U.S. Fire Administration/National Fire Data Center

Fire in the United States 1995-2004

Fourteenth Edition

August 2007

FEMA

U.S. Fire Administration / National Fire Data Center

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Department of Homeland Security
Federal Emergency Management Agency

U. S. Fire Administration
National Fire Data Center

U.S. Fire Administration

Mission Statement

As an entity of the Federal Emergency Management Agency (FEMA), the mission of the U.S. Fire Administration (USFA) is to reduce life and economic losses due to fire and related emergencies, through leadership, advocacy, coordination, and support. We serve the Nation independently, in coordination with other Federal agencies, and in partnership with fire protection and emergency service communities. With a commitment to excellence, we provide public education, training, technology, and data initiatives.

FEMA

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Acknowledgments

The United States Fire Administration (USFA) greatly appreciates the participation in the National Fire Incident Reporting System (NFIRS) from fire departments across the United States. The NFIRS data, on which the bulk of this report is based, are available through the work of the staffs of the various State agencies and State Fire Marshals' offices responsible for fire data collection, and on each and every fire officer who fills out an NFIRS form. Without their efforts to collect data, this report could not exist. Although reporting to NFIRS is wholly voluntary, the information collected on fires each year represents the most comprehensive set of fire data and statistics in the world. At the time of publication, over 21,000 fire departments were participants in the system; these departments added over 1.2 million fires to the NFIRS database in the current public release files alone.

The National Fire Information Council (NFIC), a nonprofit organization of State and metropolitan-area participants in NFIRS, helps coordinate and specify requirements for NFIRS and its operation. NFIC represents an outstanding example of local, State, and Federal cooperation on a major, long-term undertaking. The USFA appreciates the support NFIC has provided NFIRS over the years.

The USFA also thanks the many State Fire Marshals' offices or their equivalents for their assistance with, and input to, the numbers of fire departments presented in Chapter 1.

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Executive Summary

Fire departments in the United States respond to nearly 1.8 million fire calls each year. The U.S. fire problem, on a per capita basis, is one of the worst in the industrial world. Thousands of Americans die each year, tens of thousands of people are injured, and property losses reach billions of dollars. There are huge indirect costs of fire as well—temporary lodging, lost business, medical expenses, psychological damage, and others. These indirect costs may be as much as 8 to 10 times higher than the direct costs of fire. To put this in context, the annual losses from floods, hurricanes, tornadoes, earthquakes, and other natural disasters combined in the United States average just a fraction of those from fires. The public, the media, and local governments generally are unaware of the magnitude and seriousness of the fire problem to individuals and their families, to communities, and to the Nation.

PURPOSE AND SCOPE

The National Fire Data Center (NFDC) of the U.S. Fire Administration (USFA) periodically publishes *Fire in the United States*—a statistical overview of the fires in the United States with the focus on the latest year in which data were available at the time of preparation. This report is designed to arm the fire service and others with information that motivates corrective action, sets priorities, targets specific fire programs, serves as a model for State and local analyses of fire data, and provides a baseline for evaluating programs.

This 14th edition covers the 10-year period 1995 to 2004 with a primary focus on 2004. For the first time, only native National Fire Incident Reporting System (NFIRS) 5.0 data are used for NFIRS-based analyses. The report addresses the overall national fire problem. Detailed analyses of the residential and non-residential fire problem, firefighter casualties, and other subsets of the national fire problem are not included. These topic-specific analyses will be addressed as separate, stand-alone publications.

The primary source of data is from NFIRS. National Fire Protection Association (NFPA) annual survey results, mortality data from the National Center for Health Statistics (NCHS), data from State Fire Marshals' offices or their equivalents, population data from the U.S. Census Bureau, and inflation adjustments from the Bureau of Labor Statistic's Consumer Price Index also are used. Because of the time it takes for States to submit data to USFA from the thousands of fire departments that participate in NFIRS, then edit and obtain corrections, and analyze and display the results, the publication lags behind the date of data collection. Fortunately, the fire problem does not change very rapidly, so the data usually are quite representative of the situation in the year of publication as well.

NATIONAL PROBLEM

Annual deaths from fire in the United States were estimated at 12,000 in 1974, the year in which the USFA was established. At that time, a goal was set for reducing this number by half within a generation. This goal was met and, in 2002, civilian deaths were at their lowest level (3,380). While fire deaths still are trending downward, in 2004 fire deaths were 15 to 18 percent higher—3,900 to 3,993 deaths, depending on the data source.[1]

Table 1 presents the rate of U.S. fire losses in 2004 and the 10-year trends. Fires and fire injuries per million population reached 10-year lows. Property loss, when adjusted for inflation, continues to trend downward. The death rate of 13.6 per million population is half what it was in the late 1970s.[2] Nevertheless, the United States has a fire death rate two to two and a half times that of several European nations and at least 20 percent higher than many. Of the 25 industrial nations examined by the World Fire Statistics Centre, the U.S. ranked as having the fourth highest fire death rate. This general status has been unchanged for the past 25 years.

