FIRE LOSS IN THE UNITED STATES 2008

Michael J. Karter, Jr.

August 2009

National Fire Protection Association
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Abstract

U.S. fire departments responded to an estimated 1,451,500 fires. These fires resulted in 3,320 civilian fire fatalities, 16,705 civilian fire injuries and an estimated $15,478,000,000 in direct property loss. (The direct property loss includes the California Wildfires 2008 with an estimated property loss of $1,400,000,000.) There was a civilian fire death every 158 minutes and a civilian fire injury every 31 minutes in 2008. Home fires caused 2,755, or 83%, of the civilian fire deaths. Fires accounted for six percent of the 25,252,500 total calls. Nine percent of the calls were false alarms; sixty-two percent of the calls were for aid such as EMS.

Keywords: fire fatalities, fire injuries, fire losses, fire statistics, intentional fires, region fire department calls, intentional fires.

Acknowledgements

The NFPA gratefully thanks the many fire departments that responded to the 2008 National Fire Experience Survey for their continuing efforts for providing us in a timely manner the data so necessary to make national projections.

The survey project manager and author of the report gratefully thanks the many members of NFPA staff who worked on this year's survey including Frank Deely, John Baldi, and John Conlon for editing the survey forms and their follow-up calls to fire departments; and Norma Candeloro for handling the processing of survey forms and typing this report.

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Overview of 2008 U.S. Fire Experience

Number of Fires

- 1,451,500 fires were attended by public fire departments, a decrease of 6.8% from the year before.
- 515,000 fires occurred in structures, a decrease of 2.9%.
- 403,000 fires or 78% of all structure fires occurred in residential properties.
- 236,000 fires occurred in vehicles, a decrease of 8.5% from the year before.
- 700,500 fires occurred in outside properties, a decrease of 8.9%.
- What do these fire frequencies above mean? Every 22 seconds, a fire department responds to a fire somewhere in the nation. A fire occurs in a structure at the rate of one every 61 seconds, and in particular a residential fire occurs every 78 seconds. Fires occur in vehicles at the rate of 1 every 134 seconds, and there's a fire in an outside property every 45 seconds.

Civilian Fire Deaths

- 3,320 civilian fire deaths occurred in 2008, an increase of 3.2%.
- About 83% of all fire deaths occurred in the home.
- 2,755 civilian fire deaths occurred in the home, an decrease of 3.8%.
- 350 civilians died in highway vehicle fires.
- 120 civilians died in nonresidential structure fires.
- Nationwide, there was a civilian fire death every 158 minutes.

Civilian Fire Injuries

- 16,705 civilian fire injuries occurred in 2008, a decrease of 5.5%. This estimate for civilian injuries is on the low side, because many civilian injuries are not reported to the fire service.
- 13,560 of all civilian injuries occurred in residential properties, while 1,400 occurred in nonresidential structure fires.
- Nationwide, there was a civilian fire injury every 31 minutes.

Property Damage

- An estimated $15,478,000,000 in property damage occurred as a result of fire in 2008, an increase of 5.7% from last year.
- $12,361,000,000 of property damage occurred in structure fires.
- $8,550,000,000 of property loss occurred in residential properties.

Intentionally Set Fires

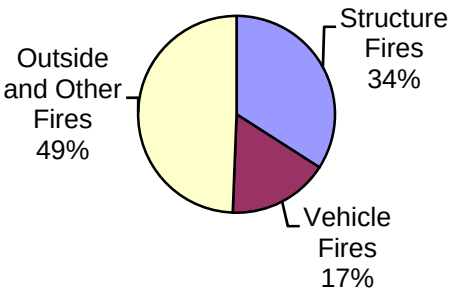
- An estimated 30,500 intentionally set structure fires occurred in 2008, a decrease of 6.2%.
- Intentionally set fires in structures resulted in 315 civilian deaths, an increase of 6.8%.
- Intentionally set structure fires also resulted in $866,000,000 in property loss, an increase of 18.2%.
- 17,500 intentionally set vehicle fires occurred, no change from a year ago, and caused $139,000,000 in property damage, a decrease of 4.1% from a year ago.

Fires in the United States During 2008

1,451,500 fires were reported in the U.S. during 2008.

- down **7%** from 2007
- **3,320** civilian fire deaths
- On civilian death occurred every two hours and 38 minutes
- **16,705** civilian fire injuries
- One civilian injury occurred every 31 minutes
- **$15.4 billion** in property damage (This figure includes the California Wildfires 2008 with an estimated property loss of $1.4 billion.)
- A fire department responded to a fire every **22** seconds

Fires in the United States During 2008



515,000 structure fires occurred in the U.S. during 2008.

- down **3%** from 2007
- **2,900** civilian fire deaths
- **14,960** civilian fire injuries
- **$12.4 billion** in property damage
- One structure fire was reported every **61** seconds

236,000 vehicle fires occurred in the U.S. during 2008.

- down **9%** from 2007
- **365** civilian fire deaths
- **1,065** civilian fire injuries
- **$1.5 billion** in property damage
- One vehicle fire was reported every **134** seconds

700,500 outside and other fires occurred in the U.S. during 2008.

- down **9%** from 2007
- **55** civilian fire deaths
- **680** civilian fire injuries
- **$0.2 billion** in property damage
- One outside fire was reported every **45** seconds

List of Tables and Figures

Number of Fires

In 2008, public fire departments responded to 1,451,500 fires in the United States, according to estimates based on data the NFPA received from fire departments responding to its 2008 National Fire Experience Survey (see Tables 1 and 2). This represents a decrease of 6.8% and the lowest its been since the NFPA started using its current survey methodology in 1977-78.

There was an estimated 515,000 structure fires reported to fire departments in 2008, a decrease of 2.9%, and the lowest figure since 2005 when there were 511,000 structure fires. For the 1977-2008 period, the number of structure fires were at their peak in 1977 when 1,098,000 structure fires occurred (see Figure 1). The number of structure fires then decreased quite steadily particularly in the 1980s to 688,000 by the end of 1989 for an overall decrease of 37.3% from 1977. Since 1989, structure fires again decreased quite steadily 24.7% to 517,500 by the end of 1998. They have stayed in the 505,000 to 530,500 area from 1999 to 2008.

Fire incident rates by community size were examined for the 2004-2008 period (see Figure 2). The smallest communities (populations less than 2,500) had the highest rate with 11.9 fires per thousand population.

Of the structure fires, 403,000 were residential fires, accounting for 78.2% of all structure fires, and a slight decrease of 2.7% from a year ago. Of the residential structure fires, 291,000 occurred in one- and two-family homes, accounting for 56.5% of all structure fires. Another 95,500 occurred in apartments accounting for 18.5% of all structure fires.

For nonresidential structure fires most property types showed little or no change in 2008. The only property types with notable changes were a decrease of 13.0% to 10,000 in industrial properties; a decrease of 7.7% in educational properties to 6,000; and a decrease of 7.1% in institutional properties to 6,500.

For the 1977-2008 period, the number of outside fires were at their high in 1977 when 1,658,500 outside fires occurred. The number of outside fires decreased steadily the next six years to 1,011,000 in 1983 for a considerable decrease of 39.0% from 1977. Outside fires changed little for the rest of the 1980s except for 1988 when 1,214,000 occurred. Outside fires dropped to 910,500 in 1993, and stayed near the 1,000,000 level the next three years. Since 1997, the number of outside fires stayed in the 839,000 to 861,500 level except for 1999 when they jumped to 931,500 and during the 2003-05 and 2008 period when they were at the 700,500 to 801,000 level.

