting on the 7th floor or higher: 2009-2013**



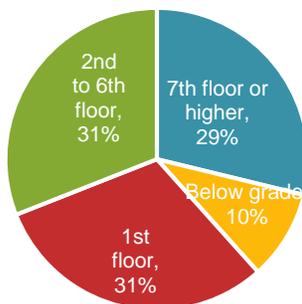
Ten percent of hotel and office building high-rise fires actually started below grade. Figure 4 shows a general breakdown of level of origin for the five different occupancies. Hotels, office buildings and facilities that care for the sick often have restaurants or cafeterias, small stores and other types of activities on the first floor. This may explain the higher percentages (25-35%) occurring on the first floor in these properties. Only 5% of the high-rise dormitory fires and 13% of the high-rise apartment fires began on the first floor.

**Figure 4. High-Rise Building Fires by Level of Fire Origin  
2009-2013**

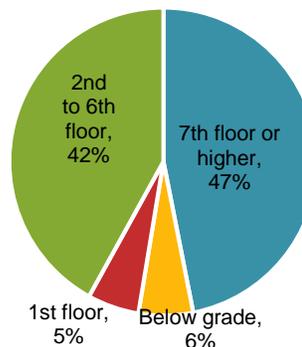
**A. Apartments**



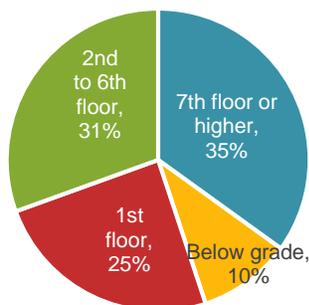
**B. Hotels or motels**



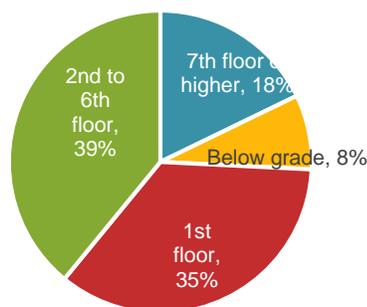
**C. Dormitories**



**D. Office buildings**



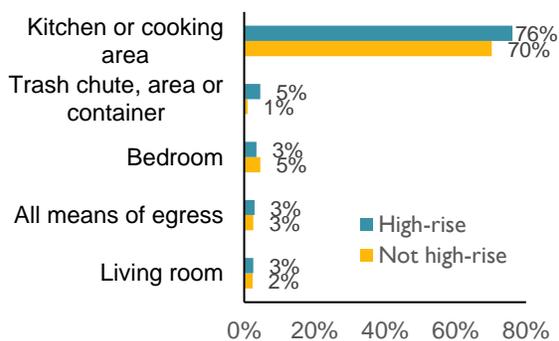
**E. Care of sick**



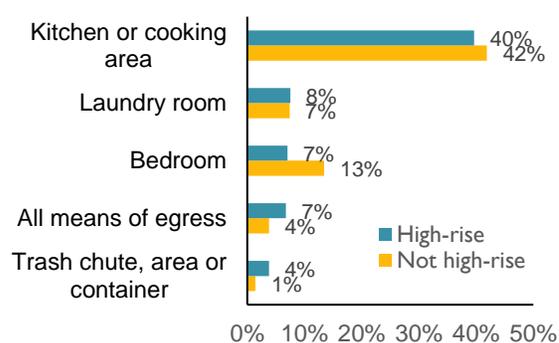
**The kitchen or cooking area was the leading area of origin in all five occupancies, regardless of height.** Figure 5 and Table 5 show that roughly two-thirds to three quarters of fires in apartments or other multi-family homes or in dormitory-type properties started in the kitchen or cooking area. All means of egress are grouped together in the figures but listed separately in Table 5.

**Figure 5.  
Top five areas of origin in high-rise fires and their share in shorter building fires  
2009-2013**

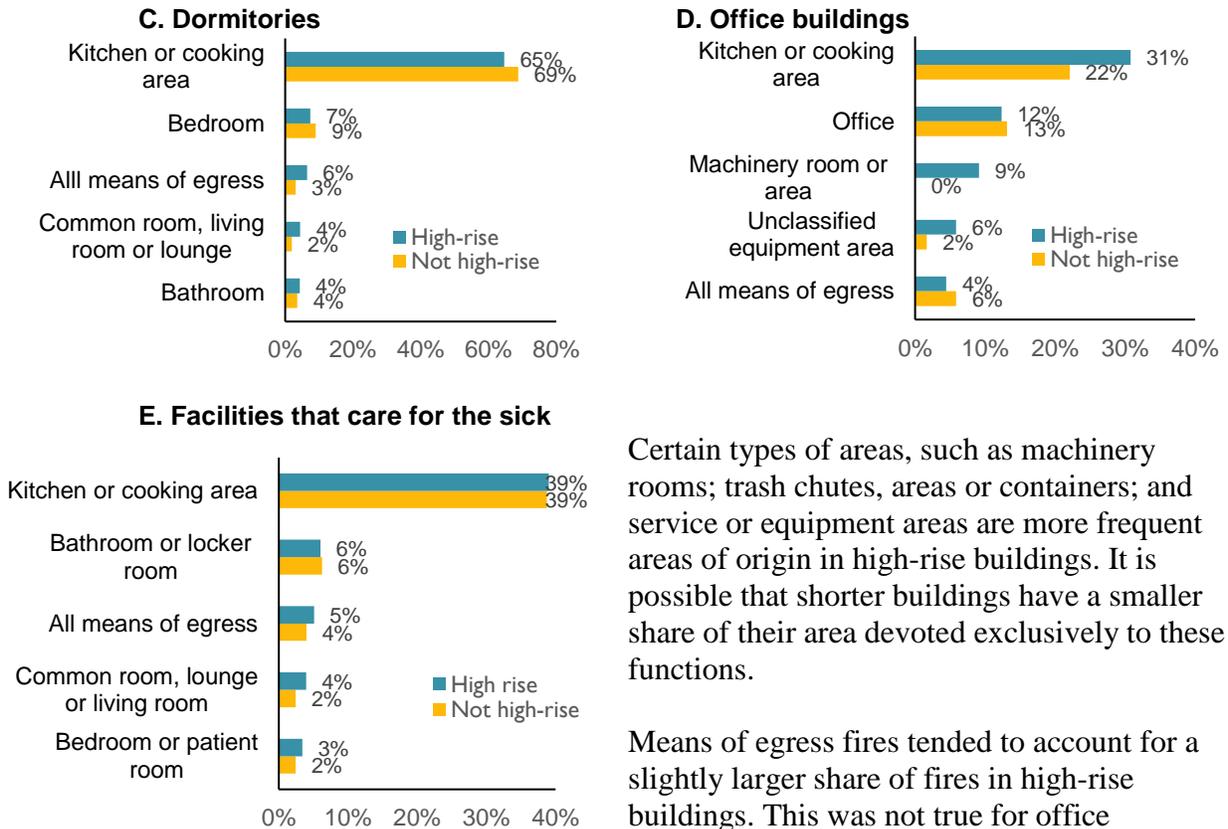
**A. Apartments or other multi-family**



**B. Hotels or motels**



**Figure 5.**  
**Top five areas of origin in high-rise fires and their share in shorter building fires**  
**2009-2013 (Continued)**

