

# **TRENDS AND PATTERNS OF U.S. FIRE LOSSES IN 2008**

**Marty Ahrens**  
**September 2009**



**National Fire Protection Association**  
**Fire Analysis and Research Division**

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## **Abstract**

Projections from NFPA's annual fire department experience data reported in Michael Karter's annual reports on *U.S. Fire Loss*, particularly the most recent report, are summarized in this analysis. Reported fires and fire deaths have fallen since 1977, the first year of available data. The drop in population-based rates is even sharper. In 2008, home structure fires accounted for 27% of the reported fires. However, these incidents caused 83% of all civilian fire deaths. Vehicle fires accounted for 16% of the reported fires and 11% of the civilian fire deaths. Roughly half (48%) of the reported fires were outside or other non-structure, non-vehicle fires. In 2008, only 6% of all fire department responses were to fires while 62% were medical aid responses.

Keywords: fire statistics, fires, fire deaths, fire loss

## **Acknowledgements**

The National Fire Protection Association thanks all the fire departments who participate in the annual NFPA fire experience survey. These firefighters are the original sources of the data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

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## Fire Department Experience with Fires and Other Calls

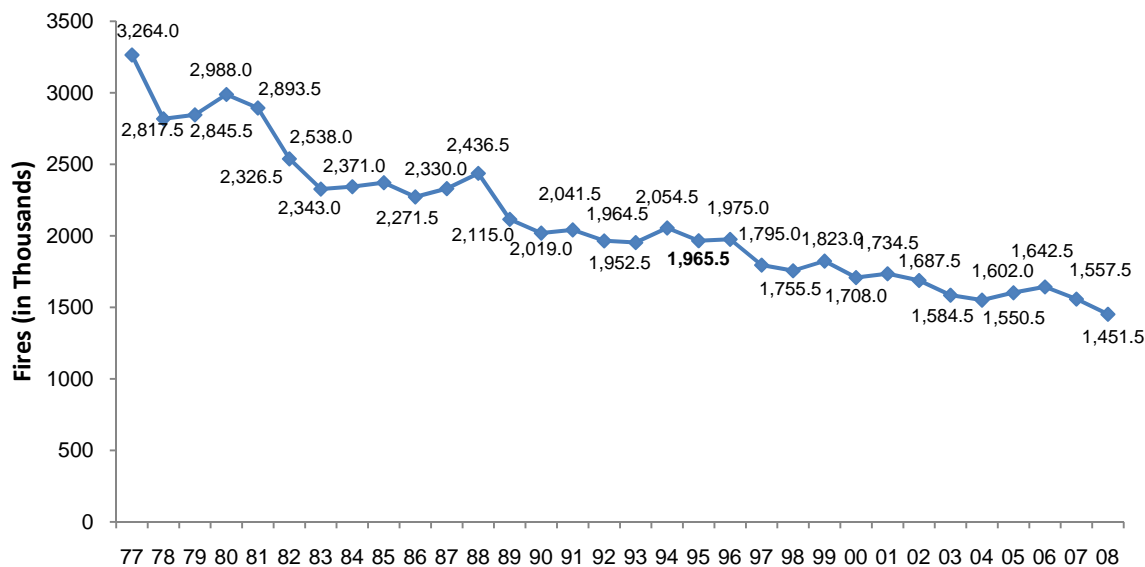
Except where otherwise noted, the statistics in this report were extracted from the annual reports, *Fire Loss in the United States*, by Michael J. Karter, Jr. The 2008 report may be downloaded free of charge from <http://www.nfpa.org/osds>. Copies can also be obtained from NFPA's One-Stop Data Shop by calling (617) 984-7443 or emailing [osds@nfpa.org](mailto:osds@nfpa.org). These statistics are projections based on the results of NFPA's annual fire department survey. Only fires reported to municipal fire departments are included. Fires handled without fire department involvement, by private fire brigades or by state or federal firefighting authorities are not included in these statistics.

### Fire departments responded to 1,451,500 fires in 2008.

U.S. municipal fire departments responded to an estimated 1,451,500 fires in 2008. These fires killed 3,320 civilians (non-firefighters) and caused 16,705 reported civilian fire injuries. Direct property damage was estimated at \$15.5 billion dollars. This figure includes an estimated \$1.4 billion in property losses from the California wildfires of 2008. One hundred and three (103) firefighters died while on duty or of injuries incurred while on duty.<sup>1</sup> The 515,000 structure fires accounted for 35% of all reported fires.

Figure 1 and Table 1 show that reported fires fell 56% from 3,264,000 in 1977 to 1,451,500 in 2008, the lowest point since the current data collection system began. Reported fires fell 7% from 1,557,500 in 2007.

**Figure 1. U.S. Fire Incident Trends  
(in Thousands) 1977-2008**

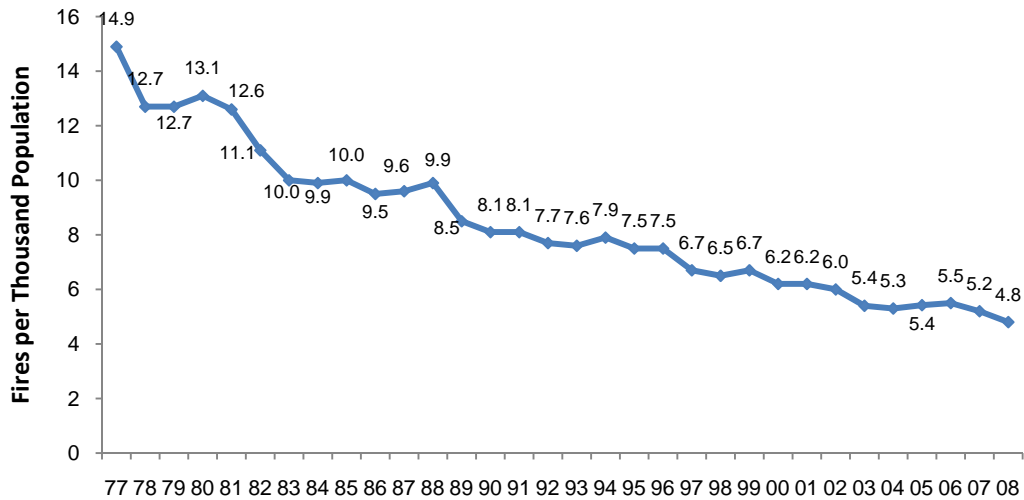


<sup>1</sup> Rita F. Fahy, Paul R. LeBlanc, and Joseph L. Molis, *Firefighter Fatalities in the United States – 2008*, Quincy, MA: National Fire Protection Association, July 2009.

