

FIRE LOSS IN THE UNITED STATES DURING 2003

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Overview of 2003 U.S. Fire Experience

Number of Fires

- 1,584,500 fires were attended by public fire departments, a decrease of 6.1% from the year before.
- 519,500 fires occurred in structures, a very slight increase of 0.1%.
- 402,000 fires or 77% of all structure fires occurred in residential properties.
- 312,000 fires occurred in vehicles, a decrease of 5.3% from the year before.
- 753,000 fires occurred in outside properties, a decrease of 10.3%.
- What do these fire frequencies above mean? Every 20 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 79 seconds. Fires occur in vehicles at the rate of 1 every 101 seconds, and there's a fire in an outside property every 42 seconds.

Civilian Fire Deaths

- 3,925 civilian fire deaths occurred in 2003, an increase of 16.1% from a year ago.
- About 80% of all fire deaths occurred in the home.
- 3,145 civilian fire deaths occurred in the home, an increase of 17.8%, and back to the 2000 and 2001 levels.
- 220 civilians died in nonresidential structure fires. This includes 100 civilians that died in the Station Nightclub Fire in Rhode Island, and 31 civilians who died in nursing home fires in Connecticut and Tennessee.
- Nationwide, there was a civilian fire death every 134 minutes.

Civilian Fire Injuries

- 18,125 civilian fire injuries occurred in 2003, a decrease of 1.6%. This estimate for civilian injuries is on the low side, due to under reporting of civilian injuries to the fire service.
- 14,075 of all civilian injuries occurred in residential properties, while 1,525 occurred in nonresidential structure fires.
- Nationwide, there was a civilian fire injury every 29 minutes.

Property Damage

- An estimated \$12,307,000,000 in property damage occurred as a result of fire in 2003, an increase of 19.1% from last year. This total figure includes the Southern California Wildfires (Cedar and Old Wildfires) with an estimated property loss of \$2,040,000,000.
- \$8,678,000,000 of property damage occurred in structure fires.
- \$6,074,000,000 of property loss occurred in residential properties.

Intentionally Set Fires

- An estimated 37,500 intentionally set structure fires occurred in 2003, a decrease of 15.7%.
- Intentionally set fires in structures resulted in 305 civilian deaths, a decrease of 12.9% from a year ago.
- Intentionally set structure fires also resulted in \$692,000,000 in property loss, a decrease of 24.7% from last year.
- 30,500 intentionally set vehicle fires occurred, a decrease of 25.6% from a year ago, and caused \$132,000,000 in property damage, a decrease of 40.5% from a year ago.

Number of Fires

In 2003, public fire departments responded to 1,584,500 fires in the United States, according to estimates based on data the NFPA received from fire departments responding to its 2003 National Fire Experience Survey (see Tables 1 and 2). This represents a moderate decrease of 6.1% from a year ago.

There was an estimated 519,500 structure fires in 2003, a very slight decrease of 0.1% or virtually no change from last year. For the 1977-2003 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 and has stayed in the 517,500 to 519,500 area during 1999-2003 except for 2001.

Fire incident rates by size of community were examined for the 1999-2003 period. (See Figure 2). The smallest communities (under 2,500 population) had the highest rate with 12.4 fires per thousand population.

Of the 2003 structure fires, 402,000 were residential fires, accounting for 77.3% of all structure fires, and virtually no change from a year ago. Of the residential fires 297,000 occurred in one-and two-family dwellings, accounting for 57.2% of all structure fires. Another 91,500 occurred in apartments accounting for 17.6% of all structure fires.

For nonresidential structures most property type showed little or no change in 2003. The only nonresidential property types with notable changes were: an increase of 7.7% in institutional properties to 7,000; and a decrease of 8.0% in industrial properties to 11,500.

For the 1977-2003 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 reached 910,500 in 1993, and stayed near the 1,000,000 level the next three years. In 1997-1998 outside fires were at the 850,000 level, went up 8.7% to 931,500 in 1999, before dropping a cumulative 9.9% in 2001-2002 to 839,000 by the end of 2002. In 2003, the number of outside fires decreased a substantial 10.3% to 753,000. In particular, brush fires decreased 9.8% to 360,000, and rubbish fires decreased 6.6% to 190,500.

Table 1
Estimates of 2003 Fires, Civilian Deaths, Civilian Injuries
and Property Loss in the United States

	Estimate	Range¹	Percent Change From 2002
Number of Fires	1,584,500	1,547,500 to 1,621,500	-6.1**
Number of Civilian Deaths	3,925	3,575 to 4,275	+16.1*
Number of Civilian Injuries	18,125	16,125 to 20,125	-1.6
Property Loss ²	\$12,307,000,000 ³	\$12,027,000,000 to 12,587,000,000	+19.1**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 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 Southern California Wildfires (Cedar and Old Wildfires) with an estimated total property loss of \$2,040,000,000. Loss by specific property type for this fire was not available.

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

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

Table 2
Estimates of 2003 Fires and
Property Loss by Property Use

Type of Fire	Number of Fires		Property Loss ¹	
	Estimate	Percent Change from 2002	Estimate	Percent Change from 2002
Southern California Wildfires (includes Cedar and Old Wildfires)			\$2,040,000,000	—
Fires in Structures	519,500	+0.1	\$8,678,000,000	-0.7
Fires in Highway Vehicles	286,000	-6.8**	1,101,000,000	-7.0*
Fires in Other Vehicles ²	26,000	+15.6	255,000,000	+22.6*
Fires Outside of structures with value involved but no vehicle (outside storage, crops, timber, etc.)	66,000	-7.0	162,000,000	+33.9**
Fires in Brush, Grass Wildland (excluding crops and timber) with no value or loss involved	360,000	-9.8**	—	—
Fires in Rubbish including dumpsters (outside of structures), with no value or loss involved	190,500	-6.6	—	—
All Other Fires	136,500	-17.3**	71,000,000	-13.4
Total	1,584,500	-6.1**	\$12,307,000,000	+19.1**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey.