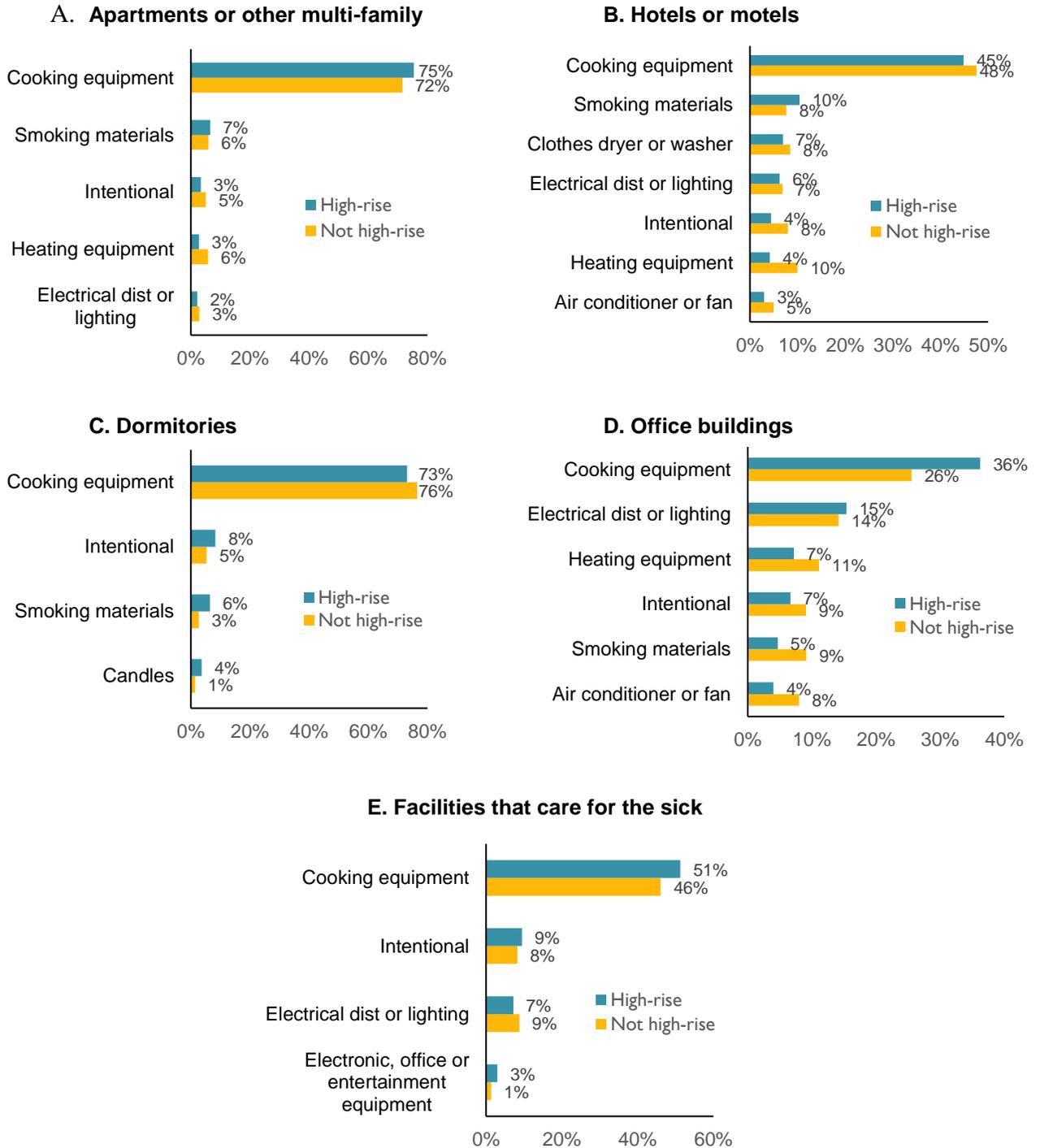


Certain types of areas, such as machinery rooms; trash chutes, areas or containers; and service or equipment areas are more frequent areas of origin in high-rise buildings. It is possible that shorter buildings have a smaller share of their area devoted exclusively to these functions.

Means of egress fires tended to account for a slightly larger share of fires in high-rise buildings. This was not true for office buildings.

**Cooking equipment was the leading cause of fires in both high-rise and shorter buildings in all of the occupancies studied.** Figure 6 and Table 6 show that building height makes little difference in the causes that have a strong human component, such as cooking, smoking materials, and intentional. Heating equipment was a less common cause of fires in high-rise buildings than in shorter buildings. High-rise buildings are more likely to have centrally controlled and maintained heating systems. The leading causes were derived from details collected in several data elements. See Appendix C for a description of how these causes were calculated.

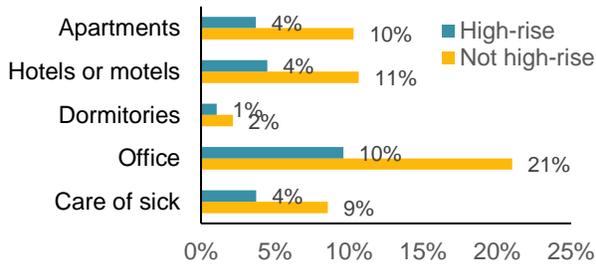
**Figure 6.**  
**Leading causes of high-rise fires and their share in shorter building fires**  
**2009-2013**



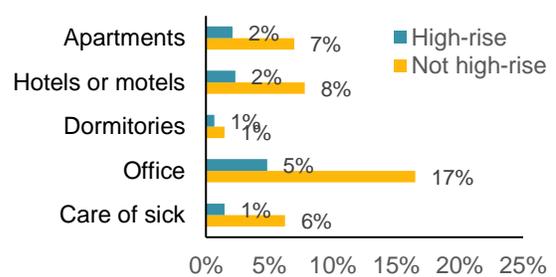
**Fires in high-rise buildings are less likely to spread beyond the room and floor of origin than were fires in shorter buildings.** Figure 7 shows that the fire was roughly twice as likely to spread beyond the room of origin in shorter buildings and two to four times as likely to spread beyond the floor of origin in non-high-rise buildings as in high-rise buildings. The fire was more likely to spread in office buildings than in other occupancies.