In 2008, there were 700,500 outside fires, a moderate decrease of 8.9% and the lowest since NFPA has been using its current survey methodology in 1977-78. In

Table 1
Estimates of 2008 Fires, Civilian Deaths, Civilian Injuries and Property Loss in the United States

	Estimate	Range[1]	Percent Change From 2007
Number of Fires	1,451,500	1,424,000 to 1,477,000	-6.8**
Number of Civilian Deaths	3,320	3,000 to 3,640	-3.2
Number of Civilian Injuries	16,705	15,755 to 17,655	-5.5
Property Loss[2]	$15,478,000,000[3]	$15,188,000,000 to 15,768,000,000	+5.7**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2008 National Fire Experience Survey.

[1] These are 95 percent confidence intervals.

[2] This includes overall direct property loss to contents, structures, vehicles, machinery, vegetation, and anything else involved in a fire. It does not include indirect losses. No adjustment was made for inflation in the year-to-year comparison.

[3] This figure includes the California Wildfires 2008 with an estimated property loss of $1,400,000,000. Loss by specific property type was not available.

**Change was statistically significant at the .01 level.

Table 2
Estimates of 2008 Fires and
Property Loss by Property Use

	Number of Fires		Property Loss[1]	
Type of Fire	**Estimate**	**Percent Change from 2007**	**Estimate**	**Percent Change from 2007**
California Wildfires 2008			$1,400,000,000	
Fires in Structures	515,000	-2.9*	$12,361,000,000	+16.2**
Fires in Highway Vehicles	207,000	-9.0**	1,167,000,000	+7.9*
Fires in Other Vehicles[2]	29,000	-4.9	327,000,000	-0.6
Fires Outside of structures with value involved but no vehicle (outside storage, crops, timber, etc.)	71,000	-16.5**	129,000,000	-81.8
Fires in Brush, Grass Wildland (excluding crops and timber) with no value or loss involved	335,000	-5.6*	—	—
Fires in Rubbish including dumpsters (outside of structures), with no value or loss involved	188,000	-9.0*	—	—
All Other Fires	106,500	-13.1	94,000,000	+13.3
Total	1,451,500	-6.8	$15,478,000,000	+5.7**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2008 National Fire Experience Survey.

[1] This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

[2] This includes trains, boats, ships. aircraft, farm vehicles and construction vehicles.

*Change was statistically significant at the .05 level.

**Change was statistically significant at the .01 level.

Table 3
Estimates of 2008 Structure Fires and Property Loss by Property Use

	Structure Fires		Property Loss[1]	
Property Use	**Estimate**	**Percent Change from 2007**	**Estimate**	**Percent Change from 2007**
California Wildfires 2008			$1,400,000,000	
Public Assembly	14,000	-3.5	$518,000,000	+4.0
Educational	6,000	-7.7	66,000,000	-34.0**
Institutional	6,500	-7.1	22,000,000	-46.3**
Residential (Total)	403,000	-2.7	8,550,000,000	+13.3**
One- and Two-Family Homes[2]	291,000	-3.2	6,892,000,000	+10.7**
Apartments	95,500	-3.1	1,351,000,000	+16.1**
Other Residential[3]	16,500	+10.0	307,000,000	+95.5**
Stores and Offices	20,500	-4.7	684,000,000	+5.0
Industry, Utility, Defense[4]	10,000	-13.0**	1,401,000,000[5]	+79.9**
Storage in Structures	30,000	-3.2	661,000,000	-1.3
Special Structures	25,000	+2.0	459,000,000	+26.8
Total	515,000	-2.9	$12,361,000,000[6]	+16.2**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2008 National Fire Experience Survey.

[1] This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

[2] This includes manufactured homes.

[3] Includes hotels and motels, college dormitories, boarding houses, etc.

[4] Incidents handled only by private fire brigades or fixed suppression systems are not included in the figures shown here.

[5] This total reflects three industrial property incidents that resulted in $775 million in property damage.

[6] This total does not include the California Wildfires 2008.
**Change was statistically significant at the .01 level.

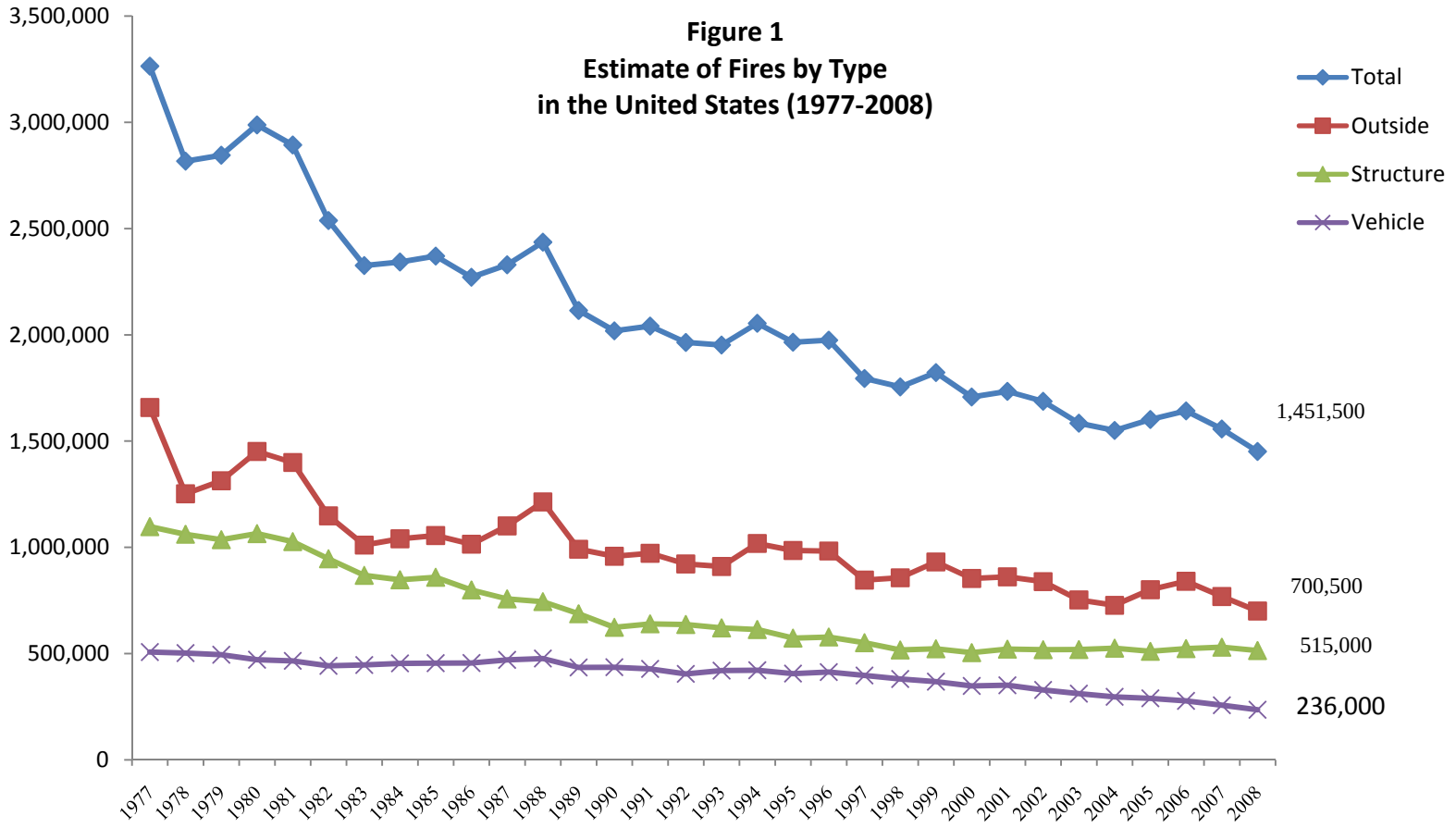
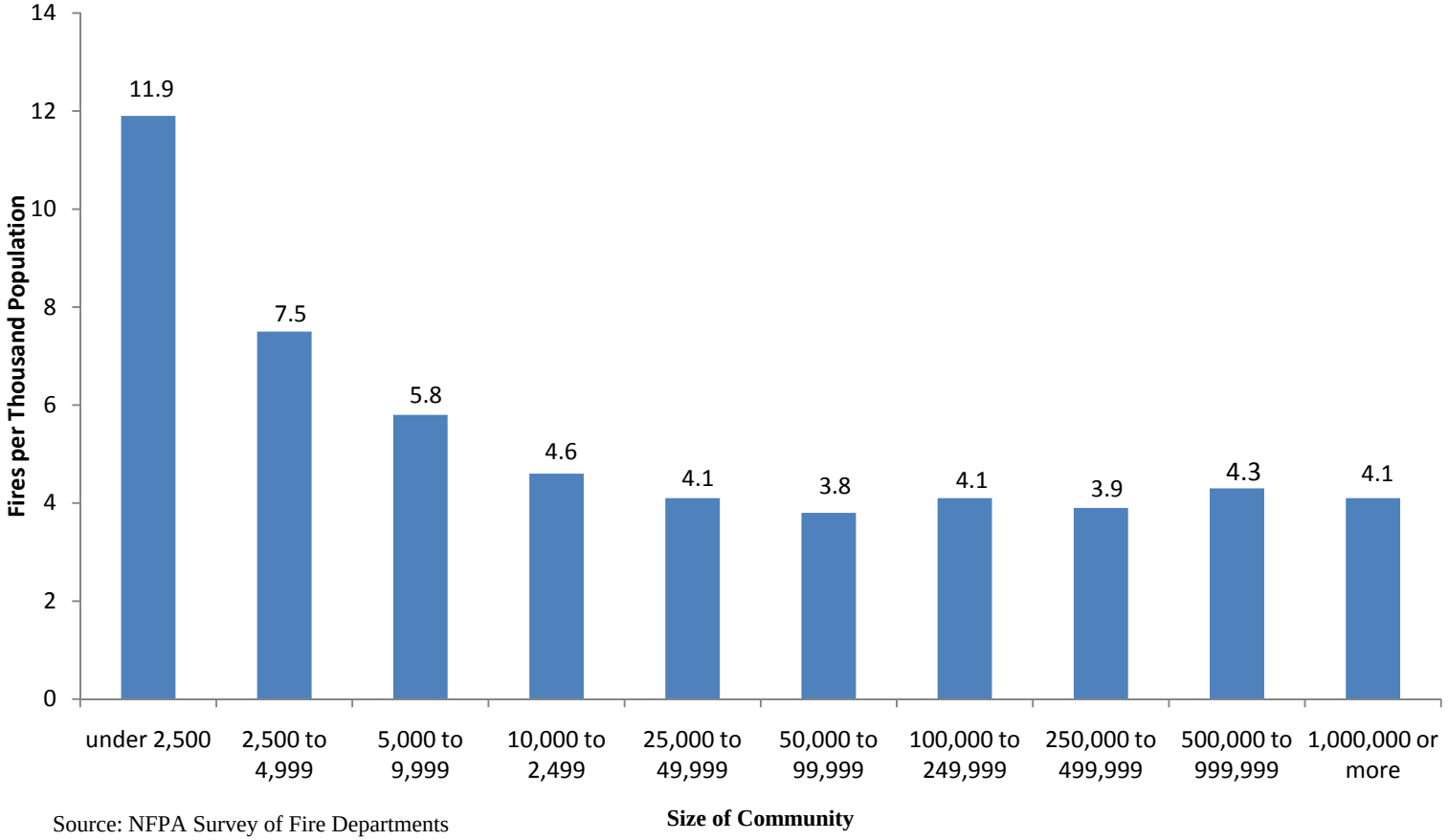