Table 1. Fire and Fire Loss Rates

Loss Measure	2004	10-Year Trend (percent)
Fires/Million Population	5,280	-27.7
Deaths/Million Population	13.3	-28.9
Injuries/Million Population	60.9	-39.6
Dollar Loss/Capita*	$33.4	-6.2

*Adjusted to 2004 dollars
Sources: NFPA, Consumer Price Index, and U.S. Census Bureau

REGIONAL AND STATE PROFILES

The fire problem varies from region to region and State to State because of variations in climate, socio-economic status, education, demographics, and other factors. Six States (Alabama, Arkansas, Mississippi, Oklahoma, Tennessee, and West Virginia) and the District of Columbia have fire death rates that exceed 25 deaths per million population; this rate is one of the worst among the world's nations. Fifteen States, mostly situated in the Southeast, have death rates between 14 and 25 per million population. Twenty-eight States have fire death rates at or below the national rate of 13.6 per million population. While some death rates are still high, States have made great progress in lowering both the absolute number of deaths and the deaths per capita.

Ten States in 2004, mostly large-population States, account for 49 percent of the national total U.S. fire deaths. Unless their fire problems are significantly reduced, the national total will be difficult to lower.

RESIDENCES AND OTHER PROPERTIES

Over the years, there has been little change in the proportion of fires, deaths, injuries, and dollar loss by the type of property involved. In terms of numbers of fires, the largest category continues to be outside

[1]The NFPA estimates fire deaths to be 3,900 in 2004. Analysis of NCHS mortality data suggests that fire deaths were 3,993.
[2]The per-capita rate used throughout *Fire in the United States* reflects the number of fire deaths (3,993) from NCHS mortality analyses.

fires (38 percent)—in fields, vacant lots, trash, etc. Many of these fires are intentionally set, but do not cause much damage. Residential and non-residential structure fires together now comprise as many fires as outside fires (also 38 percent), with residential structure fires outnumbering non-residential structure fires by over three to one. What may surprise some is the large number of vehicle fires. In fact, nearly one out of every five fires to which fire departments respond involves a vehicle.

By far, the largest percentage of deaths, 76 percent in 2004, occurs in residences, with the majority of these in one- and two-family dwellings. Vehicles account for the second largest percentage of fire deaths at 18 percent. Great attention is given to large, multiple-death fires in public places such as hotels, nightclubs, and office buildings. But these major attention-getting fires that kill 10 or more people are few in number and constitute only a small portion of overall fire deaths. Firefighters generally are doing a good job in protecting public properties in this country. Furthermore, these properties are generally required by local codes to have built-in fire suppression systems. The area with the largest problem is where it is least suspected—in people's homes. Prevention efforts continue to focus on home safety.

Only 3 percent of the 2004 fire deaths occur in commercial and public properties. Outside and other miscellaneous fires, including wildfires, are also a small factor (4 percent combined) in fire deaths.

The picture generally is similar for fire injuries, with 74 percent of all injuries occurring in residences. The remaining 26 percent of fire injuries are distributed across the other property types—non-residential structures, 10 percent; vehicles, 9 percent; and outside and other fires, 7 percent.

The picture changes somewhat for dollar loss. While residential structures are the leading property in dollar loss, non-residential structures play a considerable role. These two property types account for 86 percent of all dollar loss. The proportion of dollar loss from outside fires may be understated because the destruction of trees, grass, etc., often is given zero value in fire reports if it is not commercial cropland or timber.

CAUSES OF FIRES AND FIRE LOSSES

At 28 percent, cooking is the leading cause of fires. Incendiary or suspicious fires (arson) cause another 21 percent. These percentages (and those that follow) are adjusted, which proportionally spreads the unknown causes over the other 12 causes.

The two leading causes of civilian deaths are arson, at 28 percent, and smoking, at 18 percent. The leading cause of injuries is cooking (24 percent), followed by open flame (18 percent) and arson (17 percent). Arson is, by far, the leading cause of property loss, at 26 percent.

RACE, AGE, AND GENDER CHARACTERISTICS OF VICTIMS

Fire losses affect all groups and races, rich and poor, North and South, urban and rural. But the problem is higher for some groups than for others. African-Americans and American Indians have much higher fire death rates per capita than the national average. African-Americans comprise a large and disproportionate share of total fire deaths, accounting for 24 percent of fire deaths—nearly twice as high as their share of the overall population.