**Figure 7.**  
**Fire spread beyond the room and floor of origin**  
**2009-2013**

**A. Beyond room of origin.**



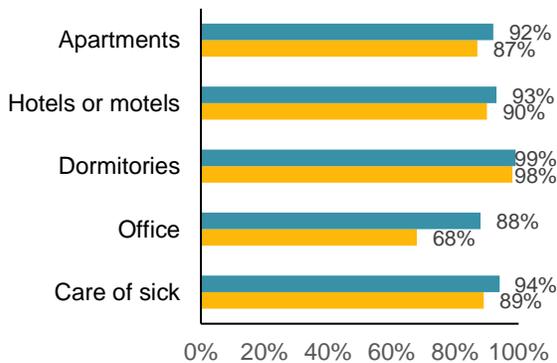
**B. Beyond floor of origin**



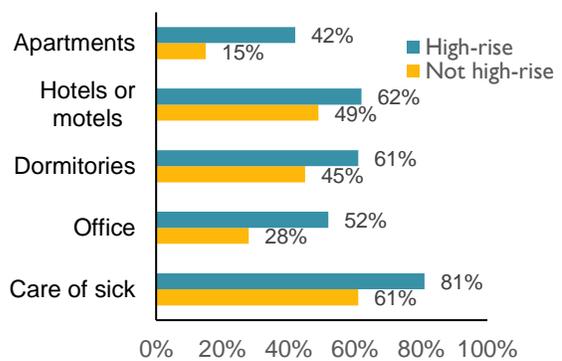
**The usage of wet pipe sprinklers and fire detection equipment is higher in high-rise buildings than in other buildings, for each property use group.** Figure 8 shows that the vast majority of properties had some type of fire detection, with office buildings having the smallest percentages, 68% and 88%, of shorter buildings and high-rise buildings, respectively.

**Figure 8.**  
**Presence of fire protection in fires**  
**2009-2013**

**A. Fire detection.**



**B. Wet pipe sprinklers, excluding buildings under construction and partial systems**

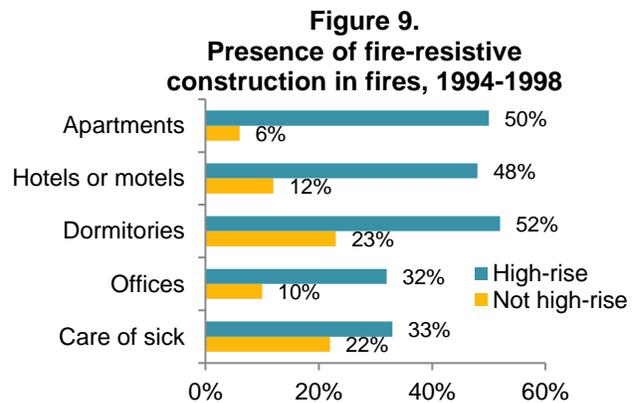


**Wet pipe sprinkler protection was much less common than fire detection.** Figure 8 shows that facilities that care for the sick were most likely to have this protection in buildings of all heights. Excluding properties under construction and those with only partial systems, wet pipe systems were present in 61% the shorter facilities and 81% of the high-rise facilities.

Although high-rise apartments or multi-family housing were almost three times as likely to have wet pipe sprinklers as shorter buildings (42% vs. 15%), they were the least likely of the five high-rise occupancies to have sprinklers.

**Fire-resistive construction is also more common in high-rise buildings.** Fire-resistive construction is either concrete or fire-resistant covered steel construction. It is designed to keep a fire from burning through it in less than two hours. Earlier versions of NFIRS captured the building's type of construction. This data element was dropped from Version 5.0 of NFIRS. Consequently, our most recent data on the subject is for the five-year period of 1994-1998.

Figure 9 shows that roughly half of the high-rise building fires in apartments, hotels, or dormitories had fire-resistive construction, compared to 6%, 12%, and 23% of the fires in shorter buildings in the same three occupancies. One-third of the high-rise fires in office buildings and facilities that care for the sick were in fire-resistive properties compared to 10% and 22% in the corresponding non-high-rise buildings.



**Because high-rise buildings tend to have more occupants and a longer distance to the exit discharge, fire prevention and fire protection are essential.** Great strides have been made in ensuring that the residential properties have fire detection. High-rise buildings are also much more likely to have wet pipe sprinklers and fire-resistive construction. The importance of these measures is seen in the lower overall fire death rate and average loss per fire and in the fact that fires in high rise buildings are much less likely to spread beyond the room or floor of origin.

Even so, too many fires are occurring in high-rise properties without sprinklers. Retrofitting these properties will make them safer. [NFPA 101®, Life Safety Code®](#), details fire protection requirements for the different occupancies for new and existing high-rise buildings. Despite the best efforts at fire prevention, a fire will occasionally start. The early warning from smoke detectors, automatic fire sprinklers that can control a fire and other building features are necessary to ensure that these fires stay small and building occupants are safe.

Most of us are not responsible for the design, construction or code enforcement in a high-rise building. See NFPA's additional resources about [high-rise fire safety for the public](#) to learn how to plan for a high-rise evacuation or read about fires that occurred in high-rise properties.

**Table 1. High-Rise Fires by Occupancy  
2009-2013 Annual Averages**

Occupancy	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Apartment or other multi-family housing	8,970	(62%)	26	(64%)	387	(75%)	\$39	(25%)
Hotel	540	(4%)	0	(0%)	11	(2%)	\$7	(4%)
Dormitory	510	(4%)	0	(1%)	7	(1%)	\$1	(0%)
Office building	290	(2%)	0	(0%)	6	(1%)	\$6	(4%)
Care of the sick	260	(2%)	0	(0%)	7	(1%)	\$2	(1%)
Subtotal	10,570	(73%)	27	(65%)	418	(81%)	\$54	(35%)
All other occupancies	3,970	(27%)	14	(35%)	100	(19%)	\$100	(65%)
Total	14,540	(100%)	41	(100%)	518	(100%)	\$154	(100%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 2. Percentage of Fires and Fire Losses in the Five Occupancies  
in High-Rise Buildings 2009-2013**

Occupancy	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage
Apartment or other multi-family housing	8%	7%	9%	3%
Hotel	15%	0%	10%	8%
Dormitory	13%	33%	23%	5%
Office building	9%	0%	15%	6%
Care of the sick	14%	0%	15%	7%

Note: Percentages were calculated by dividing the total reported structure fires in each occupancy by the reported high-rise fires in these occupancies. These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 3.**  
**Risk of Fire Casualty per Thousand Reported Fires and Average Loss per Fire**  
**2009-2013 Annual Averages**

<b>A. High-Rise Buildings</b>			
<b>Occupancy</b>	<b>Civilian Deaths per 1,000 Fires</b>	<b>Civilian Injuries per 1,000 Fires</b>	<b>Average Loss per Fire</b>
Apartment or other multi-family housing	2.9	43.1	\$4,300
Hotel	0.0	20.9	\$12,600
Dormitory	0.7	14.3	\$1,300
Office building	0.0	19.3	\$19,800
Care of the sick	0.0	25.0	\$8,800
Average of the five occupancy groups	2.5	39.5	\$5,100