**Rates of reported fires per 1,000 population fell even more sharply than total fires over the past three decades.**

According to the U.S. Census, the resident population of the US grew 38% from 1977 to 2008. Figure 2 shows that the rate of fires per 1,000 population fell 68% from 14.9 in 1977 to 4.8 in 2008.

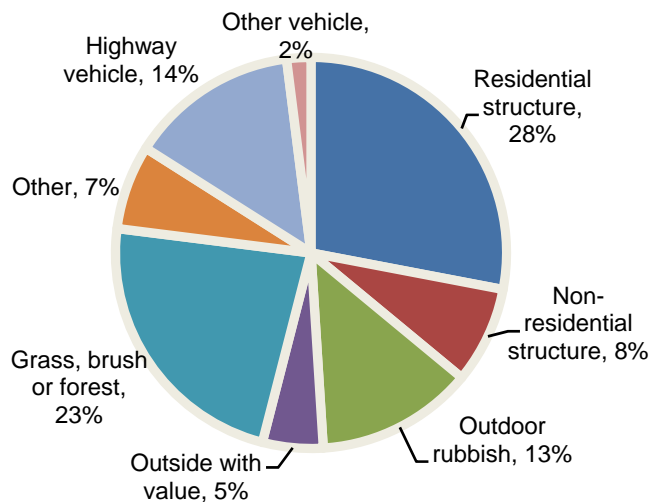
**Figure 2. Trend in Reported Fire Rates per Thousand Population 1977-2008**



**Structure fires account for one-third of all reported fires but the majority of losses.**

Figure 3 shows a breakdown of fires by major property class. The 515,000 reported structure fires caused 2,900 civilian fire deaths, 14,960 civilian fire injuries, and \$12.4 billion in direct property damage, not including the \$1.4 billion in losses from the California wildfires. Structure fires accounted for 35% of the reported fires, 87% of the civilian fire deaths, 90% of the civilian fire injuries, and 80% of the direct property loss.

**Figure 3. Reported Fire Incidents by Major Property Class 2008**



Reported structure fires fell 53% from 1,098,000 in 1977. From 2007 (530,500 structure fires) to 2008, they fell 4%. Generally speaking, any fire in or on a structure is considered a structure fire, even if only the contents were involved and there was no structural damage.

### **Home fires dominate the structure fire problem.**

Seventy-eight percent (403,000) of the 515,000 structure fires occurred in residential properties, including homes, hotels, motels, rooming houses and dormitories; 75% (386,500) occurred in homes. (NFPA uses the term “home” to include one- and two-family homes, apartments and manufactured housing.) Home structure fires fell 47% from the 723,500 reported in 1977. They fell 3% from the 399,000 reported in 2007.

Fifty-seven percent (291,000) of all reported structure fires occurred in one- and two-family homes, including manufactured homes; 19% (95,500) occurred in apartments. NFPA produces a variety of reports about general and specific causes and circumstances of home fires. The general overview of home structure fires, free to all, is available at <http://www.nfpa.org/osds>. NFPA members may download more specific reports at no cost. Purchasing details for non-members are also found on the site.

### **Home structure fires caused 83% of the civilian fire deaths.**

Eighty-three percent of the 3,320 civilian fire deaths resulted from home structure fires. Only 20% of all reported fires occurred in one- or two-family homes but these fires caused 71% (2,365) of the fire deaths. Apartment fires accounted for 7% of all reported fires, but resulted in 12% (390) of the deaths. Figures 4-6 show breakdown of civilian fire deaths, civilian fire injuries, and direct property damage by type of fire and property class. Homes also account for the largest share of civilian fire injuries and direct property damage. Although non-residential structure fires accounted for only 8% of all reported fires, Figure 6 shows that these incidents caused 25% of the direct property damage.

For more information about the people killed or injured in home fires, see NFPA’s 2008 report, *Characteristics of Home Fire Victims*, by Jennifer D. Flynn.

### **Vehicle fires caused 11% of fire deaths.**

During 2008, the 236,000 reported vehicle fires caused an estimated 365 civilian deaths, 1,065 civilian injuries, and \$1.5 billion in direct property loss. Vehicle fires accounted for 16% of the reported fires, 11% of the civilian fire deaths, 6% of the civilian fire injuries, and 10% of the total direct property damage.