Figure 1
Estimate of Fires by Type
in the United States (1977-2008)
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Total
Outside
Structure
Vehicle
1,451,500
700,500
515,000
236,000

Figure 2. Fires per Thousand Population by Size of Community (2004-2008)



Source: NFPA Survey of Fire Departments for U.S. Fire Experience; (2004-2008)

particular, fires outside with value decreased a highly significant 16.5% to 71,000, rubbish fires decreased a significant 9.0% to 188,000, and brush fires decreased 5.6% to 335,000.

Civilian Fire Deaths

The 1,451,500 fires reported by fire departments in the U.S. in 2008, resulted in an estimated 3,320 civilian deaths based on data reported to the NFPA. This is a slight decrease of 3.2% from a year ago. The nature of this decrease is better understood when results are examined by property type.

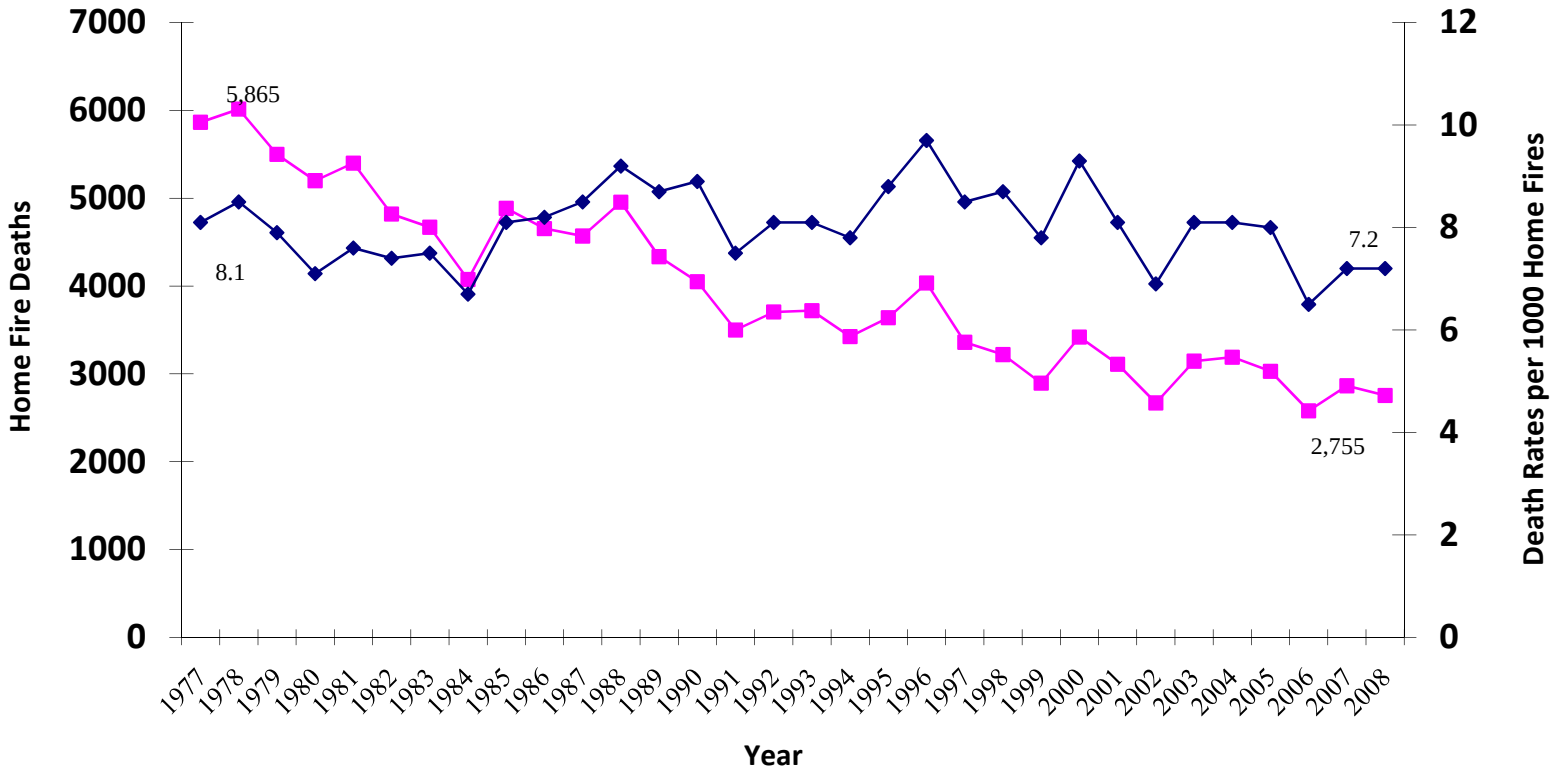
An estimated 2,780 civilians died in residential fires in 2008, a decrease of 4.0% from a year ago. Of these deaths, 390 occurred in apartment fires and the lowest figure since 2002 when a similar number died in apartment fires. Another 2,365 died in one- and two-family homes fires, virtually no change from a year ago.