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Average loss per fire is rounded to the nearest hundred dollars and not adjusted for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 3.**  
**Risk of Fire Casualty per Thousand Reported Fires and Average Loss per Fire**  
**2009-2013 Annual Averages**

<b>B. Buildings that Were Not High-Rise</b>			
<b>Occupancy</b>	<b>Civilian Deaths per 1,000 Fires</b>	<b>Civilian Injuries per 1,000 Fires</b>	<b>Average loss per fire</b>
Apartment or other multi-family housing	3.9	40.0	\$12,500
Hotel	3.1	35.3	\$25,800
Dormitory	0.2	7.3	\$3,900
Office building	0.4	11.8	\$33,600
Care of the sick	0.6	24.1	\$20,000
Average of the five occupancy groups	3.6	37.9	\$13,300

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Average loss per fire is rounded to the nearest hundred dollars and not adjusted for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 4.**  
**Fires in Selected Properties, by Number of Stories above Ground**  
**2009-2013 Annual Averages**

<b>A. Apartments or other multi-family housing</b>								
<b>Number of Stories</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
<b>Not high-rise (1-6 stories)</b>								
1	17,590	(17%)	69	(17%)	501	(12%)	\$127	(10%)
2	42,030	(40%)	199	(50%)	1,813	(42%)	\$636	(51%)
3	27,070	(25%)	74	(19%)	1,081	(25%)	\$360	(29%)
4	6,280	(6%)	16	(4%)	250	(6%)	\$64	(5%)
5	2,370	(2%)	7	(2%)	89	(2%)	\$18	(1%)
6	2,100	(2%)	10	(2%)	165	(4%)	\$15	(1%)
Subtotal-	97,430	(92%)	376	(93%)	3,900	(91%)	\$1,219	(97%)
<b>High-rise (7-100 stories)</b>								
7	1,250	(1%)	4	(1%)	65	(2%)	\$3	(0%)
8	980	(1%)	2	(0%)	31	(1%)	\$2	(0%)
9	670	(1%)	2	(0%)	19	(0%)	\$2	(0%)
10	1,010	(1%)	3	(1%)	27	(1%)	\$2	(0%)
11	630	(1%)	3	(1%)	18	(0%)	\$7	(1%)
12	870	(1%)	2	(1%)	25	(1%)	\$3	(0%)
13 or more	3,570	(3%)	10	(3%)	202	(5%)	\$18	(1%)
Subtotal	8,970	(8%)	26	(7%)	387	(9%)	\$39	(3%)
<b>Total</b>	<b>106,400</b>	<b>(100%)</b>	<b>402</b>	<b>(100%)</b>	<b>4,287</b>	<b>(100%)</b>	<b>\$1,258</b>	<b>(100%)</b>

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 4.**  
**Fires in Selected Properties, by Number of Stories above Ground**  
**2009-2013 Annual Averages (Continued)**

<b>B. Hotels or motels</b>								
<b>Number of Stories</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
<b>Not high-rise (1-6 stories)</b>								
1	630	(18%)	2	(23%)	23	(19%)	\$14	(17%)
2	740	(21%)	6	(62%)	45	(39%)	\$30	(36%)
3	870	(25%)	1	(8%)	18	(15%)	\$21	(25%)
4	420	(12%)	1	(7%)	14	(12%)	\$9	(10%)
5	200	(6%)	0	(0%)	4	(3%)	\$1	(1%)
6	120	(3%)	0	(0%)	2	(2%)	\$2	(2%)
Subtotal-	2,980	(85%)	9	(100%)	105	(90%)	\$77	(92%)
<b>High-rise (7-100 stories)</b>								
7	60	(2%)	0	(0%)	1	(1%)	\$1	(1%)
8	50	(1%)	0	(0%)	0	(0%)	\$0	(0%)
9	60	(2%)	0	(0%)	3	(2%)	\$1	(1%)
10	60	(2%)	0	(0%)	0	(0%)	\$0	(0%)
11	20	(0%)	0	(0%)	1	(1%)	\$2	(2%)
12	40	(1%)	0	(0%)	0	(0%)	\$1	(1%)
13 or more	250	(7%)	0	(0%)	5	(5%)	\$2	(2%)
Subtotal	540	(15%)	0	(0%)	11	(10%)	\$7	(8%)
<b>Total</b>	<b>3,520</b>	<b>(100%)</b>	<b>9</b>	<b>(100%)</b>	<b>117</b>	<b>(100%)</b>	<b>\$84</b>	<b>(100%)</b>

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 4.**  
**Fires in Selected Properties, by Number of Stories above Ground**  
**2009-2013 Annual Averages (Continued)**

<b>C. Dormitories</b>									
<b>Number of Stories</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>		
<b>Not high-rise (1-6 stories)</b>									
1	420	(11%)	0	(34%)	4	(12%)	\$2	(13%)	
2	890	(23%)	0	(32%)	7	(23%)	\$3	(22%)	
3	1,150	(30%)	0	(0%)	10	(30%)	\$3	(20%)	
4	610	(16%)	0	(0%)	2	(6%)	\$5	(37%)	
5	170	(4%)	0	(0%)	1	(3%)	\$0	(1%)	
6	120	(3%)	0	(0%)	1	(2%)	\$0	(1%)	
Subtotal-	3,360	(87%)	1	(67%)	25	(77%)	\$13	(95%)	
<b>High-rise (7-100 stories)</b>									
7	70	(2%)	0	(0%)	0	(0%)	\$0	(1%)	
8	110	(3%)	0	(0%)	4	(12%)	\$0	(1%)	
9	30	(1%)	0	(33%)	2	(5%)	\$0	(0%)	
10	50	(1%)	0	(0%)	0	(0%)	\$0	(0%)	
11	20	(1%)	0	(0%)	0	(0%)	\$0	(1%)	
12	30	(1%)	0	(0%)	1	(2%)	\$0	(0%)	
13 or more	210	(5%)	0	(0%)	1	(3%)	\$0	(1%)	
Subtotal	510	(13%)	0	(33%)	7	(23%)	\$1	(5%)	
<b>Total</b>	<b>3,870</b>	<b>(100%)</b>	<b>1</b>	<b>(100%)</b>	<b>32</b>	<b>(100%)</b>	<b>\$14</b>	<b>(100%)</b>	

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 4.**  
**Fires in Selected Properties, by Number of Stories above Ground**  
**2009-2013 Annual Averages (Continued)**

