

# **TRENDS AND PATTERNS OF U.S. FIRE LOSSES IN 2011**

**Paula Levesque**

**January 2013**



**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: *Fire Loss in the United States*, 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 2011, home structure fires accounted for 27% of the reported fires. However, these incidents caused 84% of all civilian fire deaths. Vehicle fires accounted for 16% of the reported fires and 10% of the civilian fire deaths. Roughly half (49%) of the reported fires were outside or other non-structure, non-vehicle fires. In 2011, only 5% of all fire department responses were to fires while 66% were medical aid responses. Since 1981, medical aid calls have almost quadrupled.

Keywords: fire statistics, fires, fire deaths, fire loss, fire injuries, fire department calls

## **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

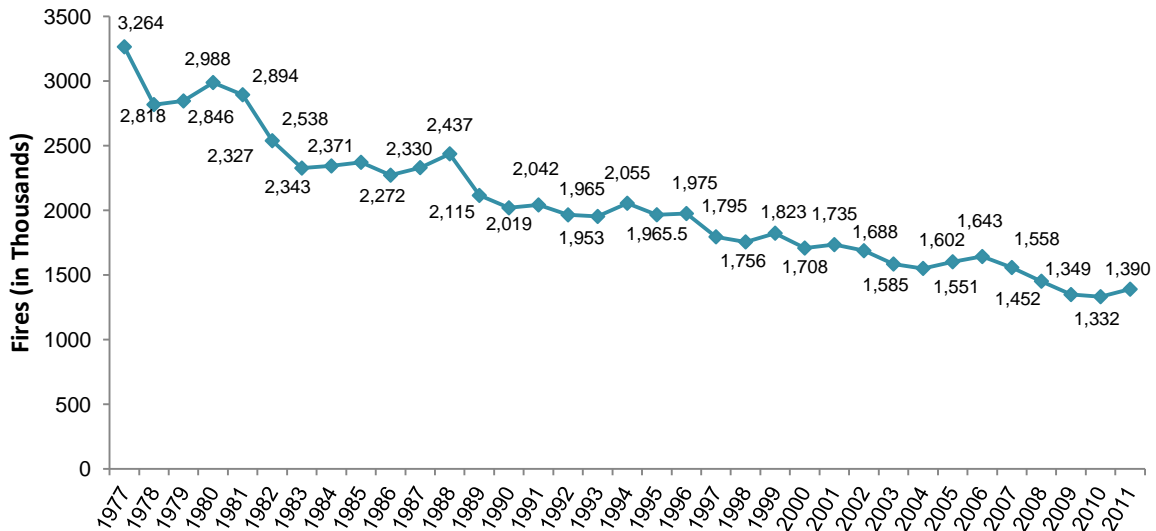
Except where otherwise noted, the statistics in this report were extracted from the annual reports, *Fire Loss in the United States*, by Michael J. Karter, Jr. The 2011 report may be downloaded free of charge from [www.nfpa.org/fireloss](http://www.nfpa.org/fireloss). Copies can also be obtained from 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 1,389,500 fires in 2011.

U.S. municipal fire departments responded to an estimated 1,389,500 fires in 2011. These fires killed 3,005 civilians (non-firefighters) and caused 17,500 reported civilian fire injuries. Direct property damage was estimated at \$11.7 billion dollars. Sixty one firefighters died while on duty or of injuries incurred while on duty.<sup>1</sup> The 484,500 structure fires accounted for 35% of all reported fires.

Figure 1 and Table 1 show that reported fires fell 57% from 3,264,000 in 1977 to 1,389,500 in 2011. Reported fires rose 4% from the previous record low of 1,331,500 in 2010.

**Figure 1. U.S. Fire Incident Trends  
(in Thousands) 1977-2011**

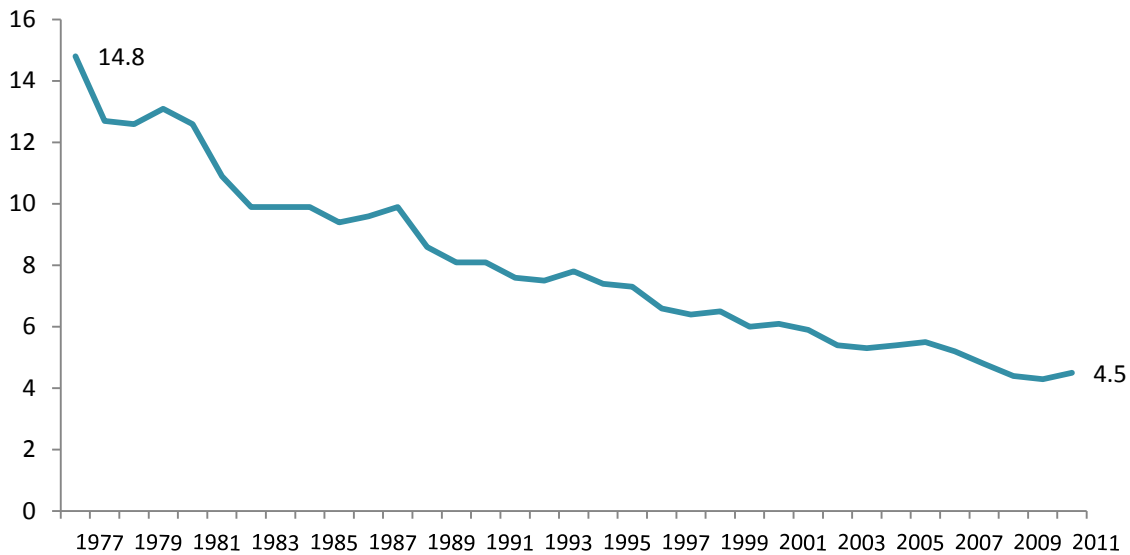


<sup>1</sup> Rita F. Fahy, Paul R. LeBlanc, and Joseph L. Molis, *Firefighter Fatalities in the United States – 2011*, Quincy, MA: National Fire Protection Association, June 2012.