In all, fires in the home (one- and two-family homes including manufactured homes and apartments) resulted in 2,755 civilian deaths, a decrease of 3.8% from a year ago, and the third lowest since 1977. Looking at trends in civilian deaths since 1977-78[1], several observations are worth noting (see Figure 3). Home fire deaths were at their peak in 1978 when 6,015 fire deaths occurred. Home fire deaths then decreased steadily during the 1979-82 period except for 1981, and decreased a substantial 20% during the period to 4,820 by the end of 1982. From 1982 to 1988, the number of home fire deaths stayed quite level in the 4,655 to 4,955 area except for 1984 when 4,075 fire deaths occurred. From 1989 to 1996 home fire deaths continued to decline and stayed in the 3,425 to 4,335 area. From 1997 onward home fire deaths have generally continued to decline with the number of deaths staying in the 2,580 to 3,190 area since 2001.

Overall for the 1977-2008 period, the number of home fire deaths decreased from 5,865 in 1977 to 2,775 in 2008 for a decrease of 53%. The number of home fire incidents also declined steadily for an overall decrease of 47% for the same period. When the death rate per 1,000 home fire incidents is looked at (Figure 3), there is no steady decline, but rather the rate fluctuates considerably up and down[2]. In fact, the death rate per 1,000 home fires was 8.1 in 1977 and 7.2 in 2008 for a decrease of 11%. These results suggest that even though the number of home fires and home fire deaths declined similarly during the period, the death rate did not, and when there is a home fire, the fire death rate risk has not changed much for the period.

With home fire deaths still accounting for 2,755 fire deaths or 83% of all civilian deaths, fire safety initiatives targeted at the home remain the key to any reductions in the overall fire death toll. Five major strategies are: First, more widespread public fire safety education is needed on how to prevent fires and how to avoid serious injury or death if

Figure 3.
Civilian Home Fire Deaths and Rates per 1000 Fires, 1977-2008



Source: NFPA Survey of Fire Departments (1977-2008)

Table 4
Estimates of 2008 Civilian Fire Deaths and Injuries by Property Use

	Civilian Deaths			Civilian Injuries		
Property Use	**Estimate**	**Percent Change From 2007**	**Percent of all Civilian Deaths**	**Estimate**	**Percent Change From 2007**	**Percent of all Civilian Injuries**
Residential (total)	2,780	-4.0	83.7	13,560	-3.1	81.2
One-and-Two-Family Homes[1]	2,365	+0.5	71.2	9,185	-4.8	55.0
Apartments	390	-24.7	11.8	3,975	+0.6	23.8
Other Residential[2]	25	-16.7	0.7	400	0	2.4
Non-residential Structures[3]	120	+14.3	3.6	1,400	+3.7	8.4
Highway Vehicles	350	-4.1	10.5	850	-43.3**	5.1
Other Vehicles[4]	15	-25.0	0.5	215	+22.9	1.3
All Other[6]	55	+22.2	1.7	680	+4.6	4.0
Total	3,320	-3.2		16,705	-5.5	

Estimates are based on data reported to the NFPA by fire departments that responded to the 2008 National Fire Experience Survey. Note that most changes were not statistically significant; considerable year-to-year fluctuation is to be expected for many of these totals because of their small size.

[1] This includes manufactured homes.

[2] Includes hotels and motels, college dormitories, boarding houses, etc.

[3] This includes public assembly, educational, institutional, store and office, industry, utility, storage, and special structure properties.

[4] This includes trains, boats, ships, farm vehicles and construction vehicles.

[6] This includes outside properties with value, as well as brush, rubbish, and other outside locations.

**Change was statistically significant at the .01 level.

fire occurs. Information on the common causes of fatal home fires should continue to be used in the design of fire safety education messages. Second, more people must use and maintain smoke detectors and develop and practice escape plans. Third, wider use of residential sprinklers must be aggressively pursued. Fourth, additional ways must be sought to make home products more fire safe. The regulations requiring more child-resistant lighters are a good example, as are requirements for cigarettes, with reduced ignition strength (generally called "fire-safe" cigarettes). The wider use of upholstered furniture and mattresses that are more resistant to cigarette ignitions is an example of change that has already accomplished much and will continue to do more. Fifth, the special fire safety needs of high-risk groups, e.g., the young, older adults, and the poor need to be addressed.[3,4]

Also in 2008, 120 civilians died in nonresidential structure fires, an increase of 14.3%.

Civilian fire death rates by size of community were examined for the 2004-08 period (see Figure 4). The smallest communities (under 2,500 population) had the highest rate. The rate for communities under 2,500 population was more than twice the national average rate.

Of the 2,900 civilians that died in structure fires, 315 or 10.8% died in fires that were intenionally set.

Also in 2008, an estimated 350 civilians died in highway vehicle fires, the lowest it has been since the NFPA started using its current survey methodology in 1977-78.