Approximately 50 percent more men die in fires than women. The reasons for this disparity are not known for certain. Suppositions include the greater likelihood of men being intoxicated and the more dangerous occupations of men (most industrial fire fatalities are males). Female fire deaths increase at

age 75, and the 75 and older age group accounts for over one-quarter of female fire deaths (28 percent). Male fire deaths, by contrast, are higher in the late midlife years (40 to 54). We also know that men have more injuries trying to extinguish the fire and rescue people than do women. Mid-aged men (20 to 44) have the largest portion of fire injuries. Incendiary and suspicious fires are the leading cause of deaths in 2004; smoking is the second leading cause. Cooking fires are the leading cause of injuries, with incendiary and suspicious as the second leading cause.

People with limited physical and cognitive abilities, especially children and older adults, are at a higher risk of death and injury from fire than other groups.[3] These two age groups accounted for 46 percent of the 2004 fire deaths and 22 percent of estimated fire injuries.

As baby boomers enter retirement age, the U.S. demographic profile is expected to change dramatically. Over the coming decades the older population will increase, and a corresponding increase in fire deaths and injuries among older adults is likely.

CONCLUSIONS

This report shows that the fire problem in the United States continues to improve. Ten-year per capita rates are down. It is likely that several factors have contributed to these trends:

- smoke alarms, whose usage has become nearly universal over the past two decades;
- sprinklers, which quickly combat incipient fires, especially in non-residential structures and recently in apartments;
- fire codes, which have been strengthened;
- construction techniques and materials, which have been targeted specifically to fire prevention;
- public education at the community, county, State, and Federal levels, which seems to be increasing; and
- firefighter equipment and training, which have improved.

Even considering these positive trends, the United States still has a major fire problem compared to other industrialized nations. The study and implementation of international fire prevention programs that have proved effective in reducing the number of fires and deaths should be considered.

Other areas of concern:

- The very young and very old continue to be at high risk.
- Certain ethnic groups are at enormous risk for fire injuries and death.
- Arson is an enormous problem in the United States, especially to outside and non-residential structure properties. Economically, arson accounts for 26 percent of property loss from all fires, over 50 percent higher than that of the next leading cause.
- Contiguous States often have similar fire profiles. A study to determine reasons for this could uncover severe problem areas or, conversely, reveal best practices.

[3] USFA defines children as age 14 and under. Older adults are defined as age 65 and older.

- Many records submitted to NFIRS by participating fire departments provide either incomplete or no information in some of the fields. Additionally, in preparing this report, it is assumed that participating fire departments have reported 100 percent of their fire incidents; however, this is not always the case. The completeness of all the information in the NFIRS modules will contribute to the refinement and confidence level of future analyses.

If we could understand the relative importance of these factors to lessening the fire problem, resources could be better targeted to have the most impact.

Chapter 1
Introduction

In 1973, the President's Commission on Fire Prevention and Control published *America Burning*. This document was the first in-depth discussion of this country's fire problem, the most severe of the industrialized nations. The report prompted a national consciousness-raising about the depth of the fire problem and the need for prevention efforts. By 1987, when a second commission was assembled, much progress had been made toward addressing the United States' fire problem. Among other objectives, *America Burning Revisited* redefined the strategies needed to further reduce loss of life and property to fire. As a direct result of these efforts and others like them, the U.S. fire problem no longer ranks as the most severe of the industrialized nations. Nonetheless, the U.S. continues to experience fire death rates and property losses from fire two to two and a half times those of most of its sister nations.[1] Many Americans are not aware of this or of the nature of the fire problem.

This report is a statistical portrait of fire in the United States. It is intended for use by a wide audience, including the fire service, the media, researchers, industry, government agencies, and interested citizens. The report focuses on the national fire problem. The magnitude and trends of the fire problem, the causes of fires, where they occur, and who gets hurt are topics that are emphasized.

This document is the 14th major edition of *Fire in the United States* published by the United States Fire Administration (USFA). The previous editions have included:

- first edition published in 1978; included 1975 and 76 fire data;
- second edition published in 1982; included 1977 and 78 fire data;
- third through fifth editions produced as working papers, but not published;
- sixth edition published in 1987; included 1983 fire data;
- seventh edition published in 1991; included 1983 to 87 fire data;
- eighth edition published in 1991; included 1983 to 90 fire data;
- ninth edition published in 1997; included 1985 to 94 fire data, and focused on the residential/non-residential fire problem and on firefighter casualties;

[1] "World Fire Statistics," Geneva Association Information Newsletter, Oct. 2006, *http://www.genevaassociation.org/FIRE%20N°22.pdf*. After removing the deaths attributed to the September 11 terrorist attacks, the United States has an equivalent 1.40 fire deaths per 100,000 population for 2001 to 2003; Switzerland has the lowest European death rate at 0.56 per 100,000 population for 1998 to 2000.