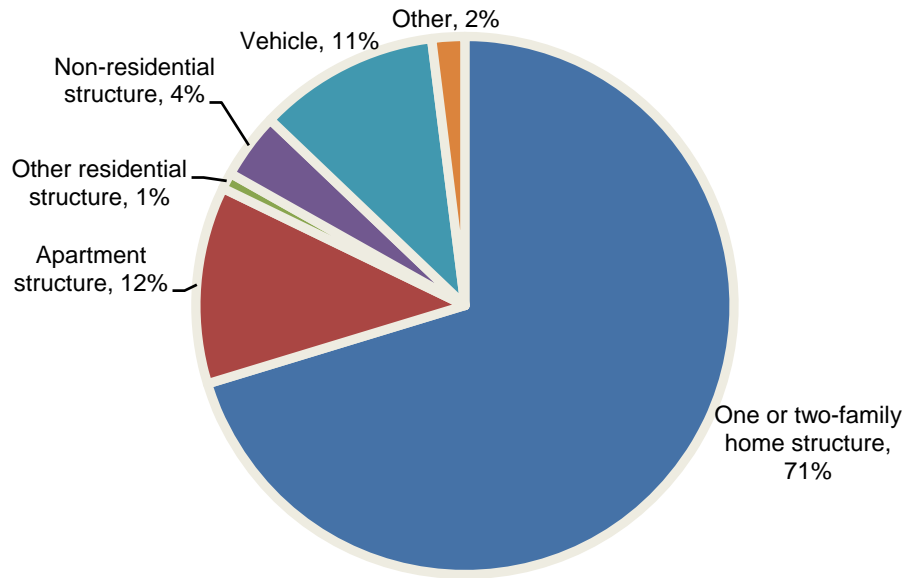
The 365 vehicle fire deaths accounted for three times the 120 civilian deaths reported in non-residential structure fires. Vehicle fires fell 54% from 508,000 in 1977. From 2007 to 2008, highway vehicle<sup>2</sup> fires fell 9%, while non-highway vehicle fires fell 5%. In 2008, vehicle fires and associated civilian fire deaths and injuries hit their lowest points since data collection began.

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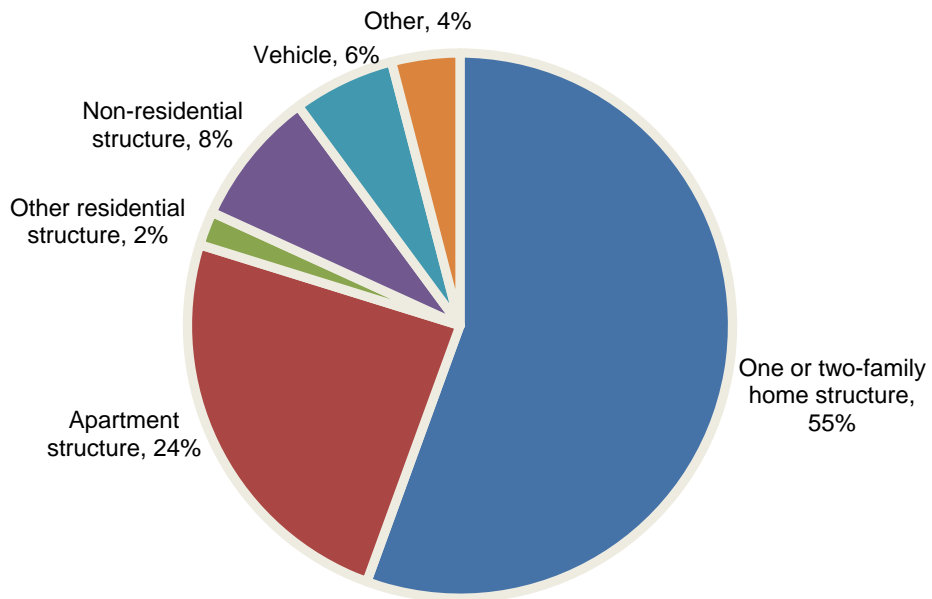
<sup>2</sup> Highway vehicles include cars, trucks and other vehicles intended for roadway use. Non-highway vehicles, include vehicles for water, air or rail transportation, as well as construction, lawn, garden and agricultural vehicles.

NFPA's 2008 report, *U.S. Vehicle Fire Trends and Patterns*, by Marty Ahrens, provides more information about highway vehicle fires and a breakdown of all vehicle fires by type of vehicle.

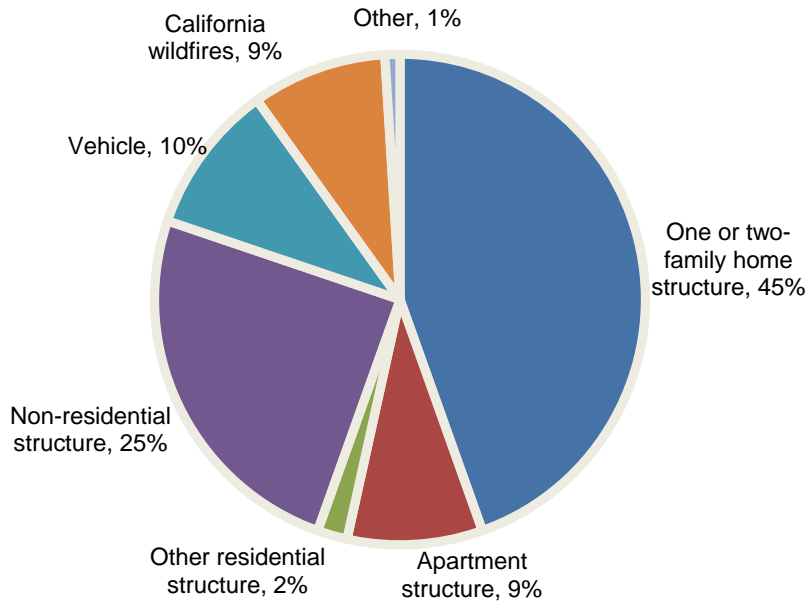
**Figure 4. Civilian Fire Deaths by Major Property Class 2008**



**Figure 5. Reported Civilian Fire Injuries by Major Property Class 2008**



**Figure 6. Direct Property Damage by Major Property Class 2008**



**Civilian fire deaths hit their second lowest point since data collection began.**

The 2008 civilian fire death toll of 3,320 was 3% lower than the 3,430 in 2006 and 55% lower than the 7,395 reported in 1977. Figure 7 shows that the 2008 total civilian fire death toll was the second lowest since data collection began in 1977. Home structure fire deaths also fell 3% from 2,865 in 2007 and 47% from 5,865 in 1977. The home fire death total was the third lowest recorded. Because home fire deaths account for such a large share of the total fire deaths, the trend line for both home fire deaths and all home fire deaths tend to be very similar.