<b>D. Office buildings</b>									
<b>Number of Stories</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>		
<b>Not high-rise (1-6 stories)</b>									
1	1,460	(47%)	0	(19%)	20	(53%)	\$40	(40%)	
2	710	(23%)	0	(39%)	5	(14%)	\$29	(29%)	
3	330	(11%)	0	(0%)	4	(11%)	\$7	(7%)	
4	160	(5%)	0	(42%)	2	(6%)	\$7	(7%)	
5	80	(2%)	0	(0%)	0	(1%)	\$6	(6%)	
6	50	(2%)	0	(0%)	0	(1%)	\$4	(4%)	
Subtotal-	2,800	(91%)	1	(100%)	33	(85%)	\$94	(94%)	
<b>High-rise (7-100 stories)</b>									
7	30	(1%)	0	(0%)	0	(0%)	\$0	(0%)	
8	20	(1%)	0	(0%)	0	(0%)	\$1	(1%)	
9	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)	
10	20	(1%)	0	(0%)	0	(0%)	\$0	(0%)	
11	10	(0%)	0	(0%)	0	(0%)	\$0	(0%)	
12	30	(1%)	0	(0%)	1	(4%)	\$0	(0%)	
13 or more	170	(5%)	0	(0%)	4	(11%)	\$5	(5%)	
Subtotal	290	(9%)	0	(0%)	6	(15%)	\$6	(6%)	
<b>Total</b>	<b>3,090</b>	<b>(100%)</b>	<b>1</b>	<b>(100%)</b>	<b>39</b>	<b>(100%)</b>	<b>\$100</b>	<b>(100%)</b>	

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 4.**  
**Fires in Selected Properties, by Number of Stories above Ground**  
**2009-2013 Annual Averages (Continued)**

<b>E. Facilities that care for the sick</b>								
Number of Stories	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
<b>Not high-rise (1-6 stories)</b>								
1	680	(37%)	0.5	(52%)	13	(29%)	\$19	(57%)
2	280	(15%)	0.2	(26%)	3	(7%)	\$6	(18%)
3	190	(10%)	0.0	(0%)	4	(9%)	\$3	(8%)
4	170	(9%)	0.0	(0%)	10	(23%)	\$2	(6%)
5	130	(7%)	0.2	(23%)	4	(9%)	\$1	(3%)
6	120	(6%)	0.0	(0%)	3	(7%)	\$0	(1%)
Subtotal-	1,560	(86%)	1.0	(100%)	38	(85%)	\$31	(93%)
<b>High-rise (7-100 stories)</b>								
7	50	(3%)	0.0	(0%)	1	(1%)	\$0	(0%)
8	90	(5%)	0.0	(0%)	1	(3%)	\$1	(2%)
9	40	(2%)	0.0	(0%)	3	(7%)	\$0	(0%)
10	30	(2%)	0.0	(0%)	0	(0%)	\$1	(4%)
11	10	(1%)	0.0	(0%)	0	(0%)	\$0	(0%)
12	0	(0%)	0.0	(0%)	0	(0%)	\$0	(0%)
13 or more	40	(2%)	0.0	(0%)	1	(3%)	\$0	(1%)
Subtotal	260	(14%)	0.0	(0%)	7	(15%)	\$2	(7%)
<b>Total</b>	<b>1,820</b>	<b>(100%)</b>	<b>1.0</b>	<b>(100%)</b>	<b>44</b>	<b>(100%)</b>	<b>\$33</b>	<b>(100%)</b>

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 5.**  
**High-Rise and Shorter Building Fires, by Leading Areas of Origin**  
**2009-2013 Annual Averages**

<b>A. Apartments or other multi-family housing</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Area of Origin</b>	<b>Fires</b>		<b>Area of Origin</b>	<b>Fires</b>	
Kitchen or cooking area	6,830	(76%)	Kitchen or cooking area	68,500	(70%)
Trash or rubbish chute, area or container	410	(5%)	Bedroom	4,420	(5%)
Bedroom	310	(3%)	All Means of Egress	2,550	(3%)
All Means of Egress	260	(3%)	Exterior stairway	670	(1%)
Hallway or corridor	90	(1%)	Interior stairway	510	(1%)
Interior stairway	80	(1%)	Unclassified means of egress	470	(0%)
Unclassified means of egress	40	(0%)	Hallway or corridor	450	(0%)
Lobby or entrance way	30	(0%)	Lobby or entrance way	420	(0%)
Exterior stairway	20	(0%)	Escalator	20	(0%)
Escalator	0	(0%)	Living room, family room or den	2,300	(2%)
Living room, family room or den	230	(3%)	Exterior balcony or unenclosed porch	2,180	(2%)
			Laundry room or area	1,820	(2%)
			Bathroom	1,730	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 5.**  
**High-Rise and Shorter Building Fires, by Leading Areas of Origin**  
**2009-2013 Annual Averages (Continued)**

<b>B. Hotels or Motels</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Area of Origin</b>	<b>Fires</b>		<b>Area of Origin</b>	<b>Fires</b>	
Kitchen or cooking area	210	(40%)	Kitchen or cooking area	1,250	(42%)
Laundry room or area	40	(8%)	Bedroom	400	(13%)
Bedroom	40	(7%)	Laundry room or area	220	(7%)
All Means of Egress	40	(7%)	Lavatory, bathroom, locker room or check room	120	(4%)
<i>Hallway or corridor</i>	10	(3%)	All Means of Egress	110	(4%)
<i>Lobby or entrance way</i>	10	(2%)	<i>Hallway or corridor</i>	40	(1%)
<i>Interior stairway</i>	10	(1%)	<i>Exterior stairway</i>	20	(1%)
<i>Unclassified means of egress</i>	0	(1%)	<i>Lobby or entrance way</i>	20	(1%)
<i>Escalator</i>	0	(0%)	<i>Unclassified means of egress</i>	20	(1%)
<i>Exterior stairway</i>	0	(0%)	<i>Interior stairway</i>	10	(0%)
Trash chute, area or container	20	(4%)	<i>Escalator</i>	0	(0%)
Machinery room or area or elevator machinery room	10	(2%)	Common room, living room, family room, lounge or den	70	(2%)
Lavatory, bathroom, locker room or check room	10	(2%)	Heating equipment room	60	(2%)
Common room, living room, family room, lounge or den	10	(2%)	Confined chimney or flue fire	60	(2%)
Unclassified equipment or service area	10	(2%)	Unclassified function area	50	(2%)
Unclassified storage area	10	(2%)	Unclassified area of origin	40	(2%)
Exterior roof surface	10	(2%)			
Unclassified function area	10	(2%)			

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 5.**  
**High-Rise and Shorter Building Fires, by Leading Areas of Origin**  
**2009-2013 Annual Averages (Continued)**