**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 40% from 1977 to 2010. Figure 2 shows that the rate of reported fires per 1,000 population fell 70% from 14.8 in 1977 to 4.5 in 2011.

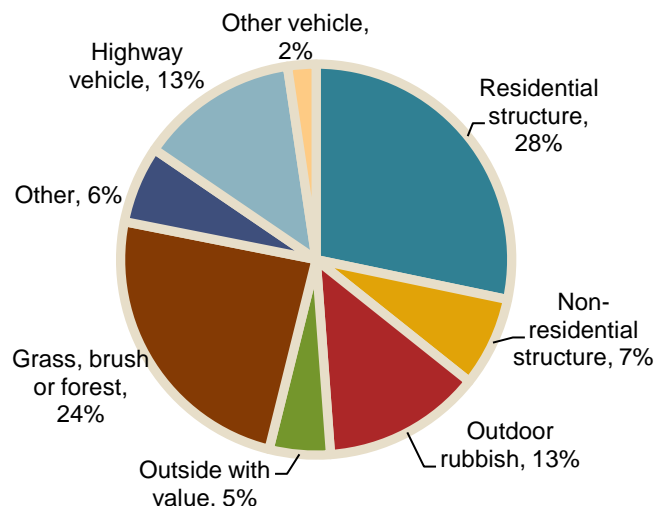
**Figure 2. Trend in Reported Fire Rates per Thousand Population 1977-2011**



**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 484,500 reported structure fires caused 2,640 civilian fire deaths, 15,635 civilian fire injuries, and \$9.7 billion in direct property damage. Structure fires accounted for 35% of the reported fires, 88% of the civilian fire deaths, 89% of the civilian fire injuries, and 83% of the direct property loss.

**Figure 3. Reported Fire Incidents by Major Property Class 2011**



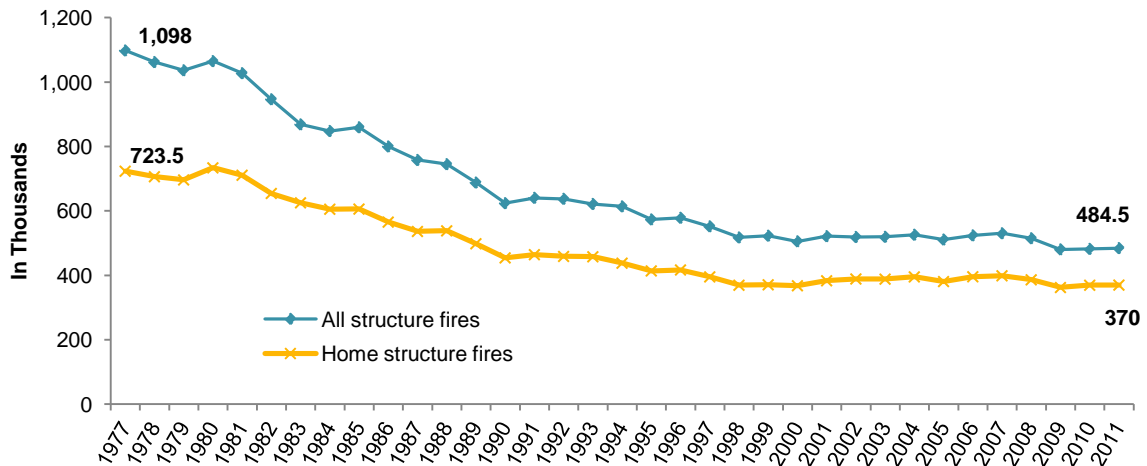
Reported structure fires fell 56% from 1,098,000 in 1977. From 2010 (482,000 structure fires) to 2011, they increased 0.5%. Generally speaking, any fire in or on a structure is considered a structure fire, even if only the contents were involved and there was no structural damage.

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

Eighty percent (386,000) of the 484,500 structure fires occurred in residential properties, including homes, hotels, motels, rooming houses and dormitories; 76% (370,000) occurred in homes. (NFPA uses the term “home” to include one- and two-family homes, apartments and manufactured housing.) Home structure fires fell 49% from the 723,500 reported in 1977. A very slight increase of 0.1% from the 369,500 reported in 2010.

Figure 4 shows that the trend line for structure fires overall resembles the trend for home fires. However, the percentage of all structure fires that are home fires has risen slowly but steadily through the years, from 66% in 1977 to 76% in 2011.

**Figure 4. All Structure Fires and Home Structure Fires by Year 1977-2011**



Fifty-seven percent (274,500) of all reported structure fires occurred in one- and two-family homes, including manufactured homes; 20% (95,500) occurred in apartments. NFPA produces a variety of reports about general and specific causes and circumstances of home fires. A general overview, *Home Structure Fires*, by Marty Ahrens, is available at [osds/reports/occupancies/homes](http://osds/reports/occupancies/homes). The report is free to all visitors. NFPA members may download more specific reports at no cost.