The figure for the Southern California Wildfires is total property loss. Loss by specific property type was not available for this fire.

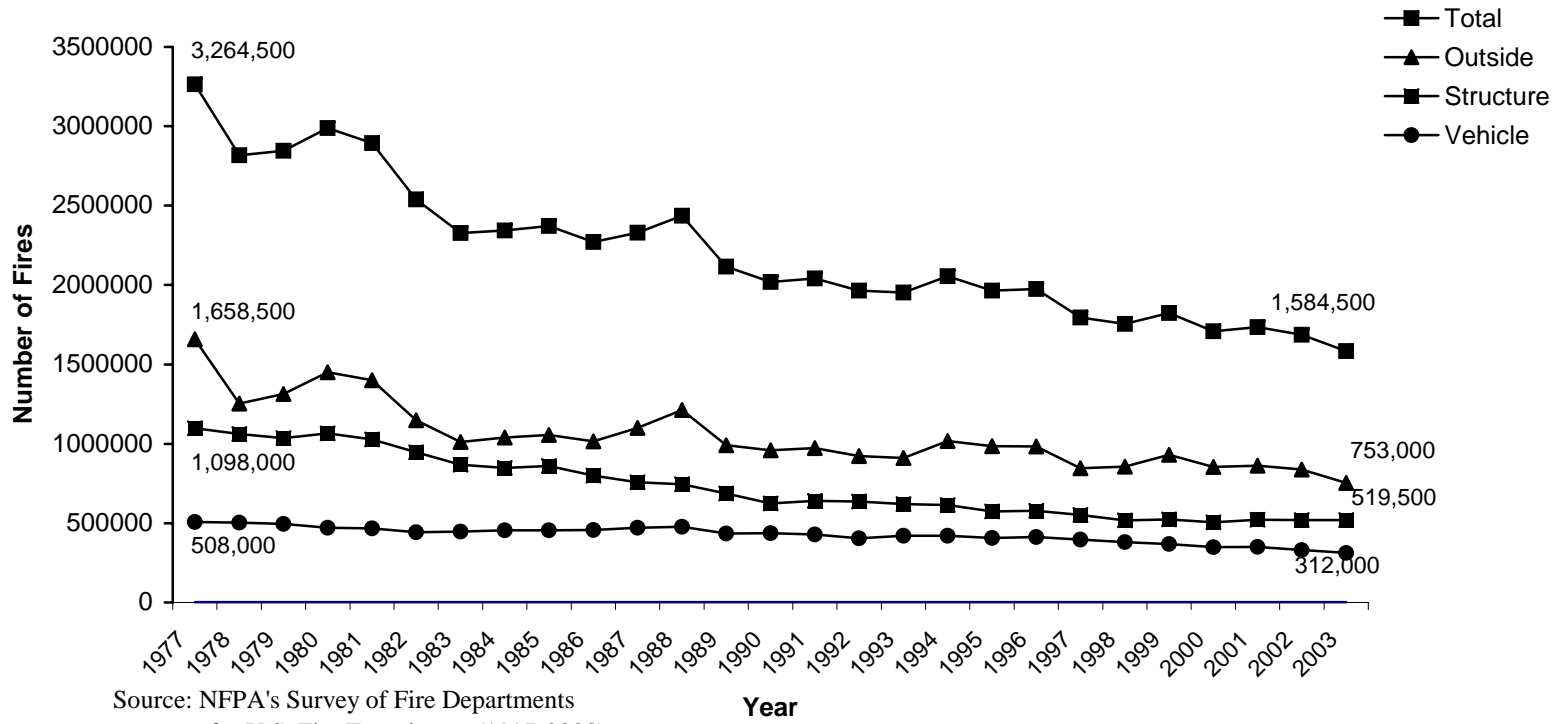
¹ This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.

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.