<b>C. Dormitories</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Area of Origin</b>	<b>Fires</b>		<b>Area of Origin</b>	<b>Fires</b>	
Kitchen or cooking area	330	(65%)	Kitchen or cooking area	2,310	(69%)
Bedroom	40	(7%)	Bedroom	300	(9%)
All Means of Egress	30	(6%)	Lavatory, bathroom, locker room or check room	120	(4%)
Hallway or corridor	20	(3%)	All Means of Egress	100	(3%)
<i>Lobby or entrance way</i>	<i>10</i>	<i>(2%)</i>	<i>Hallway or corridor</i>	<i>60</i>	<i>(2%)</i>
<i>Unclassified means of egress</i>	<i>10</i>	<i>(1%)</i>	<i>Exterior stairway</i>	<i>20</i>	<i>(1%)</i>
<i>Interior stairway</i>	<i>0</i>	<i>(0%)</i>	<i>Interior stairway</i>	<i>10</i>	<i>(0%)</i>
<i>Exterior stairway</i>	<i>0</i>	<i>(0%)</i>	<i>Lobby or entrance way</i>	<i>10</i>	<i>(0%)</i>
<i>Escalator</i>	<i>0</i>	<i>(0%)</i>	<i>Unclassified means of egress</i>	<i>10</i>	<i>(0%)</i>
Common room, living room, family room, lounge or den	20	(4%)	<i>Escalator</i>	<i>0</i>	<i>(0%)</i>
Lavatory, bathroom, locker room or check room	20	(4%)	Unclassified area of origin	70	(2%)
Trash or rubbish chute, area or container	10	(3%)	Common room, living room, family room, lounge or den	60	(2%)
Unclassified outside area	10	(2%)	Laundry room or area	50	(2%)
			Unclassified function area	50	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 5.**  
**High-Rise and Shorter Building Fires, by Leading Areas of Origin**  
**2009-2013 Annual Averages (Continued)**

<b>D. Office Buildings</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Area of Origin</b>	<b>Fires</b>		<b>Area of Origin</b>	<b>Fires</b>	
Kitchen or cooking area	90	(31%)	Kitchen or cooking area	620	(22%)
Office	40	(12%)	Office	370	(13%)
Machinery room or area or elevator machinery room	30	(9%)	All Means of Egress	160	(6%)
Unclassified equipment or service area	20	(6%)	<i>Lobby or entrance way</i>	60	(2%)
All Means of Egress	10	(4%)	<i>Unclassified means of egress</i>	50	(2%)
<i>Lobby or entrance way</i>	10	(2%)	<i>Exterior stairway</i>	30	(1%)
<i>Unclassified means of egress</i>	0	(1%)	<i>Hallway or corridor</i>	20	(1%)
<i>Exterior stairway</i>	0	(1%)	<i>Interior stairway</i>	10	(0%)
<i>Hallway or corridor</i>	0	(1%)	<i>Escalator</i>	0	(0%)
<i>Interior stairway</i>	0	(1%)	Lavatory, bathroom, locker room or check room	120	(4%)
<i>Escalator</i>	0	(0%)	Heating equipment room	110	(4%)
Lavatory, bathroom, locker room or check room	10	(3%)	Unclassified outside area	110	(4%)
Exterior roof surface	10	(3%)	Exterior wall surface	90	(3%)
Duct for HVAC, cable, exhaust, heating, or AC	10	(3%)	Exterior roof surface	80	(3%)
Small assembly area, less than 100 person capacity	10	(2%)	Attic or ceiling/roof assembly or concealed space	80	(3%)
Switchgear area or transformer vault	10	(2%)	Unclassified area of origin	70	(3%)
Trash or rubbish chute, area or container	10	(2%)	Trash or rubbish chute, area or container	50	(2%)
			Wall assembly or concealed space	50	(2%)
			Unclassified equipment or service area	50	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 5.**  
**High-Rise and Shorter Building Fires, by Leading Areas of Origin**  
**2009-2013 Annual Averages (Continued)**

<b>E. Facilities that care for the sick</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Area of Origin</b>	<b>Fires</b>		<b>Area of Origin</b>	<b>Fires</b>	
Kitchen or cooking area	100	(39%)	Kitchen or cooking area	600	(39%)
Lavatory, bathroom, locker room or check room	20	(6%)	Lavatory, bathroom, locker room or check room	100	(6%)
All Means of Egress	10	(5%)	Office	80	(5%)
<i>Hallway or corridor</i>	10	(3%)	Heating equipment room	60	(4%)
<i>Unclassified means of egress</i>	0	(2%)	All Means of Egress	60	(4%)
<i>Lobby or entrance way</i>	0	(0%)	<i>Lobby or entrance way</i>	20	(2%)
<i>Exterior stairway</i>	0	(0%)	<i>Hallway or corridor</i>	20	(1%)
<i>Interior stairway</i>	0	(0%)	<i>Exterior stairway</i>	10	(0%)
<i>Escalator</i>	0	(0%)	<i>Unclassified means of egress</i>	10	(0%)
Common room, living room, family room, lounge or den	10	(4%)	<i>Interior stairway</i>	0	(0%)
Bedroom	10	(3%)	<i>Escalator</i>	0	(0%)
Trash chute, area or container	10	(3%)	Laundry room or area	40	(3%)
Machinery room or area or elevator machinery room	10	(3%)	Bedroom	40	(2%)
Office	10	(3%)	Common room, living room, family room, lounge or den	40	(2%)
Unclassified equipment or service area	10	(3%)	Exterior roof surface	30	(2%)
Laboratory	10	(3%)	Unclassified equipment or service area	30	(2%)
Unclassified function area	10	(3%)	Dining room, bar or beverage area, cafeteria	30	(2%)
Storage room, area, tank, or bin	10	(2%)	Unclassified area of origin	30	(2%)
Unclassified area of origin	10	(2%)	Machinery room or area or elevator machinery room	30	(2%)
Unclassified service facility	10	(2%)	Unclassified function area	20	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 6.**  
**High-Rise and Shorter Building Fires, by Leading Causes**  
**2009-2013 Annual Averages**

<b>A. Apartments or other multi-family housing</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Cause</b>	<b>Fires</b>		<b>Cause</b>	<b>Fires</b>	
Cooking equipment	6,770	(75%)	Cooking equipment	69,670	(72%)
Smoking materials	590	(7%)	Smoking materials	5,750	(6%)
Intentional	300	(3%)	Heating equipment	5,650	(6%)
Heating equipment	250	(3%)	Intentional	4,910	(5%)
Electrical distribution and lighting equipment	190	(2%)	Electrical distribution and lighting equipment	2,770	(3%)
Candles	170	(2%)	Exposure	1,920	(2%)
			Clothes dryer or washer	1,850	(2%)
			Candles	1,820	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 6.**  
**High-Rise and Shorter Building Fires, by Leading Causes**  
**2009-2013 Annual Averages (Continued)**