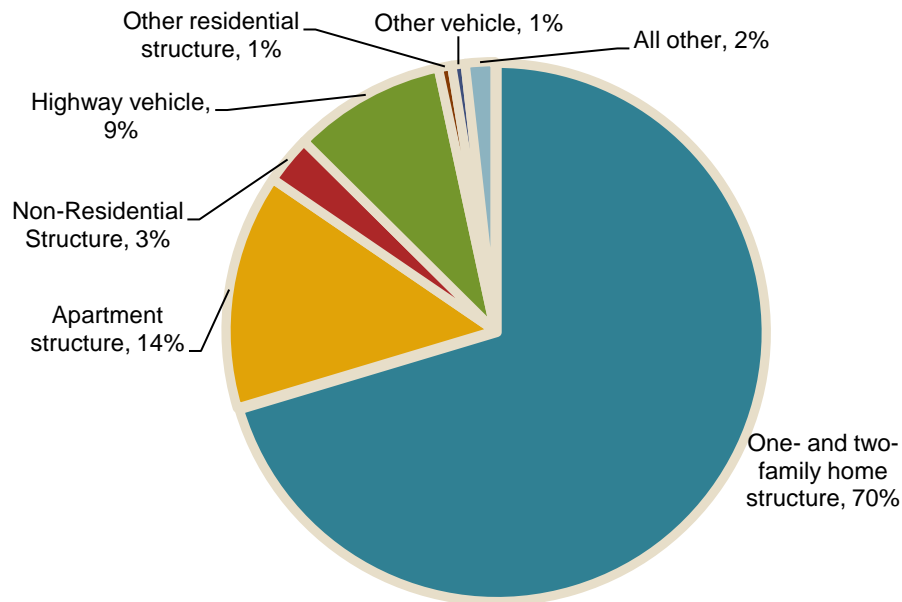
**Home structure fires caused 84% of the civilian fire deaths.**

In 2011, 2,520, or 84%, of the 3,005 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 70% (2,105) of the fire deaths. Apartment fires accounted for only 7% of all reported fires but caused 14% (415) of the deaths. Figures 5-7 show breakdowns 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. For

more information about the people killed or injured in home fires, see NFPA’s 2010 report, *Characteristics of Home Fire Victims*, by Jennifer D. Flynn.

Although non-residential structure fires accounted for only 7% of all reported fires, [Figure 7](#) shows that these incidents caused 23% of the direct property damage.

**Figure 5. Civilian Fire Deaths by Major Property Class  
2011**



**Vehicle fires caused 10% of fire deaths and 7% of civilian fire injuries**

During 2011, the 219,000 reported vehicle fires caused an estimated 300 civilian deaths, 1,190 civilian injuries, and \$1.4 billion in direct property loss. Vehicle fires accounted for 16% of the reported fires, 10% of the civilian fire deaths, 7% of civilian fire injuries, and 12% of the total direct property damage.

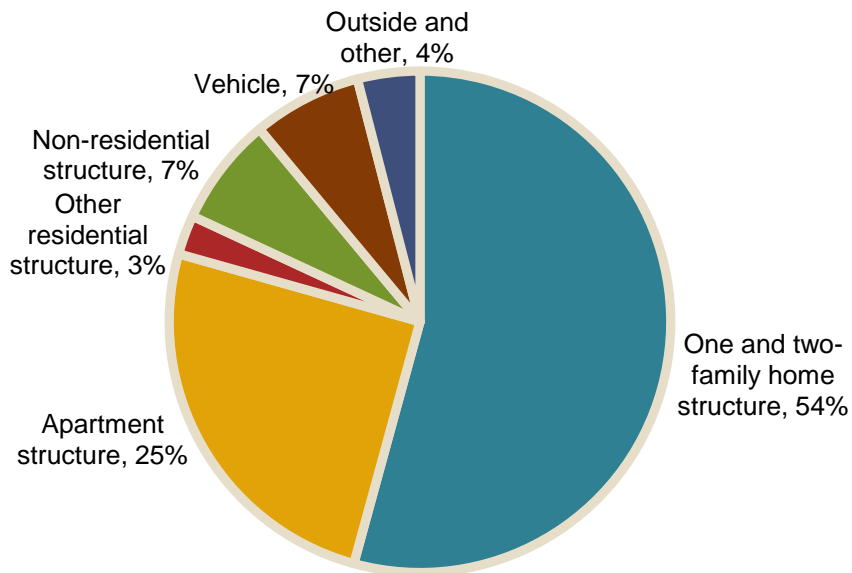
The estimate of 300 vehicle fire deaths was more than three times the 90 civilian deaths reported in non-residential structure fires. Vehicle fires fell 57% from 508,000 in 1977. From 2010 to 2011, both highway vehicle<sup>2</sup> and non-highway vehicle fires rose 2%.

NFPA’s 2010 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.