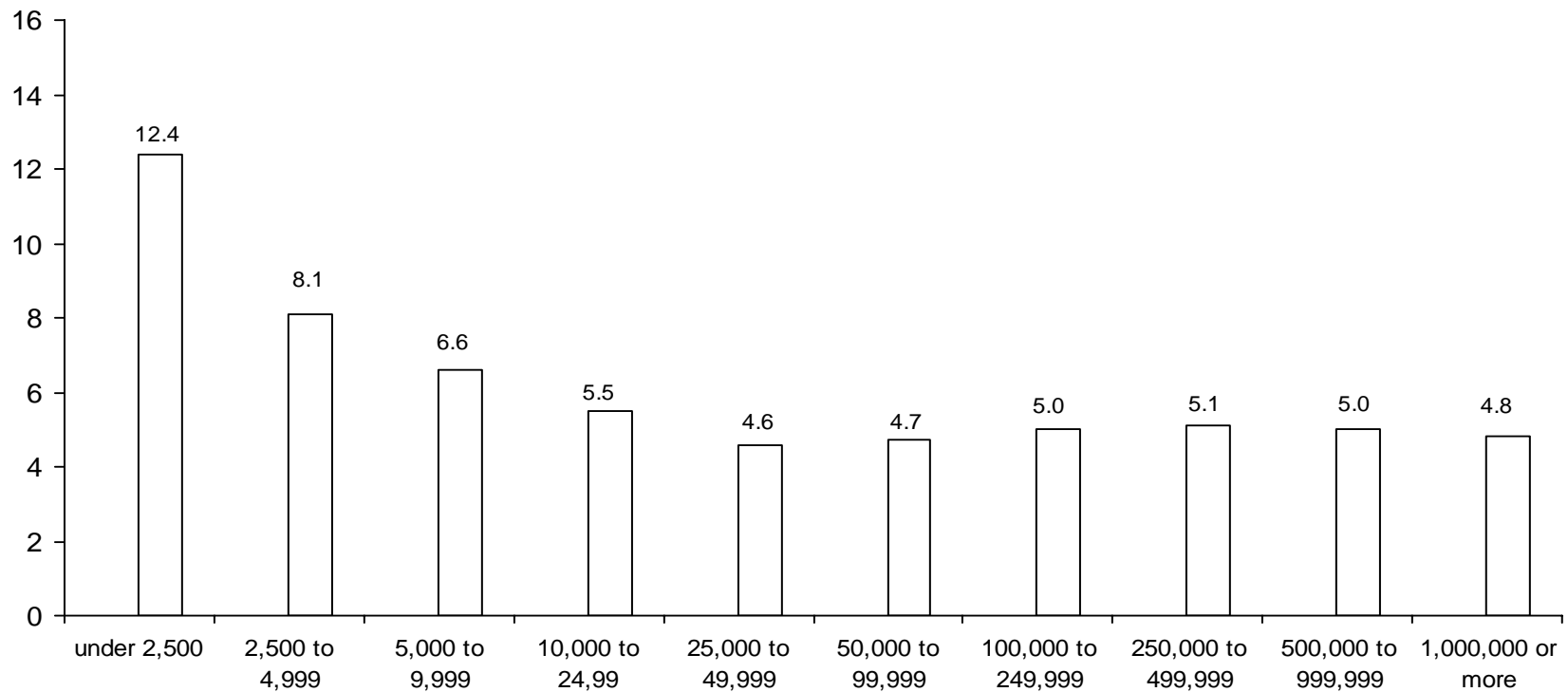
Figure 1
Estimate of Fires by Type
in the United States (1977-2003)



Source: NFPA's Survey of Fire Departments
 for U.S. Fire Experience, (1997-2003)

**Figure 2 Fires per Thousand Population
by Size of Community (1999-2003)**

Fires per Thousand Population



Source: NFPA Survey of Fire Departments
for U.S. Fire Experience, (1999-2003)

Size of Community

Table 3
Estimates of 2003 Structure Fires and
Property Loss by Property Use

Property Use	Structure Fires		Property Loss ¹	
	Estimate	Percent Change from 2002	Estimate	Percent Change from 2002
Southern California Wildfires (includes Cedar and Old Wildfires)			\$2,040,000,000	—
Public Assembly	14,000	0	\$302,000,000	11.7
Educational	7,000	0	69,000,000	-25.0
Institutional	7,000	+7.7	28,000,000	+7.7
Residential (Total)	402,000	+0.3	6,074,000,000	+0.3
One- and Two-Family Dwellings ²	297,000	-1.2	5,052,000,000	+0.9
Apartments	91,500	+3.4	897,000,000	-3.1
Other Residential ³	13,500	+12.5*	125,000,000	+0.8
Stores and Offices	25,000	+4.2	721,000,000	+19.4**
Industry, Utility, Defense ⁴	11,500	-8.0	625,000,000	-5.0
Storage in Structures	31,500	-1.6	675,000,000	+7.7
Special Structures	21,500	-2.3	184,000,000	-45.6**
Total	519,500	+0.1	\$8,678,000,000 ⁵	-0.7

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey.

The figure for the Southern California Wildfires is total property loss. Loss by specific property type was not available for this fire.

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 does not include the Southern California Wildfires.

*Change was statistically significant at the .05 level.

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

Civilian Deaths

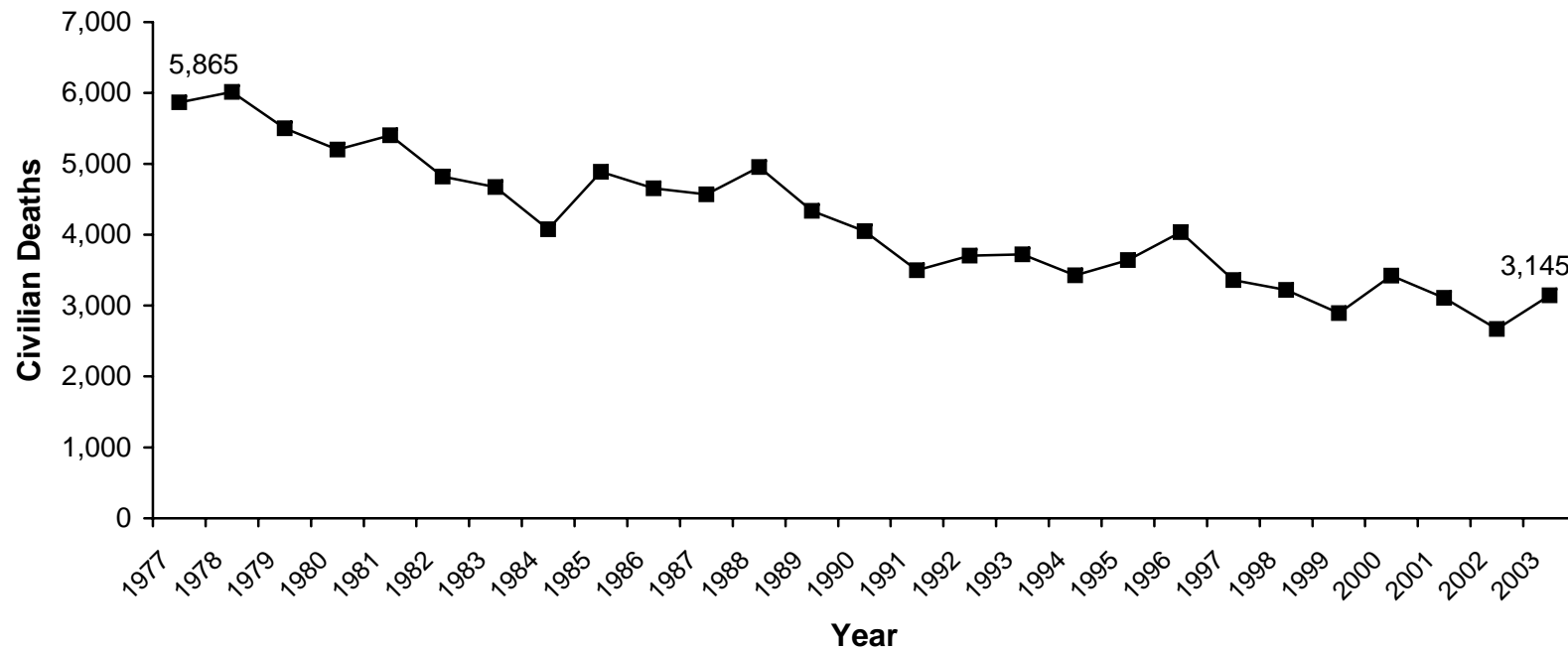
The 1,584,500 fires reported to by fire departments in the U.S. in 2003 resulted in an estimated 3,925 civilian deaths based on data reported to the NFPA. This is an increase of 16.1% from a year ago.