Civilian Fire Injuries

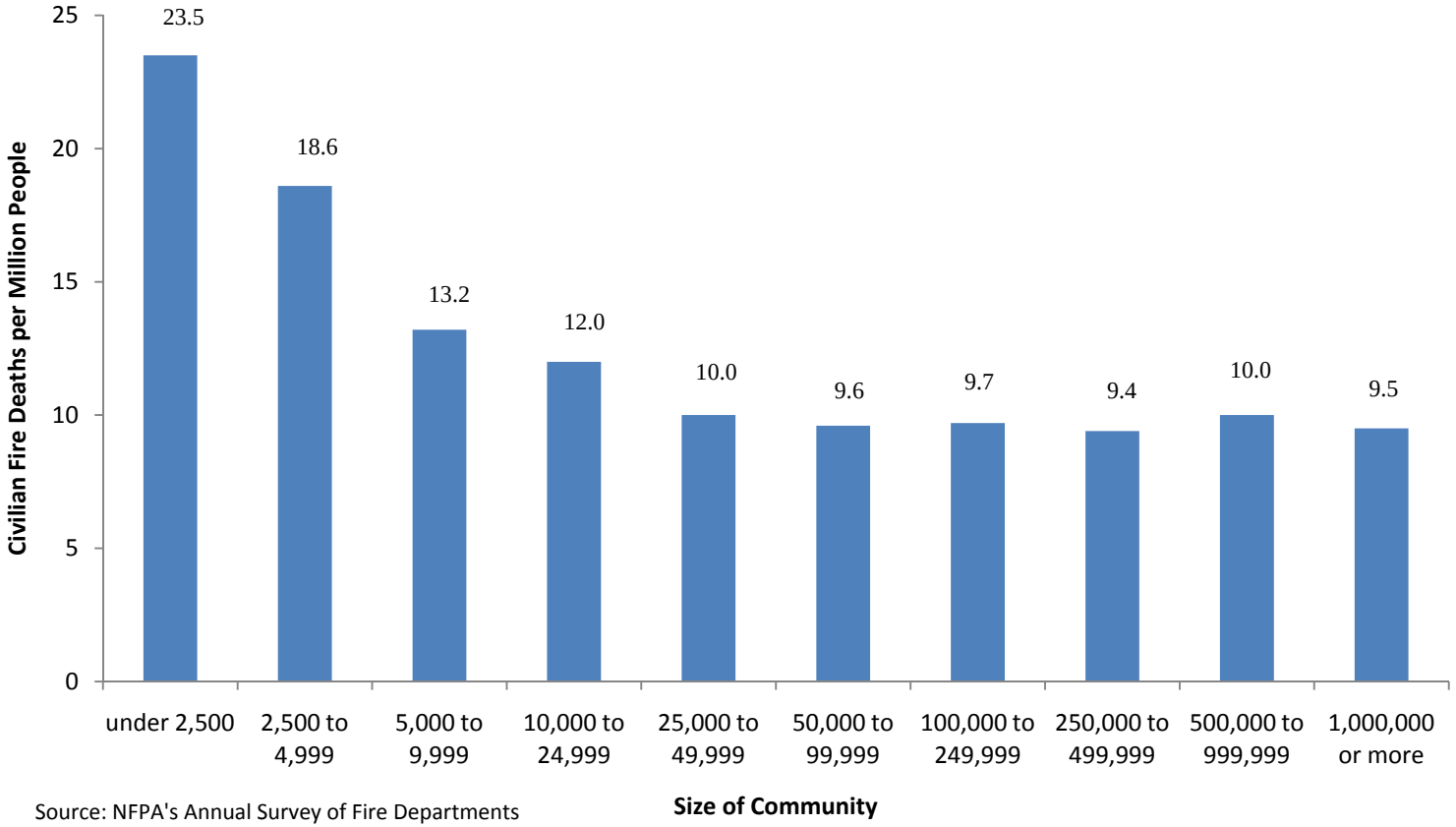
Results based on data reported to the NFPA indicate that in addition to 3,320 civilian fire deaths, there were an estimated 16,705 civilian fire injuries in 2008. This represents a decrease of 5.5% from a year ago.

Estimates of civilian fire injuries are on the low side, because many civilian injuries are not reported to the fire service. For example, many injuries occur at small fires that fire departments do not respond to, and sometime when departments do respond they may be unaware of injured persons that they did not transport to medical facilities.

The NFPA estimates that there were 13,560 civilians injured in residential properties, a decrease of 3.1%. Of these injuries, 9,185 occurred in one- and two-family homes, and 3,975 occurred in apartments. There were also 1,400 civilians injured in nonresidential structures in 2008.

For the 1977-2008 period, the number of civilian injuries has ranged from a high of 31,275 in 1983 to a low of 16,400 in 2006 for an overall decrease of 48%. There was no consistent pattern going up or down until 1995, when injuries fell roughly 5,000 in

Figure 4. Civilian Fire Deaths per Million Population by Size of Community (2004-2008)



Source: NFPA's Annual Survey of Fire Departments for U.S. Fire Experience (2004-08)

1994-95 to 25,775. From 1996 to 2002, injuries declined 28% to 18,425 by the end of 2002. From 2002 to 2008, injuries have been in the 17,650 to 18,425 area except for 2006 and 2008.

Property Loss

The NFPA estimates that the 1,451,500 fires responded to by the fire service caused $15,478,000,000 in property damage in 2008. This is an increase of 5.7% from a year ago. (This total figure includes the California Wildfires 2008 with an estimated total property loss of $1,400,000,000).

Wildfire losses typically include many structures and vehicles, but detailed property losses often are not available.

Fires in structures resulted in $12,361,000,000, a highly significant increase of 16.2%. Average loss per structure fire was $24,002, an increase of 19.7%.

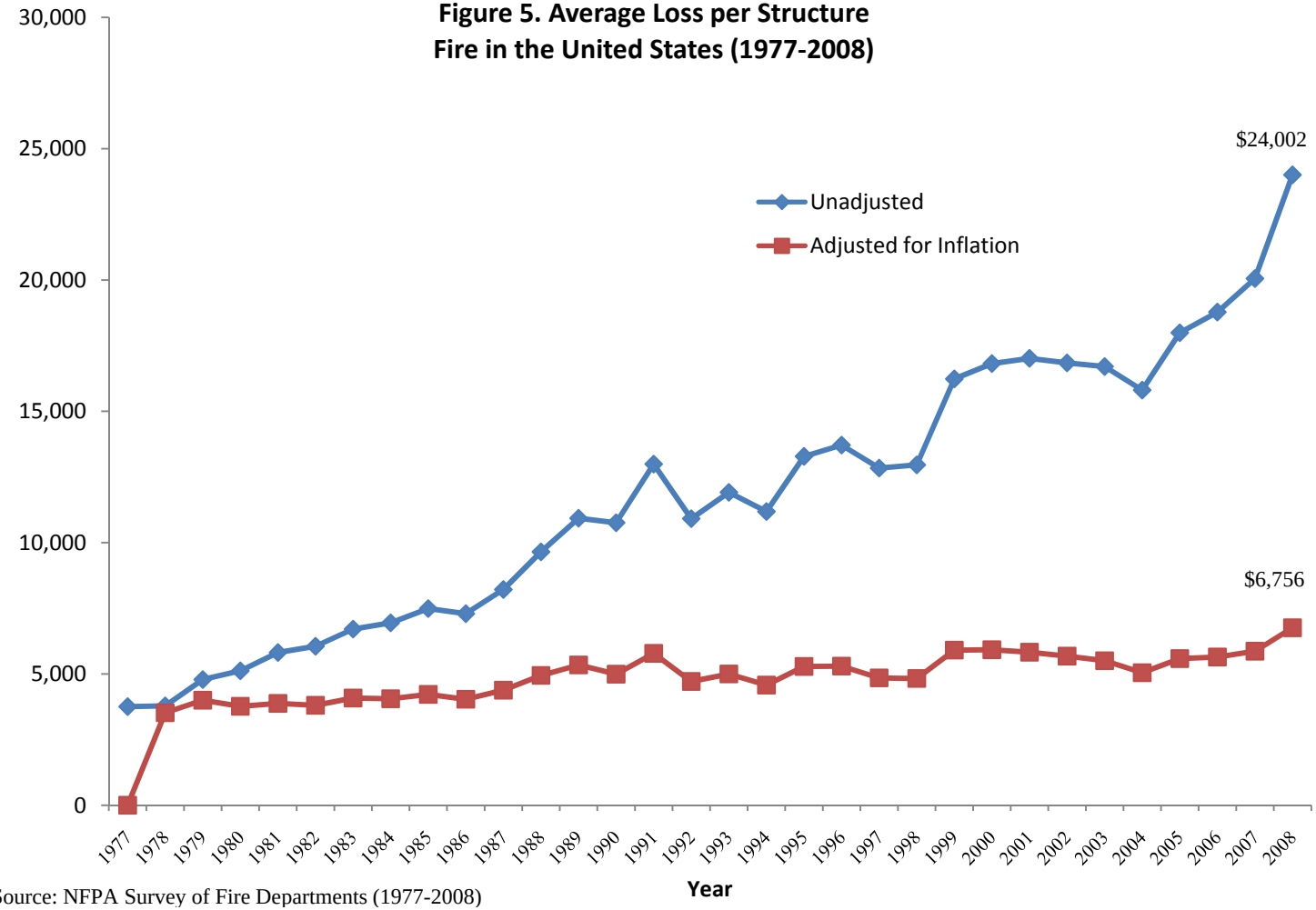
Over the 1977-2008 period, and excluding the events of 9/11/01, the average loss per structure fire ranged from a low of $3,757 in 1977 to a high of $24,002 in 2008 for an overall increase of 538%. When property loss is adjusted for inflation, the increase in the average structure fire loss between 1977 and 2008 is 80%.