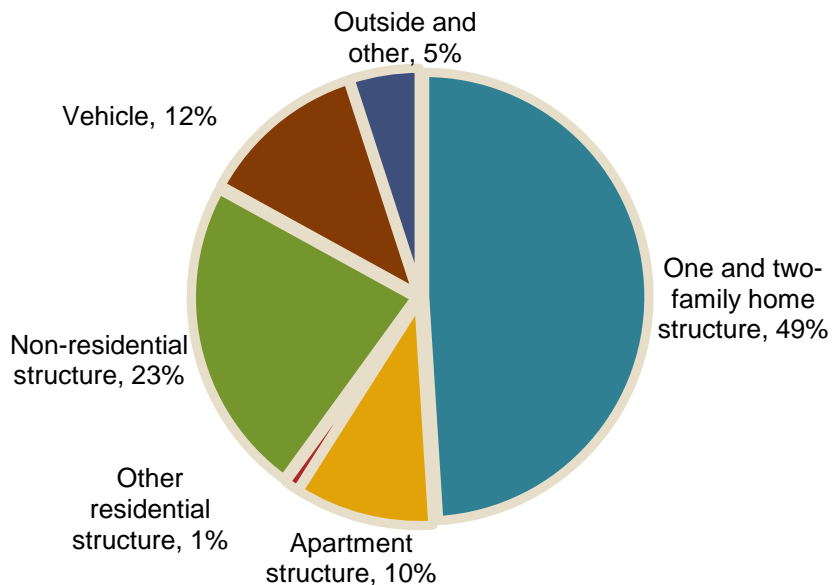
<sup>2</sup> Highway vehicles include cars, trucks and other vehicles intended for roadway use. Non-highway vehicles include vehicles for water, air or rail transportation, as well as construction, lawn, garden and agricultural vehicles.



**Figure 6. Reported Civilian Fire Injuries by Major Property Class 2011**



**Figure 7. Direct Property Damage by Major Property Class 2011**



**Civilian fire deaths decreased slightly from 2010.**

The 2011 civilian fire death toll of 3,005 was 4% lower than the 3,120 in 2010 and 59% lower than the 7,395 reported in 1977. Figure 8 shows that the 2011 total civilian fire death toll was the lowest since data collection began in 1977. Home structure fire deaths decreased 5% from 2,640 in 2010 and 57% from 5,865 in 1977. 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 8. All Civilian Fire Deaths and Home Fire Deaths by Year 1977-2011**

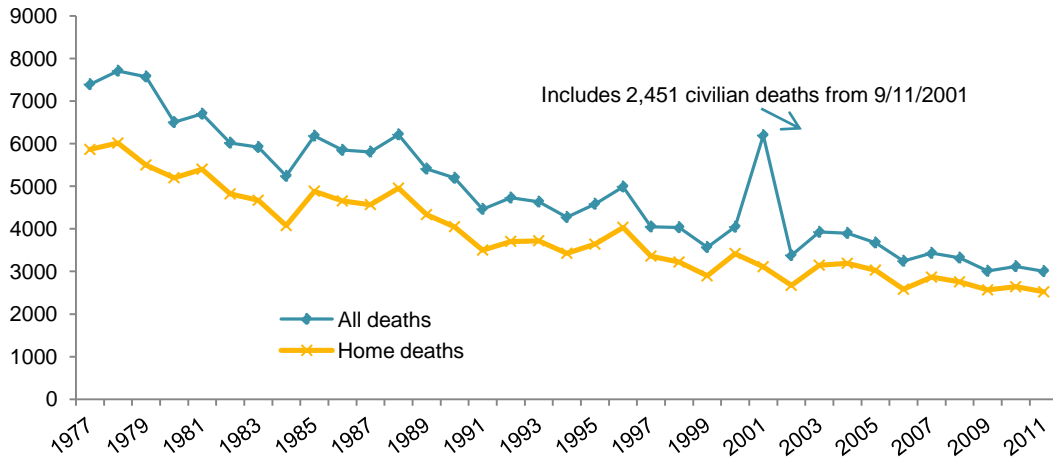
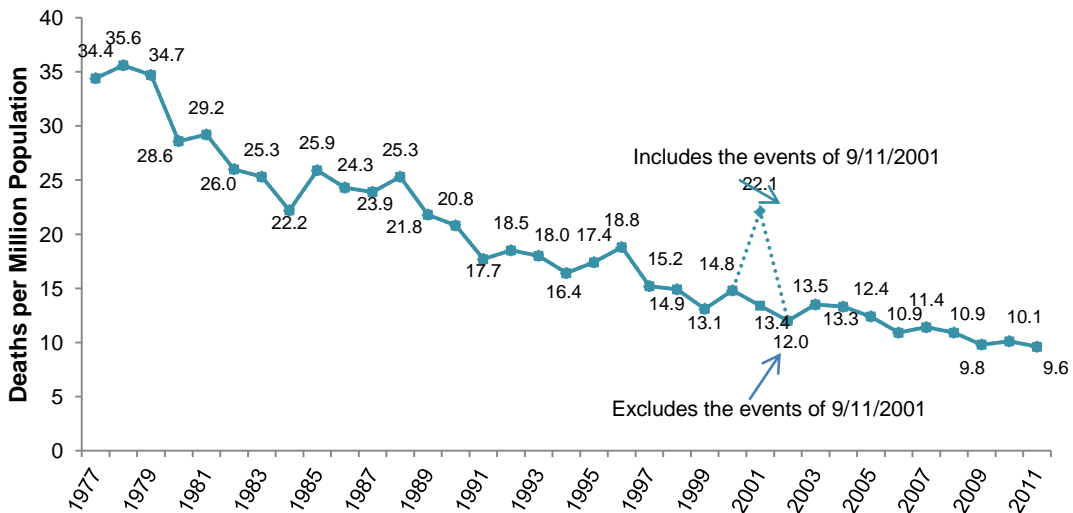


Figure 9 shows that the fire death rate per million population fell 72% from 34.4 in 1977 to 9.6 in 2011. From 2010 to 2011, the rate decreased 4%.