<b>B. Hotels or motels</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Cause</b>	<b>Fires</b>		<b>Cause</b>	<b>Fires</b>	
Cooking equipment	240	(45%)	Cooking equipment	1,420	(48%)
Smoking materials	60	(10%)	Heating equipment	290	(10%)
Clothes dryer or washer	40	(7%)	Clothes dryer or washer	250	(8%)
Electrical distribution and lighting equipment	30	(6%)	Intentional	230	(8%)
Intentional	20	(4%)	Smoking materials	200	(8%)
Heating equipment	20	(4%)	Electrical distribution and lighting equipment	160	(7%)
Air conditioner or fan	20	(3%)	Air conditioner or fan	160	5%
Spontaneous combustion or chemical reaction	10	(2%)	Candles	60	(5%)
Candles	10	(2%)			(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 6.**  
**High-Rise and Shorter Building Fires, by Leading Causes**  
**2009-2013 Annual Averages (Continued)**

<b>C. Dormitories</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Cause</b>	<b>Fires</b>		<b>Cause</b>	<b>Fires</b>	
Cooking equipment	370	(73%)	Cooking equipment	2,570	(76%)
Intentional	40	(8%)	Intentional	180	(5%)
Smoking materials	30	(6%)	Heating equipment	90	(3%)
Candles	20	(4%)	Smoking materials	90	(3%)
Playing with heat source	10	(2%)	Electrical distribution and lighting equipment	60	(2%)
Electrical distribution and lighting equipment	10	(2%)			

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 6.**  
**High-Rise and Shorter Building Fires, by Leading Causes**  
**2009-2013 Annual Averages (Continued)**

<b>D. Office buildings</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Cause</b>	<b>Fires</b>		<b>Cause</b>	<b>Fires</b>	
Cooking equipment	110	(36%)	Cooking equipment	720	(26%)
Electrical distribution and lighting equipment	50	(15%)	Electrical distribution and lighting equipment	400	(14%)
Heating equipment	20	(7%)	Heating equipment	310	(11%)
Intentional	20	(7%)	Smoking materials	260	(9%)
Smoking materials	10	(5%)	Intentional	250	(9%)
Air conditioner or fan	10	(4%)	Air conditioner or fan	220	8%
Torch, burner, or soldering iron	10	(3%)	Exposure	120	(4%)
Electronic, office or entertainment equipment	10	(3%)	Electronic, office or entertainment equipment	90	(3%)
Shop tools and industrial equipment excluding torches, burners or soldering irons	10	(3%)	Candles	60	(2%)
			Shop tools and industrial equipment excluding torches, burners or soldering irons	50	(2%)
			Torch, burner, or soldering iron	50	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

**Table 6.**  
**High-Rise and Shorter Building Fires, by Leading Causes**  
**2009-2013 Annual Averages (Continued)**

<b>E. Facilities that care for the sick</b>					
<b>High-Rise</b>			<b>Not High-Rise</b>		
<b>Cause</b>	<b>Fires</b>		<b>Cause</b>	<b>Fires</b>	
Cooking equipment	130	(51%)	Cooking equipment	720	46%
Intentional	20	(9%)	Heating equipment	140	9%
Electrical distribution and lighting equipment	20	(7%)	Electrical distribution and lighting equipment	140	9%
Electronic, office or entertainment equipment	10	(3%)	Intentional	130	8%
Shop tools and industrial equipment excluding torches, burners or soldering irons	10	(2%)	Air conditioner or fan	70	5%
Medical equipment	10	(2%)	Smoking materials	50	3%
			Medical equipment	40	3%
			Clothes dryer or washer	30	2%

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Estimates include proportional shares of fire with number of stories above ground coded as unknown, blank, zero, less than zero or greater than 100. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars without adjustment for inflation. Estimates of deaths, injuries, or property damage can be significantly affected by the inclusion or exclusion of one unusually serious fire. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA Fire Experience Survey.

## Appendix A. Deadliest High-Rise Building Fires in History

Incident	Civilian and Firefighter Deaths	Height in Stories	Floor of Origin
1. <a href="#">Office Towers (2 Towers)</a> New York, September 2001	2,666	110	94-98 (tower 1) 78-84 (tower 2)
2. <a href="#">Office</a> Brazil, February 1974	179	25	12
3. <a href="#">Office</a> Oklahoma, April 1995	168	9	Outside
4. <a href="#">Hotel</a> South Korea, December 1971	163	21	2
5. <a href="#">Clothing Manufacture</a> New York, March 1911	146	10	8
6. <a href="#">Hotel</a> Georgia, December 1946	119	15	3
7. <a href="#">Multiple Occupancy Building</a> Japan, May 1972	118	7	3
8. Garment Factory Bangladesh, November 2012	112	9	1
9. <a href="#">Department Store</a> Japan, November 1973	104	9	Unknown
10. <a href="#">Hotel</a> Puerto Rico, December 1986	97	20	1

Source: NFPA's Fire Incident Data Organization (FIDO), Fire Investigations database and other records.  
Please notify us of any corrections or additions.

## Appendix B.

### 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 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 fire department experience 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 [Fire Loss in the U.S. 2010](#).

### **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.

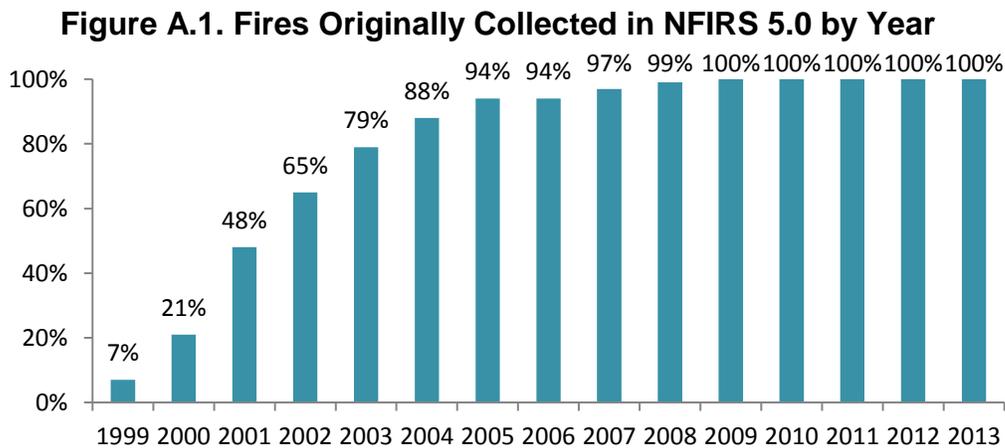
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific 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.

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.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

Some analyses of structure fires show only non-confined fires. In these tables, percentages shown are of non-confined structure fires rather than all structure fires. This

approach has the advantage of showing the frequency of specific factors in fire causes, but the disadvantage of possibly overstating the percentage of factors that are seldom seen in the confined fire incident types and of understating the factors specifically associated with the confined fire incident types.

Other analyses include entries for confined fire incident types in the causal tables and show percentages based on total structure fires. In these cases, the confined fire incident type is treated as a general causal factor.

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.

**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.

**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

All fires in range 60-69

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

All fires

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(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.