Of the property loss in structures, $8,550,000,000 occurred in residential properties, a highly significant increase of 13.3%. An estimated $6,892,000,000 occurred in one- and two-family homes, a significant increase of 10.7%. An estimated $1,351,000,000 also occurred in apartments.

Other property damage figures worth noting for 2008 include: $1,401,000,000 in industrial properties, a highly significant increase of 79.9%, and includes three incidents that resulted in a total property loss of $775,000,000; $459,000,000 in special properties, a significant increase of 26.8%; $307,000,000 in other residential properties, an increase of 95.5%, and includes one incident with $100,000,000 in property loss; and $66,000,000 in educational properties, a significant decrease of 34.0%.

It should be kept in mind that property loss totals can change dramatically from year to year because of the impact of occasional large loss fires. The NFPA provides an analysis of these large loss fires in the November/December issue of *NFPA Journal* every year.

Figure 5. Average Loss per Structure Fire in the United States (1977-2008)



Source: NFPA Survey of Fire Departments (1977-2008)

Intentionally Set Fires

Based on data reported by fire departments in the survey, the NFPA estimates there were 30,500 intentionally set structure fires in 2008, an decrease of 6.2% from a year ago (see Table 5). (Note the NFPA survey is based on the NFIRS 5.0 system. This new system has an intentionally set category which is equivalent to the old incendiary category. There is no new equivalent to the old suspicious category, which has been eliminated.)

These intentionally set structure fires resulted in an estimated 315 civilian deaths, an increase of 6.8%. These set structure fires also resulted in $866,000,000 in property loss, a significant increase of 18.2%.

Also in 2008, there were an estimated 17,500 intentionally set vehicle fires, a decrease of 14.7% from a year ago. These set vehicle fires resulted in $139,000,000 in property loss a decrease of 4.1% from a year ago.

Table 5
Estimate of 2008 Losses in
Intentionally Set Structure Fires

Intentionally* Set Structure Fires	Estimate	Percent change from 2007
Number of Structure Fires	30,500	-6.2
Civilian Deaths	315	+6.8
Property Loss[1]	$866,000,000	+18.2**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2008 National Fire Experience Survey.

[1] This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation, or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

*The NFPA Survey is based on the NFIRS 5.0 system. This system has an intentionally set category which is equivalent to the old incendiary category. There is no new equivalent to the old suspicious category, which has been eliminated.

**Change was statistically significant at the .05 level.

Region

Fire loss rates nationwide and by region[5] can be seen in Table 6. The South had the highest rate with 5.6 fires per thousand people followed by the Midwest with 5.2.

The Midwest with 15.7 had the highest death rate per million population followed by the South (12.7).

The Northeast (69.8) and the Midwest (66.1) had the highest injury rates per million population, while the West had the lowest (35.8).

The Midwest with $56.9 had the highest property loss rate per capita followed by the South ($48.9), and the West ($46.6).

Fire incident rates by region and community size are shown in Table 7. The Northeast had the highest rate for communities of 100,000 to 249,999, the Midwest had the highest rate for communities of 250,000 to 499,999, and the South had the highest rates for communities of 10,000 to 99,999, and for smaller communities (population of less that 10,000).

Civilian fire deaths per million population by region and community size are shown in Table 8. The Northeast had the highest rate for communities of 500,000 or more, the Midwest had the highest rates for communities of 250,000 to 499,999, communities of 25,000 to 49,999, and communities of 5,000 to 9,999, the South had the highest rates for communities of 100,000 to 249,999, communities of 10,000 to 24,999, and communities of less than 2,500, and the West had the highest rate for communities of 2,500 to 4,999.

Civilian fire injuries per million population by region and community size are shown in Table 9. The Midwest had the highest rates for communities of 100,000 to 499,999 and communities of 10,000 to 24,999, the South had the highest rate for communities of 25,000 to 49,999, and the Northeast had the highest rates for communities of 500,000 or more, communities of 50,000 to 99,999, and for the smaller communities (populations of less than 10,000).

Property loss per capita by region and community size are shown in Table 10. The West had the highest rate for communities of 500,000 or more, the Northeast had the highest rates for communities of 50,000 to 249,999, and the smallest communities (populations less than 2,500), and the South had the highest rates for communities of 250,000 to 499,999, communities of 10,000 to 49,999, and communities of 2,500 to 4,999.

Table 6
Fire Loss Rates Nationwide and by Region, 2008

Region	Number of Fires per Thousand Population	Civilian Deaths per Million Population	Civilian Injuries per Million Population	Property Loss per Capita
Nationwide	4.8	10.9	54.9	$48.2
Northeast	4.3	8.7	69.8	38.4
Midwest	5.2	15.7	66.1	56.9
South	5.6	12.7	53.1	48.9
West	3.5	5.4	35.8	46.6

Source: NFPA's; Survey of Fire Departments for 2008 U.S. Fire Experience.

Note that the Midwest region was formerly called the Northcentral.

Table 7
2008 Fires per Thousand Population

Population of Community	All Regions	Northeast	Midwest	South	West
500,000 or more	3.9	*	*	4.0	2.8
250,000 to 499,999	3.4	*	4.3	3.7	2.8
100,000 to 249,999	3.7	5.5	3.8	4.4	2.6
50,000 to 99,999	3.5	4.4	2.8	4.7	2.7
25,000 to 49,999	3.9	4.3	3.1	4.8	3.8
10,000 to 24,999	4.2	4.0	3.5	5.7	3.8
5,000 to 9,999	5.6	4.6	4.5	7.4	6.7
2,500 to 4,999	7.1	5.6	5.5	10.7	9.8
under 2,500	11.0	7.7	8.9	18.7	11.3

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience.

*Insufficient data

Note that the Midwest region was formerly called the Northcentral.

Table 8
2008 Civilian Fire Deaths per Million Population
by Region and Size of Community

Population of Community	All Regions	Northeast	Midwest	South	West
500,000 or more	8.2	12.7	12.3	10.1	3.7
250,000 to 499,999	8.1	*	14.7	8.6	5.5
100,000 to 249,999	7.6	6.7	7.6	10.7	4.1
50,000 to 99,999	7.5	7.3	7.0	10.0	4.8
25,000 to 49,999	10.7	11.3	12.2	10.8	5.0
10,000 to 24,999	13.4	11.6	13.5	17.7	5.6
5,000 to 9,999	10.4	11.1	13.2	8.0	3.7
2,500 to 4,999	17.2	*	23.5	14.8	29.1
under 2,500	24.2	14.1	19.9	49.0	11.0

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience

*Insufficient data

Note that the Midwest region was formerly called the Northcentral.

Table 9
2008 Civilian Fire Injuries per Million Population
by Region and Size of Community

Population of Community	All Regions	Northeast	Midwest	South	West
500,000 or more	55.9	89.3	*	41.9	46.0
250,000 to 499,999	58.9	*	93.2	72.4	30.9
100,000 to 249,999	64.2	90.3	94.6	76.7	30.8
50,000 to 99,999	60.5	77.3	63.1	68.0	39.7
25,000 to 49,999	71.7	82.9	66.6	83.5	48.7
10,000 to 24,999	51.5	57.3	58.1	46.7	26.7
5,000 to 9,999	41.1	52.3	36.0	42.5	36.7
2,500 to 4,999	33.8	50.2	34.4	26.2	15.0
under 2,500	45.1	62.9	39.8	61.1	11.3

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience.