**Figure 9. Trend in Civilian Fire Death Rates per Million Population, 1977-2011**



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

In 2011, the South had the highest overall fire death rate (10.8 per million population.) The Northeast had a rate of 11.3, the Midwest had a rate of 11.1, and the West had the lowest death rate of 5.2, much less than the national rate of 9.6.

Nationally, in terms of community size, rural areas with populations under 2,500 had a death rate of 14.0 per million. Southern communities with populations under 2,500 had a civilian fire death rate of 19.2 deaths per million population. The lowest rate was seen in communities with

a populations of 500,000 or more (6.5 deaths per million population). Larger Midwestern cities had death rates that were higher than comparably sized cities in other regions.

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

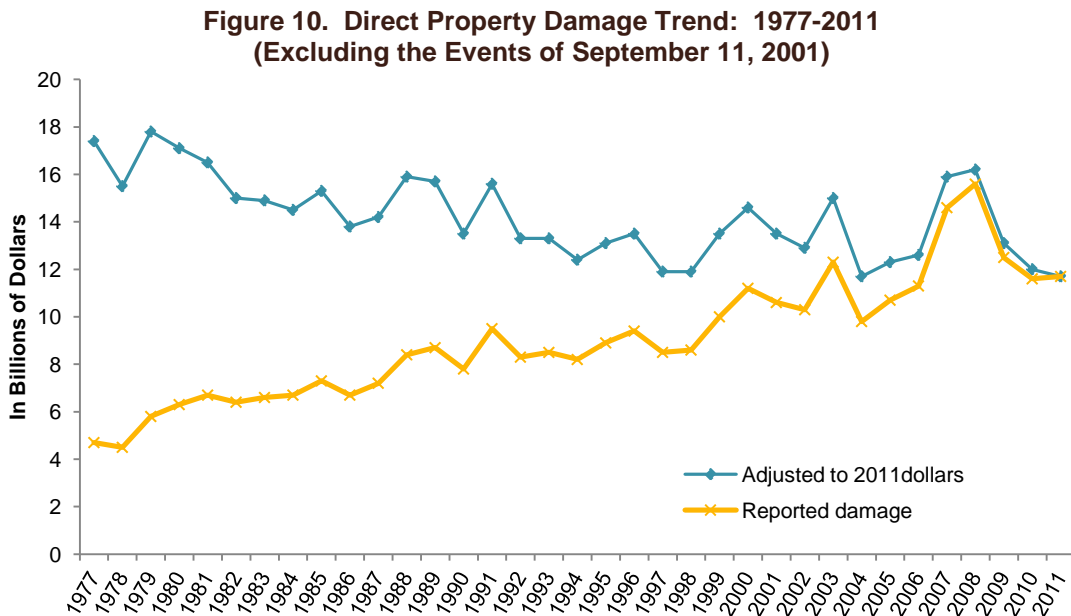
Figure 3 showed that 49% (686,000) of the 1,389,500 total reported fires were outside fires or fires other than structure or vehicle fires. These fires caused 65, or 2%, of the civilian deaths and 675, or 4%, of the civilian injuries. These fires increased 8% from the 634,000 reported in 2010.

Outside and other fires reported in 2011 included:

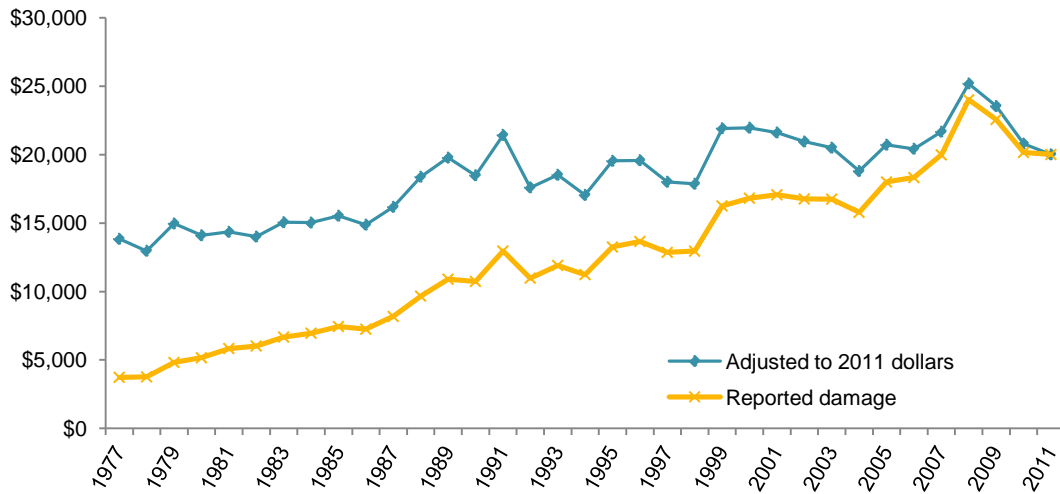
- 79,000 outside fires involving property of value;
- 338,000 brush, grass, or wildland fires; (fires handled by state or federal agencies are not included)
- 180,500 outside rubbish fires; and
- 88,500 other fires including outside spills or leaks with ensuing fires, outside gas or vapor combustion 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 10 shows that direct property damage from fire (excluding the events of September 11, 2001), as reported, has generally been rising despite a 25% drop from 2008 to 2011. When adjusted for inflation, however, total fire damages were 33% lower in 2011 than in 1977. Figure 11 shows that the adjusted loss per structure fire was 44% higher in 2011 than it was in 1977.