**Figure 7. All Civilian Fire Deaths and Home Fire Deaths by Year 1977-2008**

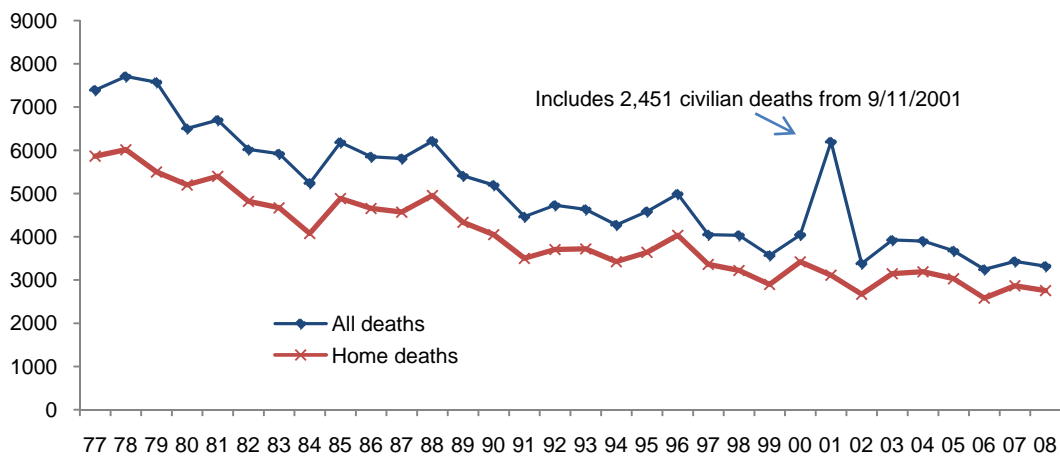
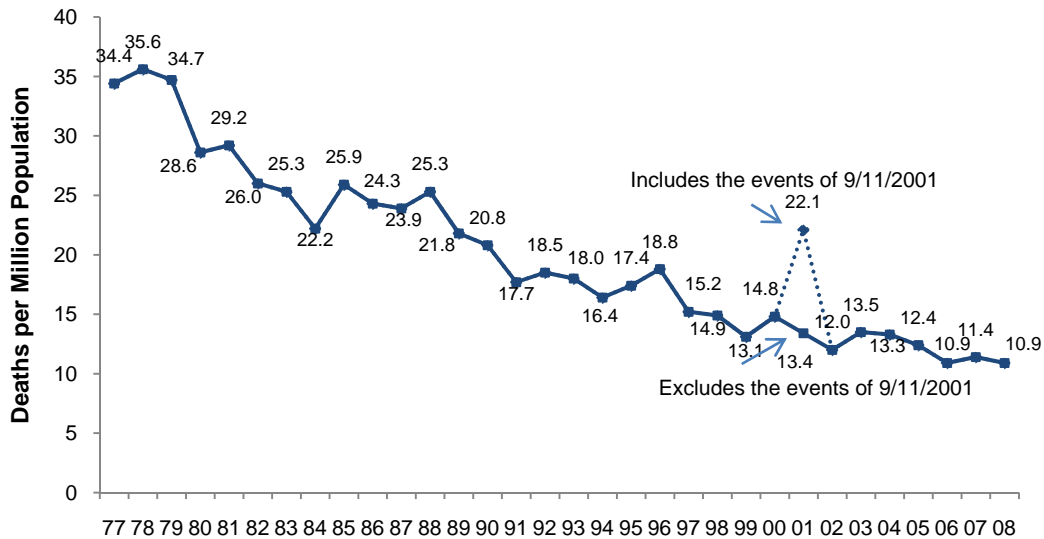


Figure 8 shows that the fire death rate per million population fell 68% from 1977 to 2008. From 2007 to 2008, the rate fell 4%.

**Figure 8. Trend in Civilian Fire Death Rates per Million Population, 1977-2008**



**The highest fire death rates were seen in the rural South.**

In both 2007 and 2008, Southern communities with populations under 2,500 had a civilian fire death rate of 49 deaths per million population, more than four times the rate for the country as a whole. In 2008, the Midwest had the highest overall fire death rate and the South ranked second. The West had the lowest death rate of 5.4, half the national rate.

Nationally, in terms of community size, rural areas with populations under 2,500 had a death rate of 24.2 per million, more than twice the national rate. The lowest rate was seen in communities with populations between 50,000 and 249,999. The fire death rate for Midwestern cities of 250,000 or more was the highest of the four regions.

**Half of the reported fires were considered “outside or other.”**

Figure 3 showed that 48% (700,500) of the 1,451,500 total reported fires were outside fires or fires other than structure or vehicle fires. These fires caused 55, or 2%, of the civilian deaths and 680, or 4%, of the civilian injuries. These fires fell 9% from the 769,000 reported in 2007.