*Insufficient data

Note that the Midwest region was formerly called the Northcentral.

Table 10
2008 Property Loss per Person
by Region and Size of Community

Population of Community	All Regions	Northeast	Midwest	South	West
500,000 or more	$40.7	*	*	$38.3	$42.5
250,000 to 499,999	28.2	*	$28.5	32.6	24.4
100,000 to 249,999	39.9	$54.4	32.7	46.3	34.1
50,000 to 99,999	34.2	46.6	27.2	38.4	33.9
25,000 to 49,999	45.2	33.3	49.1	52.2	31.9
10,000 to 24,999	42.5	44.8	39.1	52.8	33.6
5,000 to 9,999	63.7	49.2	65.4	63.8	82.3
2,500 to 4,999	56.1	54.3	51.9	71.1	47.4
under 2,500	111.8	138.5	98.7	122.8	125.8

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience.

*Insufficient data

Note that the Midwest region was formerly called the Northcentral.

Average Fire Experience

Average fire experience by community size for all fires and residential properties can be seen in Tables 11 and 12.

Table 11
Average 2008 Fire Experience by Size of Community

Population of Community	Total Fires	Structure Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	6,223	1,881	14.50	130.67	$48,427,500
500,000 to 999,999	2,835	1,066	5.77	31.45	33,797,600
250,000 to 499,999	1,190	431	2.83	20.71	10,174,500
100,000 to 249,999	557	205	1.15	9.68	8,568,700
50,000 to 99,999	239	95	0.50	4.07	2,342,600
25,000 to 49,999	133	51	0.38	2.51	1,695,800
10,000 to 24,999	66	24	0.21	0.80	713,400
5,000 to 9,999	39	13	0.09	0.29	453,500
2,500 to 4,999	24	8	0.10	0.27	279,900
under 2,500	12	3	0.03	0.05	150,800

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience

Table 12
Average 2008 Residential Fire Experience by Size of Community

Population of Community	Number of Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	1,442	18.33	91.00	$30,023,700
500,000 to 999,999	841	4.32	24.76	22,523,300
250,000 to 499,999	344	2.37	17.31	6,462,300
100,000 to 249,999	158	0.86	8.37	3,390,700
50,000 to 99,999	76	0.41	3.29	1,393,800
25,000 to 49,999	40	0.33	2.08	964,200
10,000 to 24,999	19	0.17	0.65	432,505
5,000 to 9,999	11	0.08	0.24	244,600
2,500 to 4,999	6	0.05	0.10	187,600
under 2,500	2	0.02	0.03	69,200

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience

Fire Department Responses

In all, fire departments responded to the following estimated number of fires and other incidents in 2008.

	Number	Percent Change From 2007
Fire Incidents	1,451,500	-6.8
Medical Aid Responses (Ambulance, EMS, Rescue)	15,767,500	-0.1
False Alarms	2,241,500	+1.5
Mutual Aid or Assistance Calls	1,214,500	+9.5
Hazardous Material Responses (Spills, Leaks, etc.)	394,500	-0.3
Other Hazardous Responses (arcing wires, bomb removal etc.)	697,500	+1.6
All Other Responses (smoke scares, lock-outs, (etc.)	3,485,500	-3.0
Total Incidents	25,252,500	-0.3

A further breakdown on false responses was collected on the 2008 surveys and the results can be seen in Table 13.

Table 13
Estimates of False Alarms by Type, 2008

	Estimate	Percent Change From 2007	Percent of All False Alarms
Malicious, Mischievous False Call	190,000	-14.6	8.5
System Malfunction	765,000	+3.3	34.1
Unintentional Call	982,500	+3.3	43.8
Other False Alarms (Bomb Scares, etc.)	304,000	+3.2	13.6
Total	2,241,500	+1.5	

Source: NFPA's Survey of Fire Departments for 2008 U.S. Fire Experience

SURVEY METHODOLOGY

Each year, based on a sample survey of fire departments across the country, the NFPA estimates the national fire problem as measured by the number of fires that public fire departments attend, and the resulting deaths, injuries and property losses that occur. This report summarizes key findings based on the NFPA Survey for 2008 Fire Experience. This section explains the major steps in conducting the 2008 survey.

Sample Selection

The NFPA currently has 30,300 public fire departments listed in the US in its Fire Service Inventory (FSI) file. Based on desired levels of statistical precision for the survey results and the staff available to process, edit, and follow up on the individual questionnaires the NFPA determined that 3,000 fire departments were a reasonable number for the 2007 sample.

Because of the variation in fire loss results by community size, fire departments were placed in one of the following 10 strata by size of community protected:

1,000,000 and up
500,000 to 999,999
250, 0000 to 499,999
100,000 to 249,999
50,000 to 99,999
25,000 to 49,999
10,000 to 24,999
5,000 to 9,999
2,500 to 4,999
Under 2,500

Sample sizes for the individual strata were chosen to ensure the best estimate of civilian deaths in one-and two-family dwellings, the statistic that most aptly reflects the overall severity of the fire problem. All departments that protect 50,000 people or more were included. These 801 departments in the five highest strata protect 145,077,200.

For the remaining five population strata, assuming response rates similar to the past two years for the five highest strata, a total sample of 2,640 was indicated. Sample sizes for individual strata were calculated using a methodology that assured optimum sample allocations[6]. Based on the average variation in civilian deaths in one- and two-family dwellings by stratum for the last two years and on the estimated number of fire departments, appropriate relative sample weights were determined. Then the corresponding sample sizes by stratum were calculated. The sample size by stratum was

then adjusted based on the response rates from the last two years' returns. A sample size of 17,830 was found to be necessary to obtain the desired total response of 3,000 fire departments. For all strata, were a sample was necessary, departments were randomly selected.

Data Collection

The fire departments selected for the survey were sent the 2008 NFPA Fire Experience Questionnaire during the 2nd week of January 2009. A second mailing was sent in mid-March to fire departments that had not responded to the first mailing. A total of 2,846 departments responded to the questionnaire 2,238 to the first mailing and 608 to the second.

Table 14 shows the number of departments that responded by region and size of community. The overall response rate was 16%, although response rates were considerably higher for departments protecting larger communities than they were for departments protecting smaller communities. The 2,846 departments that did respond protect 117,748,200 people or 39% of the total U.S. population.

After the NFPA received the surveys, technical staff members of the Fire Analysis and Research Division reviewed them for completeness and consistency. When appropriate, they followed up on questions with a telephone call.

After the edit, procedures were completed; the survey data were keyed to a computer file, where additional checks were made. The file was then ready for data analysis and estimation procedures.

Estimation Methodology

The estimation method used for the survey was ratio estimation[7], with stratification by community size. For each fire statistic a sample loss rate was computed for each stratum. This rate consisted of the total for that particular statistic from all fire departments reporting it, divided by the total population protected by the departments reporting the statistic. Note that this means that the departments used in calculating each statistic could be different, reflecting differences in unreported statistics The sample fire loss rates by stratum were then multiplied by population weighing factors to determine the estimates were combined to provide the overall national estimate.

If this method of estimation is to be effective, estimates of the total number of fire departments and the total population protected in each stratum must be accurate. The NFPA makes every effort to ensure that this is the case. The population weights used for

Table 14
Number of Fire Departments Responding to 2008 NFPA Survey, by Region and Community Size

Population of Community	All Regions	Northeast	Midwest	South	West
1,000,000 or more	9	2	0	4	3
500,000 to 999,999	33	1	3	15	14
250,000 to 499,999	38	0	8	16	14
100,000 to 249,999	121	8	18	51	44
50,000 to 99,999	210	19	74	70	47
25,000 49,999	313	51	128	91	43
10,000 to 24,999	549	113	229	150	57
5,000 to 9,999	385	76	162	109	38
2,500 to 4,999	359	76	163	81	39
Under 2,500	829	112	434	170	113
TOTAL	2,846	458	1,219	757	412

the national estimates were developed using the NFPA FSI (Fire Service Inventory) File and U.S. Census population figures.