An estimated 3,165 died in residential fires in 2003, an increase of 17.4%. Of these deaths, 410 occurred in apartment fires, an increase of 5.1%. Another 2,735 civilians died in one- and two-family dwellings, an increase of 20.0%. This is 455 more deaths than the year before, and returns it closer to 2000 and 2001 levels. When dwelling death rates declined sharply in 2002 we advised caution because death rates can vary considerably from year to year, particularly for smaller communities. The same applies to the 2003 increase, but the long-term trend is still downward.

In all, fires in the home (one- and two-family dwellings including manufactured homes and apartments) resulted in 3,145 civilian deaths, an increase of 17.8% from a year ago. Looking at trends in civilian deaths since 1977-78¹, 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 decrease 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. In the past fourteen years, home fire deaths moved well below the 1982-88 plateau and has stayed in the 3,145 to 3,720 area during 1991 to 2003 except for 1996, 1999 and 2002.

With home fire deaths still accounting for 3,145 fire deaths or 80% 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 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 is the recent examination of the feasibility of less

**Figure 3 Civilian Fire Deaths
in the Home in the United States (1977-2003)**



Source: NFPA's Survey of Fire Departments
for 2003 U.S. Fire Experience

Table 4
Estimates of 2003 Civilian Fire Deaths and
Injuries by Property Use

Property Use	Civilian Deaths			Civilian Injuries		
	Estimate	Percent Change From 2002	Percent of all Civilian Deaths	Estimate	Percent Change From 2002	Percent of all Civilian Injuries
Residential (total)	3,165	+17.4*	80.6	14,075	+0.2	77.6
One-and-Two-Family Dwellings ¹	2,735	+20.0*	69.7	10,000	+0.5	55.2
Apartments	410	+5.1	10.5	3,650	-1.4	20.1
Other Residential ²	20	-20.0	0.5	425	+6.3	2.3
Non-residential Structures ³	220 ⁴	+175.0	5.6	1,525	-1.6	8.4
Highway Vehicles	455	-15.7	11.7	1,400	-17.7	7.7
Other Vehicles ⁵	20	-20.0	0.5	200	+60.0	1.1
All Other ⁶	65	+62.5	1.7	925	-7.5	5.1
Total	3,925	+16.1*		18,125	-1.6	

Estimates are based on data reported to the NFPA by fire departments that responded to the 2003 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.

¹This 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 100 fire deaths in the Station Nightclub Fire in Rhode Island, and 31 deaths in two nursing home fires in Connecticut and Tennessee.

⁵ This includes trains, boats, ships, farm vehicles and construction vehicles.

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

*Statistically significant at the .05 level.

fire-prone 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.^{2, 3}

Also in 2003, an estimated 220 civilians died in nonresidential structure fires, a highly significant increase of 175%. This increase reflects the 100 fire deaths that occurred in the Station Nightclub Fire in Rhode Island, and 31 deaths that occurred in two nursing home fires in Connecticut and Tennessee.