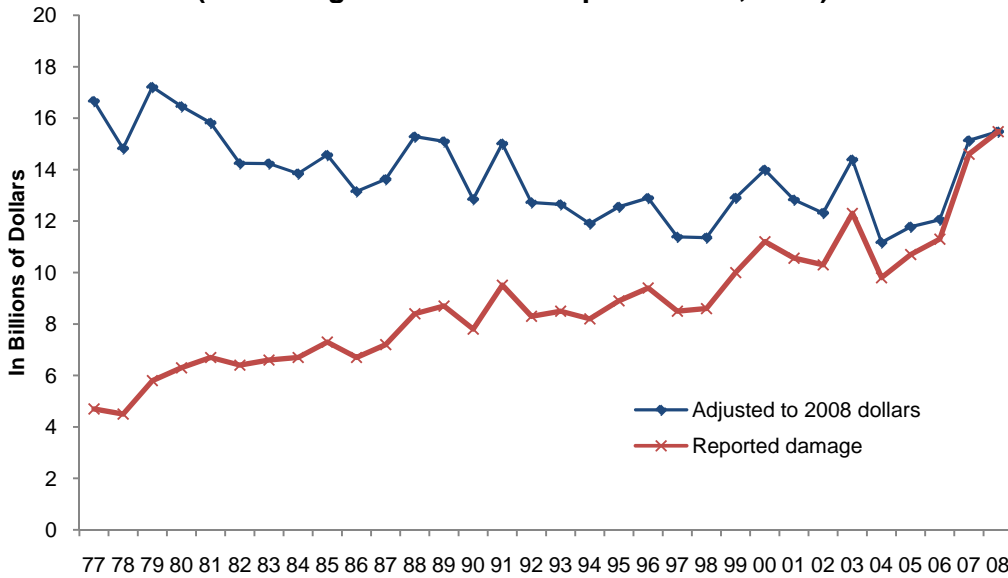
Outside and other fires reported in 2008 include:

- 71,000 outside fires involving property of value;
- 335,000 brush, grass, or wildland fires;
- 188,000 outside rubbish fires; and
- 106,500 other fires including outside spills or leaks with ensuing fires, outside gas or vapor combustion explosions with no after-fire, and unclassified or unknown-type fires.

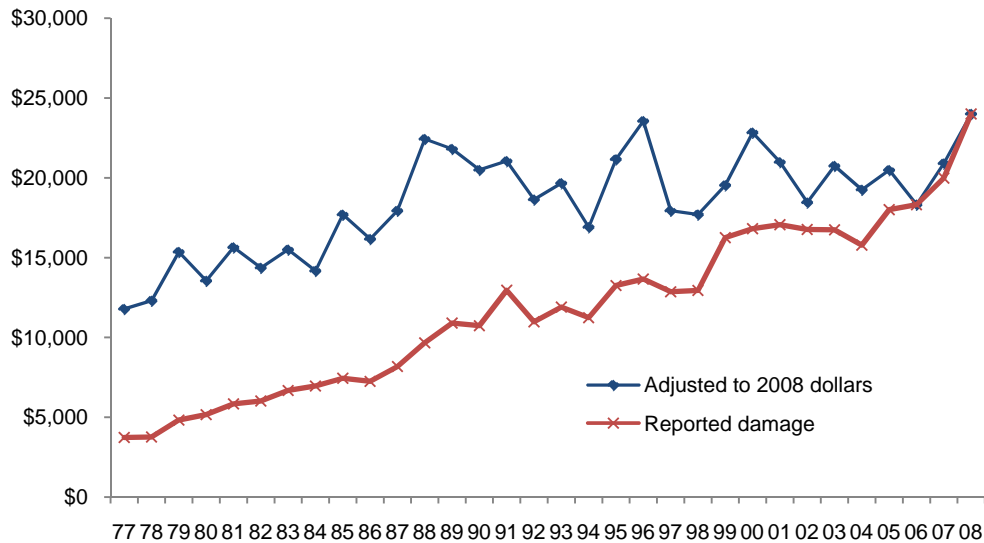
**Although real property damage was lower than in 1977, the average adjusted loss per structure fire was higher.**

Figure 9 shows that reported direct property damage from fire (excluding the events of September 11, 2001) has generally been rising. When adjusted for inflation, however, total annual fire damages were 7% lower in 2008 than in 1977. The mean adjusted loss per structure fire was twice as high in 2008 as in 1977.