For each estimate, a corresponding standard error was also calculated[6]. The standard error is a measure of the error caused by the fact that estimates are based on a sampling of fire losses rather than on a complete census of the fire problem. Due to the fact that the survey is based on a random sample, we can be very confident that the actual value falls within the percentage noted in parentheses for the overall national fire loss statistics: number of fires (1.8%), number of civilian deaths (10.7%), number of civilian injuries (5.7%), and property loss (2.0%).

The standard error helps in determining whether year-to-year differences are statistically significant. Differences that were found to be statistically significant were so noted in tables. Property loss estimates are particularly prone to large standard errors because they are sensitive to unusually high losses, and, as a result, large percentage differences from year to year are not always statistically significant. In 2008, for instance, property damage in public assembly properties was estimated to be $642,000,000. This represented an increase of 6.5% from the year before, but was found not to be statistically significant.

In addition to sampling errors, there are nonsampling errors. These include biases of the survey methodology, incomplete or inaccurate reporting of data to the NFPA, differences in data collection methods by the fire departments responding. As an example of a nonsampling error, most of the fires included in the survey took place in highly populated residential areas, because the fire departments selected for the surveys are primarily public fire departments that protect sizable residential populations. Fires that occur in sparsely populated areas protected primarily by State and Federal Departments of Forestry are not likely to be included in the survey results.

The NFPA Fire Incident Data Organization (FIDO) data base was also used in conjunction with the annual survey to help identify any large loss fires or deaths in nonresidential structures that the survey may have missed.

The editors of survey data attempted to verify all reported civilian deaths in vehicle fires. They contacted most of the fire departments that reported fire-related deaths in vehicles and found that many of the deaths were indeed the results of fire. In some instances, however, impact was found to have been the cause of death. This effort can have a considerable impact on the estimates.

The results presented in this report are based on fire incidents attended by public fire departments. No adjustments were made for unreported fires and losses (e.g., fires extinguished by the occupant). Also, no adjustments were made for fires attended solely by private fire brigades (e.g., industry and military installations), or for fires extinguished by fixed suppression systems with no fire department response.

Fire Experience of Nonrespondents

A telephone follow-up was made to a sample of nonrespondents to determine whether fire departments that did not respond to the survey experienced fire loss rates similar to those that did respond. This would help the NFPA determine whether we received questionnaires only from departments that had experienced unusually high or low fire losses.

The sample of nonrespondents selected was proportional by state and population of community to the original sample selected for the survey. As a result of these efforts, 132 fire departments were successfully contacted and answered some of the questions about their fire experience.

Table 15 compares fire loss rates for both respondents and nonrespondents. For communities of 100,000 to 249,999, the nonrespondent rate was 32% higher for property loss, 20% higher for property loss, while the respondent rate was 19% higher for fires. (None of these results were statistically significant).

For communities of 50,000 to 99,999, the respondent rate was 18% higher for property loss, while the nonrespondent rate was 12% higher for civilian deaths. (None of these results were statistically significant).

For communities of 25,000 to 49,999, the nonrespondent rate was 18% higher for civilian deaths, and 19% higher for property loss, while the respondent rate was 8% higher for fires. (None of these results were statistically significant).

For communities of 10,000 to 24,999, the nonrespondent rate was 10% higher for fires, and 9% higher for civilian deaths, and 9% higher for property loss. (None of these results were statistically significant).

For communities of 5,000 to 9,999, the nonrespondent rate was 19% higher for fires, while the rates were similar for property loss.

Table 15
A Comparison of Respondents and Nonrespondents*
to the 2008 NFPA Survey by Community Size

Population of Community	Number of Fires (Per Thousand Population)				Civilian Deaths (Per Million Population)				Property Loss (Per Capita)			
	Respondents		Nonrespondents		Respondents		Nonrespondents		Respondents		Nonrespondents	
	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate	n	Rate
100,000 to 249,999	116	3.7	17	3.1	118	7.6	18	10.0	87	39.9	15	47.7
50,000 to 99,999	200	3.5	28	3.5	206	7.5	29	8.4	122	34.2	14	28.9
25,000 to 49,999	286	3.9	30	4.2	305	10.7	30	9.1	146	45.2	24	37.9
10,000 to 24,999	518	4.2	34	4.6	548	13.4	34	14.6	277	42.5	17	46.2
5,000 to 9,999	371	5.6	21	6.7	383	10.4	ns	ns	198	63.7	9	62.4

*Some departments did not return the questionnaire. A sample of these nonrespondents was contacted by telephone and questioned about their 2008 fire experience.

Note: "n" refers to the number of departments reporting the statistic.

ns – Data not sufficient.

Definition of Terms

Civilian: The term "civilian" includes anyone other than a firefighter, and covers public service personnel such as police officers, civil defense staff, non-fire service medical personnel, and utility company employees.

Death: An injury that occurred as a direct result of a fire that is fatal or becomes fatal within one year.

Fire: Any instance of uncontrolled burning. Includes combustion explosions and fires out on arrival. Excludes controlled burning (whether authorized or not), over pressure rupture without combustion, mutual aid responses, smoke scares, and hazardous responses (e.g., oil spill without fire).

Injury: Physical damage that is suffered by a person as a direct result of fire and that requires (or should require) treatment by a practitioner of medicine (physician, nurse, paramedic, EMT) within one year of the incident (regardless of whether treatment was actually received), or results in at least one day of restricted activity immediately following the incident. Examples of injuries resulting from fire are smoke inhalation, burns, wounds and punctures, fractures, heart attacks (resulting from stress under fire condition), strains and sprains.

Property Damage: Includes all forms of direct loss to contents, structure, machinery, a vehicle, vegetation or anything else involved in the fire but not indirect losses, such as business interruption or temporary shelter provisions.

Structure: An assembly of materials forming a construction for occupancy or use in such a manner as to serve a specific purpose. A building is a form of structure. Open platforms, bridges, roof assemblies over open storage or process areas, tents, air-supported, and grandstands are other forms of structures.

Vehicles, Highway and Other: Fires in these instances may have been associated with an accident; however, reported casualties and property loss should be the direct result of the fire only. Highway vehicles include any vehicle designed to operate normally on highways, e.g., automobiles, motorcycles, buses, trucks, trailers (not mobile homes on foundations), etc. Other vehicles include trains, boats and ships, aircraft, and farm and construction vehicles.

Footnotes

1. Note that the NFPA changed its survey methodology in 1977-78, and meaningful comparisons cannot be made with fire statistics estimated before 1977.

2. The downward trend of home fire deaths for the period was examined by a Spearman's rho correlation coefficient and was found to be statistically significant at the .001 level, while for the death rate per 1,000 home fires, there was no statistically significant trend found.

3. John R. Hall, Jr., Characteristics of Home Fire Victims Including Age and Sex, July 2005, Quincy: National Fire Protection Association, Fire Analysis and Research Division.

4. Rita F. Fahy and Alison L. Miller, "How Being Poor Affects Fire Risk", *Fire Journal*, Vol. 83, No. 1 (January 1989), p. 28.

5. As defined by the U.S. Bureau of the Census, the four regions are: Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rennsylvania, Rhode Island, and Vermont. Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsis. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Verginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

6. Steve K. Thompson, *Sampling*, John Wiley, New York, NY, 1992, pp. 107-111.

7. William G. Cochran, *Sampling Techniques*, John Wiley, New York, NY, 1977, pp. 150-161.