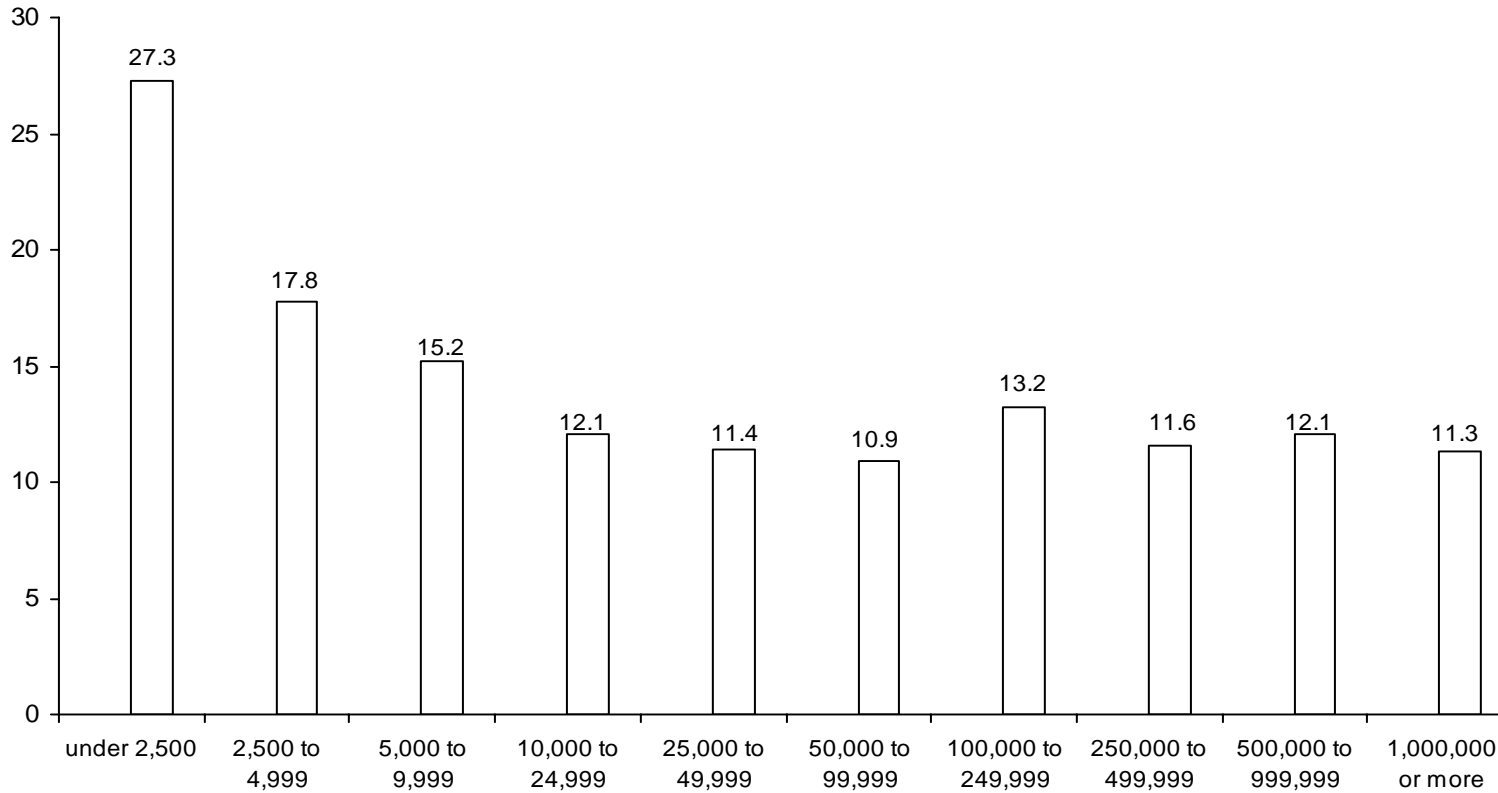
Civilian fire death rates by size of community were examined for the period (see Figure 4). The smallest communities (under 2,500 population) had the highest rate. The rate for communities under 2,500 population was more than twice the national average rate.

Of the 3,385 civilians that died in structure fires, 305 or 9.0% died in fires that were intentionally set.

Also in 2003, 455 civilians died in highway vehicle fires, a decrease of 15.7%, and 20 died in other vehicle fires.

**Figure 4 Civilian Fire Deaths per Million Population
By Size of Community (1999-2003)**

Civilian Fire Deaths per Million People



Source: NFPA's Annual Survey of Fire Departments
for U.S. Fire Experience (1999-03)

Size of Community

Civilian Fire Injuries

Results based on data reported to the NFPA indicate that in addition to 3,925 civilian fire deaths, there were 18,125 injuries in 2003. This is a decrease of 1.6% 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 14,075 civilians injured in residential properties, a slight increase of 0.2%. Of these injuries, 10,000 occurred in one- and two-family dwellings, while 3,650 occurred in apartments.

For the 1977-2003 period, the number of civilian injuries has ranged from a high of 31,275 in 1983 to a low of 18,125 in 2003 for an overall decrease of 42%. There was no consistent pattern going up or down until 1995, when injuries fell roughly 5,000 in 1994-95 to 25,775, changed little in 1996, dropped 8% to 23,750 in 1997, changed little in 1998, dropped 5% in 1999, and then increased slightly in 2000, and then dropped 20% in 2001-2003 to 18,125 by the end of 2003.