**Figure 9. Direct Property Damage Trend: 1977-2008  
(Excluding the Events of September 11, 2001)**



**Figure 10. Average Direct Loss per Structure Fire: 1977-2008  
(Excluding the Events of September 11, 2001)**

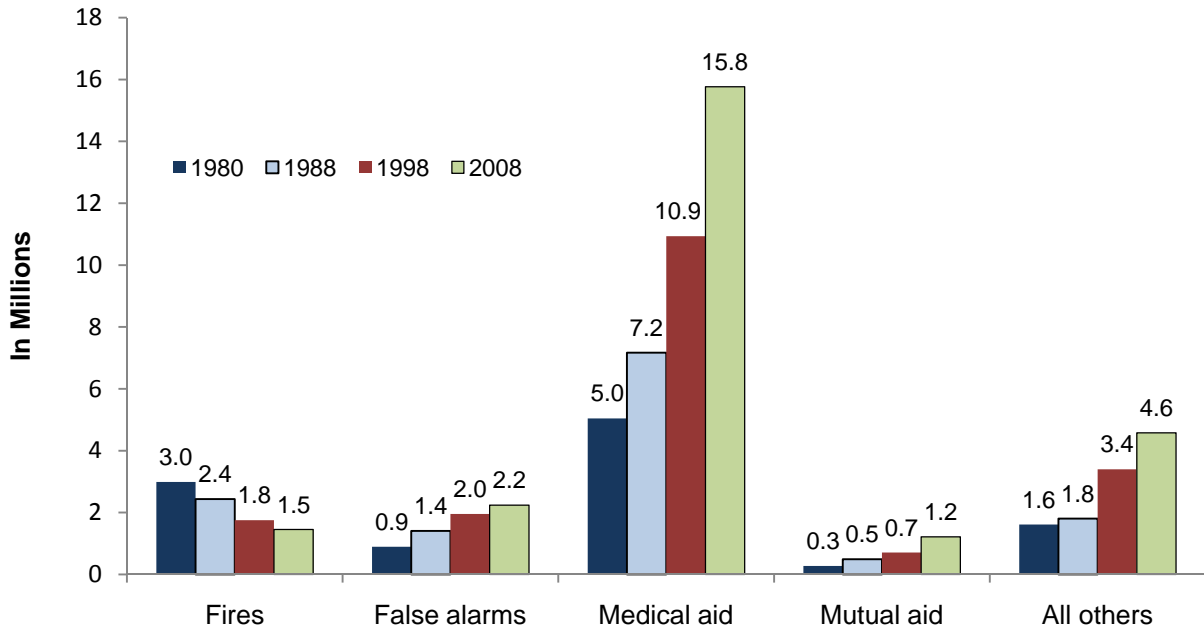


## U.S. Fire Department Responses by Incident Type

### Fire department responses have more than doubled since 1980.

During 2008, U.S. fire departments responded to a total of 25,252,500 calls, 2.3 times the 10,819,000 responses in 1980. Figure 11 shows that medical aid calls have more than tripled since 1980. Mutual aid calls increased more than four-fold although the share of mutual aid incidents remains small, increasing from 3% in 1980 to 5% in 2008.

**Figure 11. Fire Department Responses by Incident Type in 1980, 1988, 1998, and 2008**

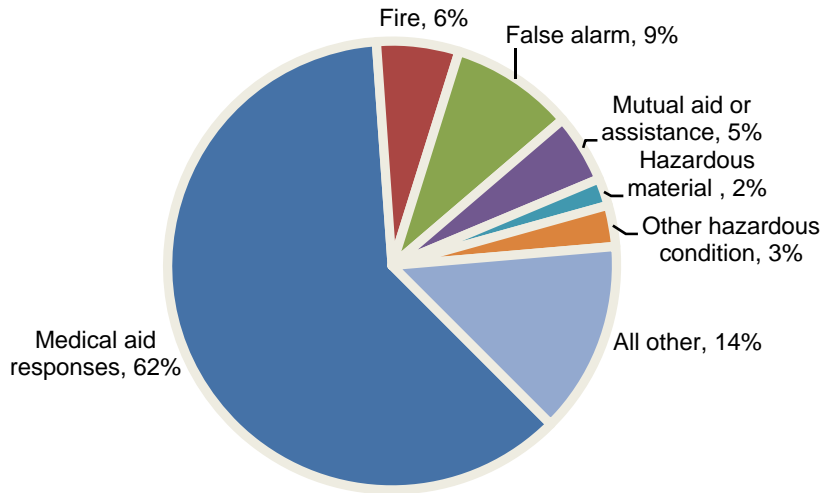


### Almost two-thirds of fire department responses were medical aid calls.

During 2008, U.S. fire departments responded to 15,767,500 medical aid calls involving emergency medical services (EMS), medical assistance, and non-fire rescue. Figure 12 shows that these incidents accounted for 62% of fire department responses. In 2005-2007, the majority of U.S. fire departments provided at least some EMS services. Forty-four percent of the departments provided EMS only and 15% provided advanced life support (ALS). The percentage of departments providing any EMS, and more specifically both EMS and ALS, increased with the size of the population protected.<sup>3</sup>

<sup>3</sup> Michael J. Karter, Jr. and Gary P. Stein. *U.S. Fire Department Profile Through 2007*, Quincy, MA: National Fire Protection Association, 2008, p. 28.

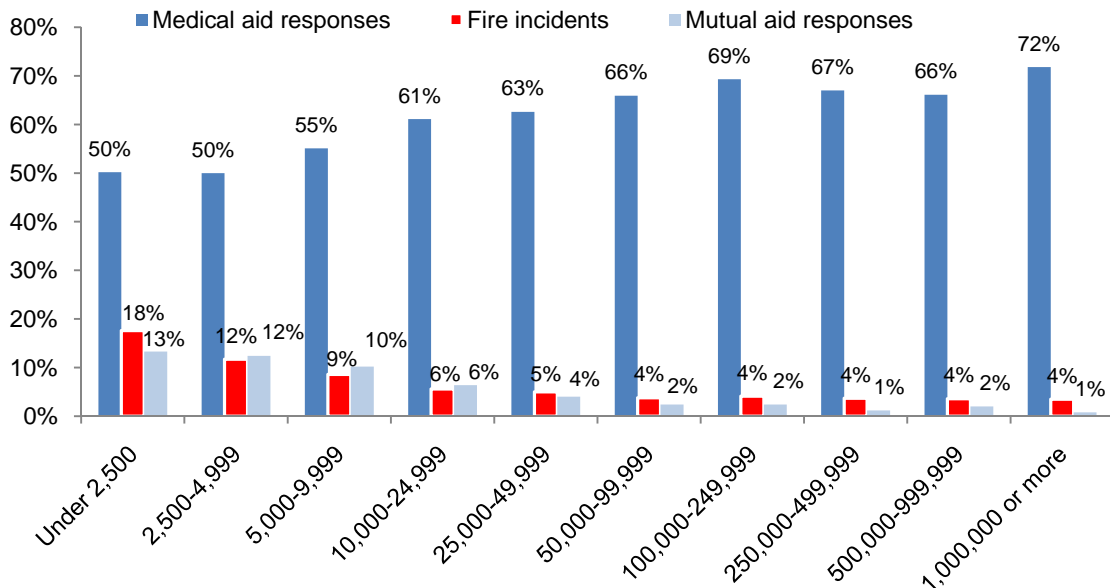
**Figure 12. Fire Department Responses by Incident Type 2008**



**Only 4% of the responses by departments protecting populations of 50,000 or more were to actual fires.**

Figure 13 shows that even in the smallest departments, medical aid accounted for an average of half of all fire department responses. In cities with populations of at least one million, almost three-quarters (72%) of the responses were for medical aid.