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

**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.

## Appendix C. Methodology and Definitions Used in “Leading Cause” Tables

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The cause table reflects relevant causal factors that accounted for at least 2% of the fires in a given occupancy. Only those causes that seemed to describe a scenario are included. Because the causal factors are taken from different fields, some double counting is possible. Percentages are calculated against the total number of structure fires, including both confined and non-confined fires. Bear in mind that every fire has at least three “causes” in the sense that it could have been prevented by changing behavior, heat source, or ignitability of first fuel, the last an aspect not reflected in any of the major cause categories. For example, several of the cause categories in this system refer to types of equipment (cooking, heating, electrical distribution and lighting, clothes dryers and washers, torches). However, the problem may be not with the equipment but with the way it is used. The details in national estimates are derived from the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS). This methodology is based on the coding system used in Version 5.0 of NFIRS. The *NFIRS 5.0 Reference Guide*, containing all of the codes, can be downloaded from <http://www.nfirs.fema.gov/documentation/reference/>.

**Cooking equipment and heating equipment** are calculated by summing fires identified by equipment involved in ignition and relevant confined fires. Confined fires will be shown if they account for at least 2% of the incidents. **Confined cooking fires** (cooking fires involving the contents of a cooking vessel without fire extension beyond the vessel) are identified by NFIRS incident type 113.

**Confined heating equipment** fires include **confined chimney or flue fires** (incident type 114) and **confined fuel burner or boiler** fires (incident type 116). The latter includes delayed ignitions and incidents where flames caused no damage outside the fire box. The two types of confined heating fires may be combined or listed separately, depending on the numbers involved.

**Intentional** fires are identified by fires with a “1” (intentional) in the field “cause.” The estimate includes a proportional share of fires in which the cause was undetermined after investigation, under investigation, or not reported. All fires with intentional causes are included in this category regardless of the age of the person involved. Earlier versions of NFIRS included codes for incendiary and suspicious. Intentional fires were deliberately set; they may or may not be incendiary in a legal sense. No age restriction is applied.

Fires caused by **playing with heat source** (typically matches or lighters) are identified by code 19 in the field “factor contributing to ignition.” Fires in which the factor contribution to ignition was undetermined (UU), entered as none (NN) or left blank are considered unknown and allocated proportionally. Because factor contributing to ignition is not required for intentional fires, the share unknown, by these definitions, is somewhat larger than it should be.

The heat source field is used to identify fires started by: **smoking materials** (cigarette, code 61; pipe or cigar, code 62; and heat from undetermined smoking material,

code 63); **candles** (code 66), **lightning** (code 73); and **spontaneous combustion or chemical reaction** (code 72). Fires started by heat from unclassified open flame or smoking materials (code 60) are allocated proportionally among the “other open flame or smoking material” codes (codes 61-69) in an allocation of partial unknown data. This includes smoking materials and candles. This approach results in any true unclassified smoking or open flame heat sources such as incense being inappropriately allocated. However, in many fires, this code was used as an unknown.

The equipment involved in ignition field is used to find several cause categories. This category includes equipment that functioned properly and equipment that malfunctioned.

**Cooking equipment Non-confined fire** refers to equipment used to cook, heat or warm food (codes 620-649 and 654). Fire in which ranges, ovens or microwave ovens, food warming appliances, fixed or portable cooking appliances, deep fat fryers, open fired charcoal or gas grills, grease hoods or ducts, or other cooking appliances) were involved in the ignition are said to be caused by cooking equipment. Food preparation devices that do not involve heating, such as can openers or food processors, are not included here. As noted in Appendix A, a proportional share of unclassified kitchen and cooking equipment (code 600) is included here.

**Heating equipment Non-confined fire** (codes 120-199) includes central heat, portable and fixed heaters (including wood stoves), fireplaces, chimneys, hot water heaters, and heat transfer equipment such as hot air ducts or hot water pipes. Heat pumps are not included. As noted in Appendix A, a proportional share of unclassified heating, ventilation and air condition equipment (code 100) is included here.

Confined fires are excluded from the tallies of the remaining categories of fires involving equipment.

**Electrical distribution and lighting equipment** (codes 200-299) include: fixed wiring; transformers; associated overcurrent or disconnect equipment such as fuses or circuit breakers; meters; meter boxes; power switch gear; switches, receptacles and outlets; light fixtures, lamps, bulbs or lighting; signs; cords and plugs; generators, transformers, inverters, batteries and battery charges.

**Torch, burner or soldering iron** (codes 331-334) includes welding torches, cutting torches, Bunsen burners, plumber furnaces, blowtorches, and soldering equipment. As noted in Appendix A, a proportional share of shop tools and industrial equipment (code 300) is included here.

**Clothes dryer or washer** (codes 811, 813 and 814) includes clothes dryers alone, washer and dryer combinations within one frame, and washing machines for clothes. As noted in Appendix A, a proportional share of unclassified personal and household equipment (code 800) is included here.

**Electronic, office or entertainment equipment** (codes 700-799) includes: computers and related equipment; calculators and adding machines; telephones or answering machines; copiers; fax machines; paper shredders; typewriters; postage meters; other office equipment; musical instruments; stereo systems and/or

components; televisions and cable TV converter boxes,, cameras, excluding professional television studio cameras, video equipment and other electronic equipment. Older versions of NFIRS had a code for electronic equipment that included radar, X-rays, computers, telephones, and transmitter equipment.

**Shop tools and industrial equipment excluding torches, burners or soldering irons** (codes 300-330, 335-399) includes power tools; painting equipment; compressors; atomizing equipment; pumps; wet/dry vacuums; hoists, lifts or cranes; powered jacking equipment; water or gas drilling equipment; unclassified hydraulic equipment; heat-treating equipment; incinerators, industrial furnaces, ovens or kilns; pumps; compressors; internal combustion engines; conveyors; printing presses; casting, molding; or forging equipment; heat treating equipment; tar kettles; working or shaping machines; coating machines; chemical process equipment; waste recovery equipment; power transfer equipment; power takeoff; powered valves; bearings or brakes; picking, carding or weaving machines; testing equipment; gas regulators; separate motors; non-vehicular internal combustion engines; and unclassified shop tools and industrial equipment. As noted in Appendix A, a proportional share of shop tools and industrial equipment (code 300) is included here.

**Medical equipment** (codes 410-419) includes: dental, medical or other powered bed, chair or wheelchair; dental equipment; dialysis equipment; medical monitoring and imaging equipment; oxygen administration equipment; radiological equipment; medical sterilizers, therapeutic equipment and unclassified medical equipment. As noted in Appendix A, a proportional share of commercial and medical equipment (code 400) is included here.

Air conditioners or fans (codes 111 and 113) are self explanatory. As noted in Appendix A, a proportional share of unclassified heating, ventilation and air condition equipment (code 100) is included here.

**Exposures** are fires that are caused by the spread of or from another fire. These were identified by factor contributing to ignition code 71. This code is automatically applied when the exposure number is greater than zero.