Property Loss

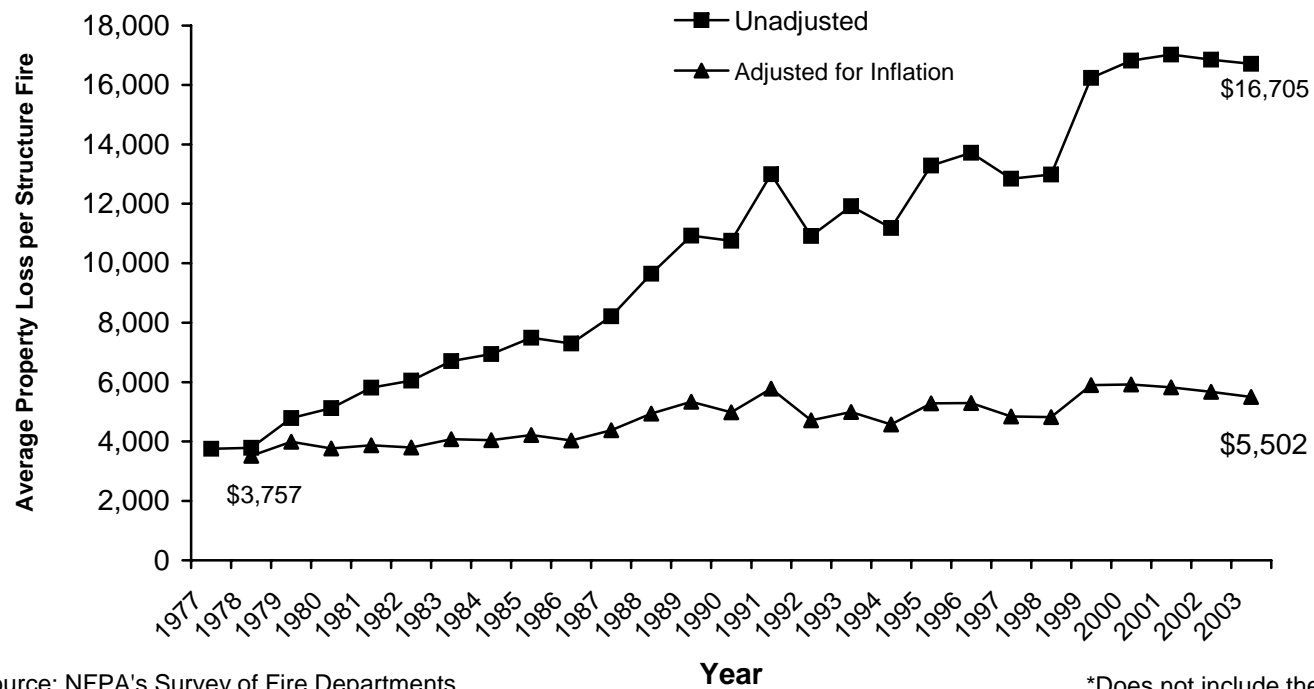
The NFPA estimates that the 1,584,500 fires responded to by the fire service caused \$12,307,000,000 in property damage in 2003. This is an increase of 19.1% from a year ago. (This total figure includes the Southern California Wildfires (Cedar and Old Wildfires) with an estimated total property loss of \$2,040,000,000. Loss by specific property type for this fire were not available, and are not included for results by property type in this report).

Fires in structures resulted in an estimated \$8,678,000,000 in property damage, a slight 0.7% decrease from a year ago. Average loss per structure fire was \$16,705, a slight decrease of 0.8%.

Over the 1977-2003 period, and excluding the events of 9/11/01, the average loss per structure fire ranged from a low of \$3,757 to a high of \$17,016 in 2001 for an overall increase of 353%. When property loss is adjusted for inflation, the increase in the average structure fire loss between 1977 and 2001 is 56%.

Of the property loss in 2003, an estimated \$6,074,000,000 occurred in residential properties, up a very slight 0.3% from a year ago. An estimated \$5,052,000,000 occurred in one- and two-family dwellings, virtually no change from a year ago. An estimated \$897,000,000 also occurred in apartments. Other property damage figures worth noting

**Figure 5. U.S. Average Property Loss per Structure*
Fire in the United States (1977-2003)**



Source: NFPA's Survey of Fire Departments
for 2003 U.S. Fire Experience

*Does not include the
events of 9/11/01

for 2003 include: \$69,000,000 in educational properties, a decrease of 25%; \$721,000,000 in store and office properties an increase of 19.4%; \$302,000,000 in public assembly properties, a decrease of 11.7%; \$675,000,000,000 in storage properties, an increase of 7.7%.

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.

Intentionally Set Fires

Based on data reported by fire departments in the survey, the NFPA estimates there were 37,500 intentionally set structure fires in 2003, a significant decrease of 15.7% from a year ago. (Note the NFPA survey is based on the newly revised 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 305 civilian deaths, a decrease of 12.9%. These set structure fires also resulted in \$692,000,000 in property loss, a significant decrease of 24.7% from last year.

Also in 2003, there were an estimated 30,500 intentionally set vehicle fires, a significant decrease of 25.6%. These set vehicle fires resulted in \$132,000,000, a highly significant decrease of 40.5%.

Table 5
Estimate of 2003 Losses in
Intentionally* Set Structure Fires

Intentionally* Set Structure Fires	Estimate	Percent change from 2002
Number of Structure Fires	37,500	-15.7**
Civilian Deaths	305	-12.9
Property Loss ¹	\$692,000,000	-24.7**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 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 newly revised 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.

**Statistically significant at the .01 level.

Region

Fire loss rates nationwide and by region⁶ can be seen in Table 6. The South had the highest fire incident rate with 6.0 fires per thousand population followed by the Northcentral (5.6).

The South with 16.0 again had the highest civilian death rate per million population followed closely by the Northeast (16.0).

The Northcentral with 78.2 had the highest injury rate per million population, while the West had the lowest rate (41.9).

The West with \$60.2 had the highest property loss rate per capita by far. This again reflects the impact of the Southern California Wildfires. Property loss rates for the other regions fell in the \$35.8 to \$37.4 range.

Fire incident rates by region and community size are shown in Table 7. The Northeast had the highest incident rates for communities of 50,000 to 249,999, the West had the highest rate for communities of 10,000 to 249,999, and the South had the highest rates for communities of 25,000 to 49,999, and for smaller communities (populations of less than 10,000).

Civilian fire deaths per million population are shown in Table 8. The Northeast had the highest death rate for communities of 500,000 or more, the Northcentral had the highest rates for communities of 100,000 to 249,999, the West had the highest rate for the smallest communities, and the South had the highest rates for communities of 2,500 to 99,999.

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

Property Loss rates per capita are shown in Tale 10. The Northeast had the highest rate for communities of 10,000 to 24,999, the West had the highest rates for communities of 25,000 to 49,999, communities of 5,000 to 9,999, and communities less than 2,500, the South had the highest rates for communities of 250,000 or more, communities of 50,000 to 99,999, and communities of 2,500 to 4,999.