**Figure 13. Fire Incidents, Medical Aid, and Mutual Aid Responses as Percentages of Fire Department Responses by Community Size 2008**



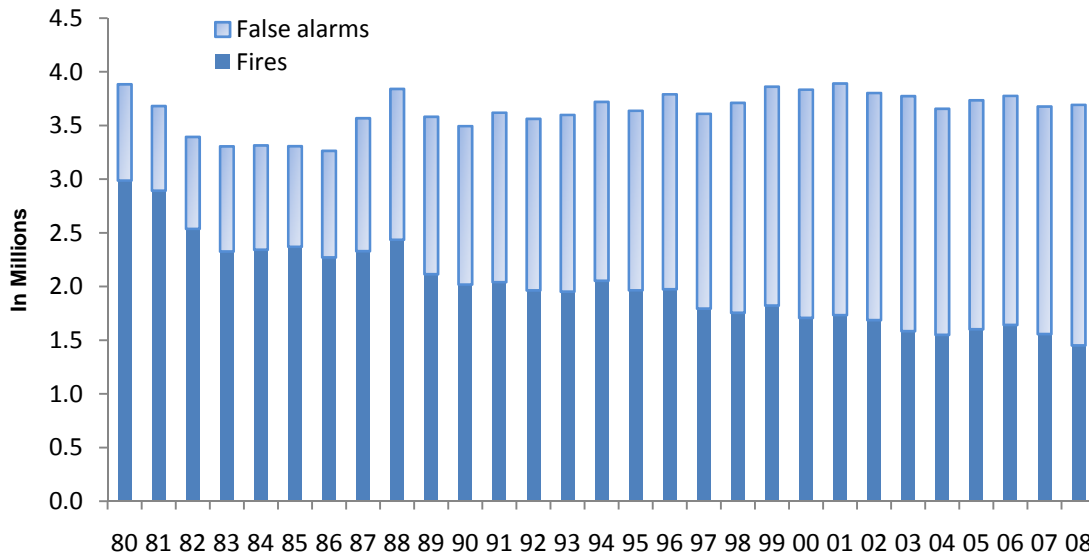
Fire incidents accounted for 18% of the responses by departments protecting populations under 2,500. The percentage of fire incidents shrank as population protected increased. When the population was at least 50,000, only 4% of fire department responses were to actual fires.

Mutual aid responses also accounted for larger percentages of the incidents in localities with smaller populations. Thirteen percent of the responses in communities with populations under 2,500 were mutual aid. The percentage dropped to 1-2% for departments with populations of 50,000 or more.

**Sum of false alarms and actual fires has not changed much.**

Fires accounted for only 6% of all fire department responses in 2008, compared to 28% in 1980. This decrease is due in large part to the increase in medical aid calls noted earlier. However, Figure 13 shows that the 2008 estimate of 2,241,500 false alarms was 2.5 times as the 896,500 reported in 1980. This increase in false alarms is due to increases in system malfunctions and unintentional calls over the years. The total of reported fires and false alarms has been remarkably stable. Fire departments cannot know the actual situation until they arrive at the scene. In terms of initial response, a false alarm is generally treated as if it were an actual fire.

**Figure 14. Reported Fires and False Alarms: 1980- 2008**



**Other comparative data is found in supporting tables.**

Table 1 compares 2008 data with data from 2007, 1998, 1988, and 1978. Most measures show steady improvement over time. Table 2 provides a numeric summary of 2008 fires and associated losses by incident type. Table 3 shows a breakdown of all fire department responses by incident type for 2008 and the percent change from the 2007, 1998, 1988, and 1980. Table 4 shows the percentage breakdown of incident types for the same years as in Table 3.

These statistics were extracted from the annual reports *Fire Loss in the United States*, by Michael J. Karter, Jr. Summaries of these reports are published each year in *NFPA Journal*®. The 2008 report may be downloaded free of charge from <http://www.nfpa.org/osds>. Copies of this and other NFPA reports can also be obtained from NFPA's One-Stop Data Shop by calling (617) 984-7443 or emailing [osds@nfpa.org](mailto:osds@nfpa.org). Trend tables for all fire department calls, all fires, structure fires, home structure fires, non-home fires, and all fires by incident type are also available on the website or from the One-Stop Data Shop.

**Table 1.**  
**The U.S. Fire Problem in 2008 Compared to 2007, 1998, 1988, and 1978**

Reported to Fire Departments	2008	2007	<u>COMPARED TO</u>		
			1998	1988	1978
Fire Incidents	1,451,500	Down 7%	Down 17%	Down 40%	Down 48%
Civilian Deaths	3,320	Down 3%	Down 18%	Down 47%	Down 55%
Firefighter Deaths	103	Unchanged	Up 13%	Down 24%	Down 40%
Civilian Injuries	16,705	Down 5%	Down 28%	Down 46%	Down 44%
Direct Property Damage Adjusted for Inflation	\$15,478,000,000*	Up 6% Up 2%	Up 80% Up 36%	Up 84% Up 1%	Up 244% Up 4%
Civilian Deaths per Thousand Fires	2.3	Up 1%	Down 3%	Down 13%	Down 19%
Civilian Deaths per Million Population	10.9	Down 4%	Down 27%	Down 57%	Down 69%
Property Damage per Structure Fire Adjusted for Inflation	\$24,002	Up 20% Up 15%	Up 85% Up 36%	Up 148% Up 7%	Up 537% Up 95%

\* This figure includes the California Wildfires of 2008 with an estimated property loss \$1.4 billion.

Sources:

Michael J. Karter, Jr. *Fire Loss in the United States* series, (1978, 1988, 1998, 2007 and 2008), Quincy, MA:

National Fire Protection Association, 1979, 1989, 1999, 2008, and 2009.