**Figure 11. Average Direct Loss per Structure Fire: 1977-2011  
(Excluding the Events of September 11, 2001)**

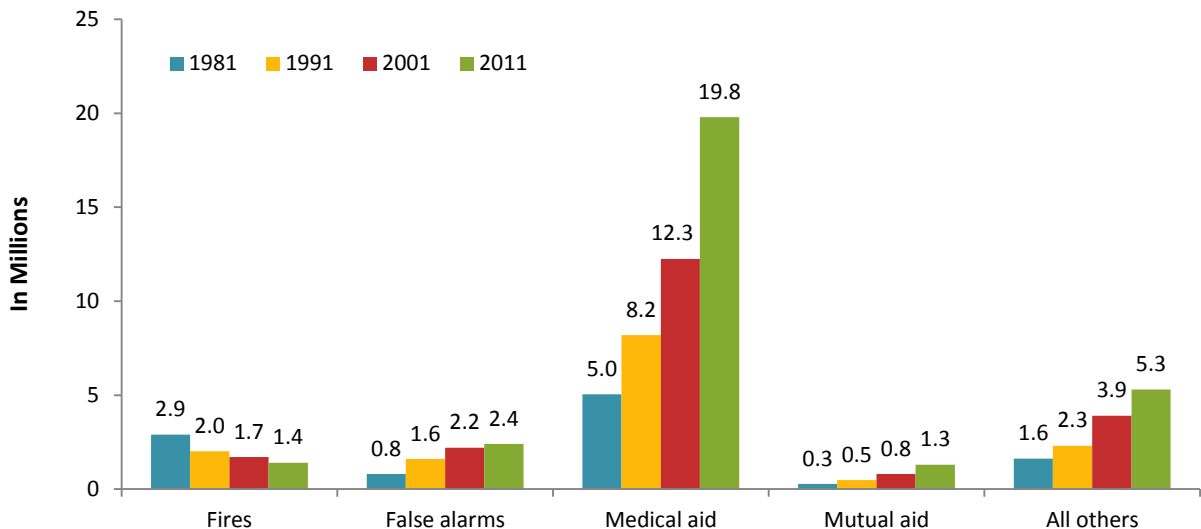


## U.S. Fire Department Responses by Incident Type

### Fire department responses have more than doubled since 1981.

During 2011, U.S. fire departments responded to a total of 30,098,000 calls, almost three times the 10,819,000 responses in 1981. Figure 12 shows that medical aid calls have more than tripled since 1981. Mutual aid calls have increased four times although the share of mutual aid incidents remains small, increasing from 3% in 1981 to 4% in 2011.

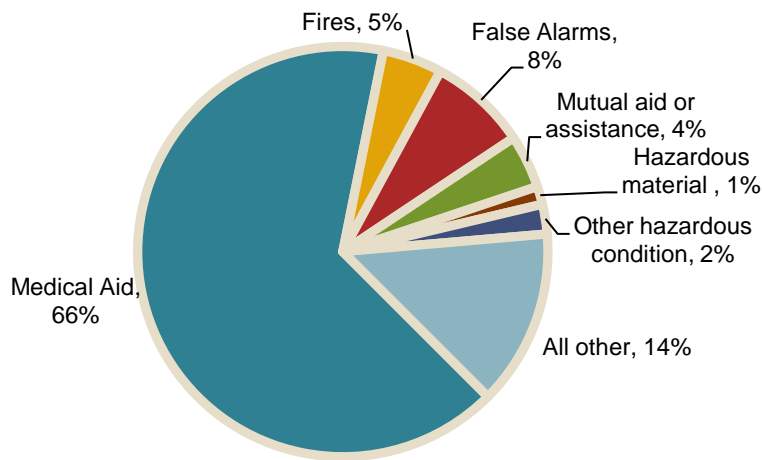
**Figure 12. Fire Department Responses by Incident Type in 1981, 1991, 2001, and 2011**



**Two-thirds of fire department responses were medical aid calls.**

During 2011, U.S. fire departments responded to 19,803,000 medical aid calls involving emergency medical services (EMS), medical assistance, and non-fire rescue. Figure 13 shows that these incidents accounted for 66% of fire department responses. In 2009-2011, 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) in addition. 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>