Table 6
Fire Loss Rates Nationwide and by Region, 2003

<u>Region</u>	<u>Number of Fires per Thousand Population</u>	<u>Civilian Deaths per Million Population</u>	<u>Civilian Injuries per Million Population</u>	<u>Property Loss per Capita</u>
Nationwide	5.4	13.5	62.3	\$42.3*
Northeast	5.4	16.0	73.1	35.8
Northcentral	5.6	12.4	78.2	36.2
South	6.0	16.4	60.8	37.4
West	4.5	8.1	41.9	60.2*

Source: NFPA's; Survey of Fire Departments for 2003 U.S. Fire Experience.

*Includes the Southern California Wildfires.

Table 7
2003 Fires per Thousand Population

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	3.9	*	*	4.4	3.5
250,000 to 499,999	4.3	*	5.6	4.4	3.2
100,000 to 249,999	4.4	5.9	4.8	4.7	3.0
50,000 to 99,999	4.1	5.1	3.7	4.6	3.4
25,000 to 49,999	4.1	3.8	3.5	4.8	4.5
10,000 to 24,999	4.6	4.4	4.1	5.2	5.3
5,000 to 9,999	6.0	4.8	5.5	7.5	7.1
2,500 to 4,999	7.6	5.7	7.2	9.4	8.9
under 2,500	12.8	8.7	12.1	16.3	15.0

Source: NFPA's Survey of Fire Departments for 2003 U.S. Fire Experience.

*Insufficient data

Table 8
2003 Civilian Fire Deaths per Million Population
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	10.0	15.9	6.7	11.6	3.9
250,000 to 499,999	11.6	*	13.5	12.1	10.0
100,000 to 249,999	12.2	14.0	21.7	12.5	5.1
50,000 to 99,999	9.6	10.0	10.2	12.3	4.0
25,000 to 49,999	8.4	9.5	5.2	12.7	9.8
10,000 to 24,999	14.0	6.8	11.1	22.7	13.8
5,000 to 9,999	16.7	14.9	11.7	28.0	13.9
2,500 to 4,999	20.4	24.3	20.1	24.8	*
under 2,500	34.5*	26.4	27.6	29.5	43.2

Source: NFPA's Survey of Fire Departments for 2003 U.S. Fire Experience

*Insufficient data

Table 9
2003 Civilian Fire Injuries per Million Population
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	47.6	*	*	50.3	28.0
250,000 to 499,999	65.2	*	99.5	65.8	51.3
100,000 to 249,999	82.5	165.0	123.6	75.5	50.7
50,000 to 99,999	80.2	84.6	88.2	79.3	63.2
25,000 to 49,999	72.2	79.1	76.2	79.7	47.2
10,000 to 24,999	67.9	56.6	82.2	66.3	41.6
5,000 to 9,999	43.4	36.6	32.3	57.5	63.4
2,500 to 4,999	64.5	104.2	62.7	45.1	25.4
under 2,500	66.0	16.2	89.0	75.9	33.4

Source: NFPA's Survey of Fire Departments for 2003 U.S. Fire Experience.

*Insufficient data

Table 10
2003 Property Loss per Person
by Region and Size of Community

Population of Community	All Regions	Northeast	Northcentral	South	West
500,000 or more	\$28.0	*	*	\$30.8	\$29.5
250,000 to 499,999	45.4	*	30.8	62.2*	31.3
100,000 to 249,999	25.8	30.2	27.3	27.6	20.8
50,000 to 99,999	32.3	28.6	28.5	38.7	30.8
25,000 to 49,999	40.8	52.5	27.0	34.5	50.5
10,000 to 24,999	35.6	33.5	35.7	39.1	29.8
5,000 to 9,999	48.8	41.5	37.5	58.0	62.7
2,500 to 4,999	58.0	44.2	62.2	66.9	40.7
under 2,500	105.8	63.3	103.5	106.2	123.1

Source: NFPA's Survey of Fire Departments for 2003 U.S. Fire Experience.

*Insufficient data

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 2003 Fire Experience by Size of Community

Population of All Community	Total Fires	Structure Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	6,130	1,688	24.56	75.71	\$49,141,300
500,000 to 999,999	3,180	1,030	6.97	38.29	20,654,400
250,000 to 499,999	1,517	497	4.05	22.94	15,960,400
100,000 to 249,999	651	228	1.84	12.25	3,778,000
50,000 to 99,999	285	105	0.67	5.55	2,247,700
25,000 to 49,999	141	48	0.30	2.52	1,413,800
10,000 to 24,999	71	25	0.21	1.04	532,600
5,000 to 9,999	42	14	0.12	0.31	341,700
2,500 to 4,999	27	8	0.07	0.23	203,100
under 2,500	15	4	0.04	0.08	111,500

Source: NFPA's Survey of Fire Departments for 2003 U.S. Fire Experience

Table 12
Average 2003 Residential Fire Experience by Size of Community

Population of Community	Number of Fires	Civilian Deaths	Civilian Injuries	Property Loss
1,000,000 or more	3,805	20.11	66.71	\$21,084,400
500,000 to 999,999	846	4.92	30.51	12,256,000
250,000 to 499,999	410	3.42	18.10	10,540,100
100,000 to 249,999	179	1.51	8.71	1,985,200
50,000 to 99,999	82	0.60	4.33	1,078,100
25,000 to 49,999	37	0.24	2.00	786,500
10,000 to 24,999	21	0.18	0.79	327,700
5,000 to 9,999	11	0.10	0.21	196,200
2,500 to 4,999	6	0.06	0.17	123,800
under 2,500	3	0.02	0.04	63,000

Source: NFPA's Survey of Fire Departments for 2003 U.S. Fire Experience

Fire Department Responses

In all, fire departments responded to the following estimated number of fires and other incidents in 2003.