Rita F. Fahy, Paul R. LeBlanc, and Joe Molis, *Firefighter Fatalities in the United States – 2008*, Quincy, MA:

National Fire Protection Association, June 2009.

U.S. Census Bureau

Inflation calculations were made with the Bureau of Labor Statistics Inflation Consumer Price Index Purchasing Power of the Dollar.

**Table 2.**  
**U.S. Fires and Losses by Incident Type in 2008**

Incident Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
<b>Structure fires</b>	<b>515,000</b>	<b>(35%)</b>	<b>2,900</b>	<b>(87%)</b>	<b>14,960</b>	<b>(90%)</b>	<b>\$12,361</b>	<b>(80%)</b>
<i>Residential structure fires</i>	<i>403,000</i>	<i>(28%)</i>	<i>2,780</i>	<i>(84%)</i>	<i>13,560</i>	<i>(81%)</i>	<i>\$8,550</i>	<i>(55%)</i>
Home structure fires	386,500	(27%)	2,755	(83%)	13,160	(79%)	\$8,243	(53%)
One- or two-family dwellings, including manufactured homes	291,000	(20%)	2,365	(71%)	9,185	(55%)	\$6,892	(45%)
Apartments	95,500	(7%)	390	(12%)	3,975	(24%)	\$1,351	(9%)
Other residential structure fires	16,500	(1%)	25	(1%)	400	(2%)	\$307	(2%)
<i>Non-residential structure fires</i>	<i>112,000</i>	<i>(8%)</i>	<i>120</i>	<i>(4%)</i>	<i>1,400</i>	<i>(8%)</i>	<i>\$3,811</i>	<i>(25%)</i>
<b>Vehicle fires</b>	<b>236,000</b>	<b>(16%)</b>	<b>365</b>	<b>(11%)</b>	<b>1,065</b>	<b>(6%)</b>	<b>\$1,494</b>	<b>(10%)</b>
Highway vehicle fires	207,000	(14%)	350	(11%)	850	(5%)	\$1,167	(8%)
Other vehicle fires	29,000	(2%)	15	(0%)	215	(1%)	\$327	(2%)
<b>Outside and other fires</b>	<b>700,500</b>	<b>(48%)</b>	<b>55</b>	<b>(2%)</b>	<b>680</b>	<b>(4%)</b>	<b>\$223</b>	<b>(1%)</b>
Brush, grass and wildland fires with no value or loss involved	335,000	(23%)	*	*	*	*	*	*
Outside rubbish fires	188,000	(13%)	*	*	*	*	*	*
Outside fires involving property of value	71,000	(5%)	*	*	*	*	\$129	(1%)
All other fires	106,500	(7%)	55	(2%)	680	(4%)	\$94	(1%)
<b>California wildfires 2008</b>							<b>\$1,400</b>	<b>(9%)</b>
<b>Total</b>	<b>1,451,500</b>	<b>(100%)</b>	<b>3,320</b>	<b>(100%)</b>	<b>16,705</b>	<b>(100%)</b>	<b>\$15,478</b>	<b>(100%)</b>

\* NFPA survey does not collect specific incident types for fire deaths and injuries caused by outside and other fires. Nor does it collect any dollar loss data for brush, grass, and wildland fires with no value or loss or for outside rubbish fires.

Source: Michael J. Karter, Jr. *Fire Loss in the United States 2008*, Quincy, MA: National Fire Protection Association, 2009.

**Table 3.**  
**U.S. Fire Department Responses in 2008 Compared to 2007, 1998, 1988 and 1980**

<b>Reported To Fire Departments</b>	<b><u>COMPARED TO</u></b>				
	<b>2008</b>	<b>2007</b>	<b>1998</b>	<b>1988</b>	<b>1980</b>
Total calls	25,252,500	Down 0%	Up 35%	Up 90%	Up 133%
Fire calls	1,451,500	Down 7%	Down 17%	Down 40%	Down 51%
Medical aid responses	15,767,500	Down 0%	Up 44%	Up 120%	Up 213%
False alarms	2,241,500	Up 1%	Up 15%	Up 60%	Up 150%
Mutual aid or assistance calls	1,214,500	Up 9%	Up 72%	Up 148%	Up 343%
Hazardous materials responses – spills, leaks, etc.	394,500	Down 0%	Up 31%	Up 93%	NA
Other hazard responses (arcing wires, bomb removal, etc.)	697,500	Up 2%	Up 25%	Up 109%	NA
All other responses (Smoke scares, lock-outs, etc.)	3,485,500	Down 3%	Up 37%	Up 174%	NA
All other plus hazardous material and other hazard responses	4,577,500	Down 2%	Up 35%	Up 153%	Up 183%

NA- Hazardous material and hazardous condition calls were captured under “All other” until 1986.

**Table 4.**  
**U.S. Fire Department Responses by Call Type**  
**As Percentage of Calls in 2008, 2007, 1998, 1988 and 1980**

<b>Reported to Fire Departments</b>	<b><u>COMPARED TO</u></b>				
	<b>2008</b>	<b>2007</b>	<b>1998</b>	<b>1988</b>	<b>1980</b>
Fire calls	6%	6%	9%	18%	28%
Medical aid responses	62%	62%	58%	54%	47%
False alarms	9%	9%	10%	11%	8%
Mutual aid or assistance calls	5%	4%	4%	4%	3%
Hazardous materials responses – spills, leaks, etc.	2%	2%	2%	2%	NA
Other hazard condition responses (arcing wires, bomb removal, etc.)	3%	3%	3%	3%	NA
All other responses (Smoke scares, lock-outs, etc.)	14%	14%	14%	10%	NA
All other plus hazard material and other hazard responses	18%	18%	18%	14%	15%

NA - Hazardous material and hazardous condition calls were captured under “All other” until 1986.