**Figure 13. Fire Department Responses by Incident Type 2011**



**Fires account for a larger percentage of fire department responses in small communities.**

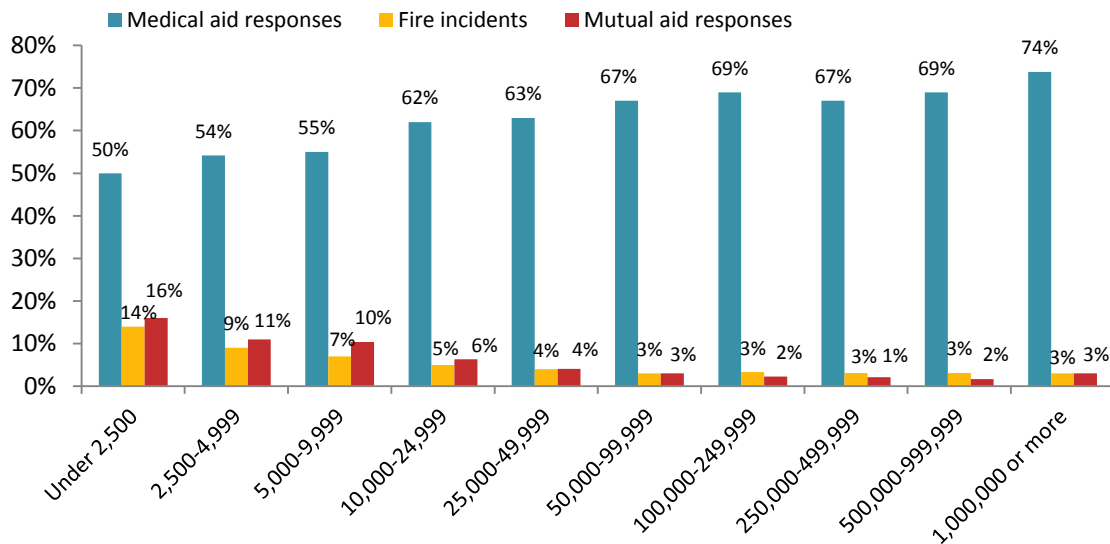
Figure 14 shows fire incidents accounted for 14% of the responses by departments protecting populations under 2,500. The percentage of fire calls fell as population grew, dropping to 4% in localities with populations between 25,000 and 49,999 and to 3% for the most populated jurisdictions. These statistics are for 2010 and 2011 combined.

Even in the smallest departments, medical aid accounted for an average of half of all fire department responses. In communities with populations of at least 50,000, at least two-thirds of the responses were for medical aid.

Mutual aid responses also accounted for larger percentages of the incidents in localities with smaller populations. Fourteen percent of the responses in communities with populations under 2,500 were mutual aid. The percentage dropped to 1-3% for departments with populations of 50,000 or more.

<sup>3</sup> Michael J. Karter, Jr. and Gary P. Stein. *U.S. Fire Department Profile Through 2011*, Quincy, MA: NFPA, 2012, p. 27.

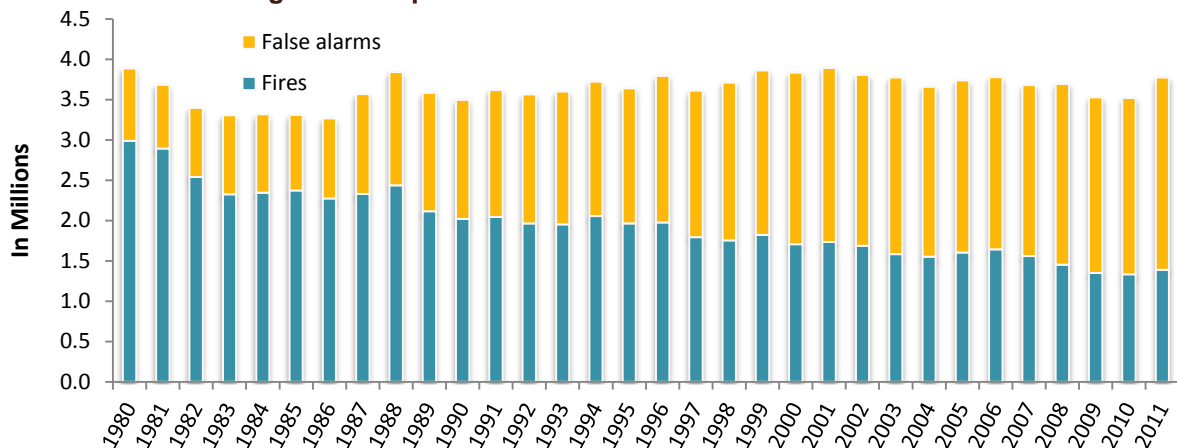
**Figure 14. Fire Incidents, Medical Aid, and Mutual Aid Responses as Percentages of Fire Department Responses by Community Size 2010-2011**



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

Fires accounted for only 5% of all fire department responses in 2011, compared to 28% in 1980. This decrease is due in large part to the increase in medical aid calls noted earlier. However, the 2011 estimate of 2,383,000 false alarms or false calls was almost three times the 896,500 reported in 1980. This increase in false alarms is due to increases in system malfunctions and unintentional calls over the years. Figure 15 shows that 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 may be treated as if it were an actual fire. False alarms or false calls can be related to equipment for smoke, fire or carbon monoxide detection as well as malicious false alarms, bomb scares, and the like.

**Figure 15. Reported Fires and False Alarms: 1980- 2011**



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

[Table 1](#) compares 2011 data with data from 2010, 2001, 1991, and 1981. Most measures show steady improvement over time. [Table 2](#) provides a numeric summary of 2011 fires and associated losses by incident type. [Table 3](#) shows a breakdown of all fire department responses by incident type for 2011 and the percent change from the 2010, 2001, 1991, and 1981. [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 2011 report may be downloaded free of charge from [www.nfpa.org/fireloss](http://www.nfpa.org/fireloss). Copies of this and other NFPA reports can 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 2011 Compared to 2010, 2001, 1991, and 1981**

<b>Reported to Fire Departments</b>	<b>2011</b>	<b>COMPARED TO</b>			
		<b>2010</b>	<b>2001*</b>	<b>1991</b>	<b>1981</b>
Fire Incidents	1,389,500	Up 4%	Down 20%	Down 32%	Down 52%
Civilian Deaths	3,005	Down 4%	Down 20%	Down 33%	Down 55%
Firefighter Deaths	61	Down 16%	Down 41%	Down 44%	Down 55%
Civilian Injuries	17,500	Down 1%	Down 14%	Down 40%	Down 43%
Direct Property Damage	\$11,659,000,000	Up 1%	Up 10%	Up 23%	Up 75%
Adjusted for Inflation		Down 3%	Down 13%	Down 25 %	Down 29%
Civilian Deaths per Million Population	9.6	Down 5%	Down 28%	Down 46%	Down 67%
Civilian Deaths per Thousand Reported Home Structure Fires	6.9	Down 5%	Down 16%	Down 10%	Down 10%
Property Damage per Structure Fire	\$20,006	Down 1%	Up 18%	Up 54%	Up 24%
Adjusted for Inflation		Down 4%	Down 7%	Down 7%	Up 39%

\*Excludes the events of September 11, 2001.