	Number	Percent Change From 2002
Fire Incidents	1,584,500	-6.1
Medical Aid Responses (Ambulance, EMS, Rescue)	13,631,500	+5.6
False Alarms	2,189,500	+3.5
Mutual Aid or Assistance Calls	987,000	+11.1
Hazardous Material Responses (Spills, Leaks, etc.)	349,500	-3.2
Other Hazardous Responses (arcing wires, bomb removal etc.)	660,500	+9.4
All Other Responses (smoke scares, lock-outs, etc.)	3,003,500	+9.5
Total Incidents	22,406,000	+5.2

A further breakdown on false responses was collected on the 2003 surveys and the results can be seen in Table 13.

Table 13
Estimates of False Alarms by Type, 2003

	Estimate	Percent Change From 2002	Percent of All False Alarms
Malicious, Mischievous False Call	301,000	-3.2	13.7
System Malfunction	795,500	+0.3	36.3
Unintentional Call	773,000	+8.4	35.3
Other False Alarms (Bomb Scares, etc.)	320,000	+7.0	14.6
Total	2,189,500	+3.5	

Source: NFPA's Survey of Fire Departments for 2003 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 2003 Fire Experience. This section explains the major steps in conducting the 2003 survey.

Sample Selection

The NFPA currently has 30,311 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 2003 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
- 250,000 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 100,000 people or more were included. These 316 departments in the four highest strata protect 104,648,000.

For the remaining six population strata, assuming response rates similar to the past two years for the four highest strata, a total sample of 2,840 was indicated. Sample sizes for individual strata were calculated using a methodology that assured optimum sample allocations⁵. 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 13,354 was found to be necessary to obtain the desired total response of 3,000 fire departments. For all strata, where a sample was necessary, departments were randomly selected.

Data Collection

The fire departments selected for the survey were sent the 2003 NFPA Fire Experience Questionnaire during the 2nd week of January 2004. A second mailing was sent in mid-March to fire departments that had not responded to the first mailing. A total of 3,083 departments responded to the questionnaire 2,358 to the first mailing and 723 to the second.

Table 14 shows the number of departments that responded by region and size of community. The overall response rate was 23%, although response rates were considerably higher for departments protecting larger communities than they were for departments protecting smaller communities. The 3,083 departments that did respond protect 100,383,475 people or 35% 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, 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 2003 NFPA Survey, by
Region and Community Size

Population of Community	All Regions	Northeast	Northcentral	South	West
1,000,000 or more	9	2	1	3	3
500,000 to 999,999	26	1	1	16	8
250,000 to 499,999	32	1	6	15	10
100,000 to 249,999	82	7	16	35	24
50,000 to 99,999	211	30	77	65	39
25,000 to 49,999	216	28	95	56	37
10,000 to 24,999	484	88	201	131	64
5,000 to 9,999	584	133	235	146	70
2,500 to 4,999	548	114	261	126	47
Under 2,500	891	144	426	189	132
TOTAL	3,083	548	1,319	782	434

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 calculated⁶. 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. 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 2003, for instance, property damage in public assembly properties was estimated to be \$302,000,000. This represented a decrease of 11.7% 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 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, 126 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 respondent rate was 10% higher for civilian deaths and 30% higher for property loss, while the nonrespondent rate was 43% higher for fires. (Only the result for fires was statistically significant).

For communities of 50,000 to 99,999, the respondent rate was 11% higher for fires, 16% higher for civilian deaths, and 33% higher for property loss. (None of these results were statistically significant).

For communities of 25,000 to 49,999, the respondent rate was 35% higher for civilian deaths, and 87% higher for property loss, while the nonrespondent was 12% higher for fires. (None of these results were statistically significant).

For communities of 10,000 to 29,999, the respondent rate was 14% higher for civilian deaths, the nonrespondent rate was 15% higher for fires, and the rates were similar for property loss (None of these results were statistically significant).

For communities of 5,000 to 9,999 the nonrespondent rate was 42% higher for fires and 122% higher for civilian deaths, while the respondent rate was 70% higher for property loss. (None of these results were statistically significant).

Table 15
A Comparison of Respondents and Nonrespondents*
to the 2003 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	81	4.4	25	6.2	145	12.3	23	11.1	51	25.8	18	19.8
50,000 to 99,999	199	4.1	25	3.7	208	9.6	24	8.3	115	32.3	18	24.2
25,000 to 49,999	205	4.1	25	4.6	213	8.5	25	6.3	103	40.8	18	21.8
10,000 to 24,999	458	4.6	27	5.3	480	14.0	27	12.3	230	35.6	13	34.5
5,000 to 9,999	565	6.0	21	8.5	578	16.7	21	37.1	262	48.8	12	28.7

*Some departments did not return the questionnaire. A sample of these nonrespondents was contacted by telephone and questioned about their 2003 fire experience.

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

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.

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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. John R. Hall, Jr., *Patterns of Civilian Fire Casualties in Home Fires by Age and Sex, 1994-98*, August 2001, Quincy: National Fire Protection Association, Fire Analysis and Research Division.
3. Rita F. Fahy and Alison L. Miller, "How Being Poor Affects Fire Risk", *Fire Journal*, Vol. 83, No. 1 (January 1989), p. 28
4. As defined by the U.S. Bureau of the Census, the four regions are: Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Northcentral: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.
5. Steve K. Thompson, *Sampling*, John Wiley, New York, NY, 1992, pp. 107-111.
6. William G. Cochran, *Sampling Techniques*, John Wiley, New York, NY, 1977, pp. 150-161.