Sources:

Michael J. Karter, Jr. *Fire Loss in the United States* series, (1980, 1990, 2000, 2010, and 2011), Quincy, MA: NFPA, 1981, 1991, 2001, 2010, and 2012.

Rita F. Fahy, Paul R. LeBlanc, and Joe Molis, *Firefighter Fatalities in the United States – 2011*, Quincy, MA: NFPA, 2012.

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 2011**

<b>Incident Type</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Structure fires	484,500	(35%)	2,640	(88%)	15,635	(89%)	\$9,693	(83%)
Residential structure fires	386,000	(28%)	2,550	(85%)	14,360	(82%)	\$7,054	(61%)
Home structure fires	370,000	(27%)	2,520	(84%)	13,910	(79%)	\$6,914	(59%)
One- and two-family homes, including manufactured homes	274,500	(20%)	2,150	(72%)	9,485	(54%)	\$5,746	(49%)
Apartments	95,500	(7%)	415	(14%)	4,425	(25%)	\$1,168	(10%)
Other residential structure fires	16,000	(1%)	30	(1%)	450	(3%)	\$140	(1%)
Non-residential structure fires	98,500	(7%)	90	(3%)	1,275	(7%)	\$2,639	(23%)
Vehicle fires	219,000	(16%)	300	(10%)	1,190	(7%)	\$1,350	(12%)
Highway vehicle fires	187,500	(13%)	270	(9%)	1,020	(6%)	\$1,016	(9%)
Other vehicle fires	31,500	(2%)	30	(1%)	170	(1%)	\$334	(3%)
Outside and other fires	686,000	(49%)	65	(2%)	675	(4%)	\$616	(5%)
Brush, grass and wildland fires with no value or loss involved	338,000	(24%)	*	*	*	*	*	*
Outside rubbish fires	180,500	(13%)	*	*	*	*	*	*
Outside fires involving property of value	79,000	(5%)	*	*	*	*	\$541	(5%)
All other fires	88,500	(6%)	65	(2%)	675	(4%)	\$75	(1%)
<b>Total</b>	<b>1,389,500</b>	<b>(100%)</b>	<b>3,005</b>	<b>(100%)</b>	<b>17,500</b>	<b>(100%)</b>	<b>\$11,659</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 during 2011*, Quincy, MA: NFPA, 2012.

**Table 3.**  
**U.S. Fire Department Responses in 2011 Compared to 2010, 2001, 1991 and 1981**

Reported To Fire Departments	2011	COMPARED TO			
		2010	2001	1991	1981
Total calls	30,098,000	Up 7%	Up 44%	Up 107%	Up 184%
Fire calls	1,389,500	Up 4%	Down 20%	Down 32%	Down 52%
Medical aid responses	19,803,000	Up 7%	Up 61%	Up 142%	Up 295%
False alarms	2,383,000	Up 9%	Up 10%	Up 50%	Up 202%
Mutual aid or assistance calls	1,252,000	Up 5%	Up 49%	Up 153%	Up 258%
Hazardous materials responses – spills, leaks, etc.	379,000	Down 6%	Down 1%	Up 71%	NA
Other hazard responses (arcing wires, bomb removal, etc.)	720,000	Up 9%	Up 19%	Up 68%	NA
All other responses (Smoke scares, lock-outs, etc.)	4,171,500	Up 7%	Up 43%	Up 158%	NA
All other plus hazardous material and other hazard responses	5,270,500	Up 6%	Up 35%	Up 133%	Up 241%

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

Source: Michael J. Karter, Jr. *Fire Loss in the United States* series, (1980, 1990, 2000, 2009 and 2010), Quincy, MA: National Fire Protection Association, 1981, 1991, 2001, 2010, and 2011.

**Table 4.**  
**U.S. Fire Department Responses by Call Type**  
**As Percentage of Calls in 2011, 2010, 2001, 1991 and 1981**

Reported to Fire Departments	IN				
	2011	2010	2001	1991	1981
Fire calls	5%	5%	8%	14%	27%
Medical aid responses	66%	66%	59%	56%	47%
False alarms	8%	8%	10%	11%	7%
Mutual aid or assistance calls	4%	4%	4%	3%	3%
Hazardous materials responses – spills, leaks, etc.	1%	1%	2%	2%	NA
Other hazardous condition responses (arcing wires, bomb removal, etc.)	2%	2%	3%	3%	NA
All other responses (Smoke scares, lock-outs, etc.)	14%	14%	14%	11%	NA
All other plus hazardous material and other hazardous responses	18%	18%	19%	16%	NA

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

Source: Michael J. Karter, Jr. *Fire Loss in the United States* series, (1980, 1990, 2000, 2009 and 2010), Quincy, MA: National Fire Protection Association, 1981, 1991, 2001, 2010, and 2011.