- tenth edition published in 1998; included 1986 to 95 fire data, and provided a State-by-State profile of fires and an examination of firefighter casualties;
- eleventh edition published in 1999; included 1987 to 96 fire data, and focused on the residential/non-residential fire problem and on firefighter casualties;
- twelfth edition published in 2001; included 1989 to 98 fire data; the last edition to use the National Fire Incident Reporting System (NFIRS) 4.1 data system, it included analyses of all of the previous topics under one cover: residential and non-residential fire problems, State-by-State profiles, and firefighter casualties; and
- thirteenth edition published in 2004; included 1992 to 2001 fire data; the first edition to include the new NFIRS 5.0 data in the analyses; included the residential and non-residential fire problem and firefighter casualties.

This 14th edition covers the 10-year period 1995 to 2004, with a primary focus on 2004. For the first time, only native NFIRS 5.0 data are used for NFIRS-based analyses. This report addresses the overall national fire problem. Detailed analyses of the residential and non-residential fire problem, firefighter casualties, and other subsets of the national fire problem are not included. These topic-specific analyses will be addressed as separate, stand-alone publications.

SOURCES

The report is based primarily on NFIRS data, but uses other sources as well. Summary numbers for fires, deaths, injuries, and dollar loss are from the National Fire Protection Association's (NFPA's) annual survey of fire departments.[2] It also uses mortality data from the National Center for Health Statistics (NCHS), population data from the U.S. Census Bureau, inflation adjustments from the Bureau of Labor Statistics' Consumer Price Index, State statistics from State Fire Marshals' offices or their equivalents, product information from the Conswumer Product Safety Commission (CPSC), and health data from the NCHS. Because the NCHS mortality data are based on a census or enumeration of deaths based on death certificates rather than an estimate, it is used as the primary source for the analysis of deaths in Chapter 2. The USFA gratefully acknowledges the use of the data and information provided by these groups. Data sources are cited for each graph and table in this report.

National Fire Incident Reporting System

An indirect outgrowth of *America Burning*, the NFIRS was established in 1975 as one of the first programs of the National Fire Prevention and Control Administration, which later became the USFA. The basic concept of NFIRS has not changed since the system's inception. All States and all fire departments within them have been invited to participate on a voluntary basis. Participating fire departments collect a common core of information on an incident and any casualties that ensue by using a common set of definitions. The data may be written by hand on paper forms or entered directly through a computer. Local agencies forward the completed NFIRS modules to the State agency responsible for NFIRS data. The State agency combines the information with data from other fire departments into a statewide

[2] A second approach for these summary numbers is to use the relative percentage of fires (or other loss measures) from NFIRS and scale up (multiply by) the NFPA estimate of total fires. The results would be somewhat different from those using the NFPA subtotals. NFPA totals have been used as the basis for the summary numbers in each section because they are consistent with the total number of fires from NFPA. Better estimates of fire loss measures from NFIRS will not be available until a more robust method of estimation is developed.

database and then transmits the data to the National Fire Data Center (NFDC) at USFA. Data on individual incidents and casualties are preserved incident by incident at local, State, and national levels. Once limited to fire incidents only, NFIRS now encompasses all incidents to which the fire department responds—fire, emergency medical services (EMS), hazardous materials (Hazmat), and the like.

From an initial six States in 1976, NFIRS has grown in both participation and use. Over the life of the system, all 50 States, the District of Columbia, and more than 40 major metropolitan areas have reported to NFIRS. As well, more than 30,000 fire departments have been assigned participating NFIRS fire department identification numbers by their States. Approximately 1.2 million fire incidents and more than 14 million non-fire incidents are added to the database each year. NFIRS is the world's largest collection of incidents to which fire departments respond. Between 1985 and 1999, the level of participation remained relatively constant. A few States came in or left the system each year, and at least 39 States reported to NFIRS. Most years also included participation from the District of Columbia. The number of fire departments participating within the States remained relatively constant as well, with a slight dip in participation during the system migration from version 4.1 to 5.0 in 1999. In 2000, the number of States increased to 43 and fire department participation began to bounce back from the version 5.0 transition low. Since 2000, State and fire department participation has been steadily increasing. By 2004, all 50 States, the District of Columbia, and Native American Tribal Authorities participated in NFIRS—the first time in the life of NFIRS that the national goal of 100-percent participation was achieved (Table 2). Fire department participation has grown to over 18,400[3] in 2004 (Figure 1). Across participating States, an average of 54 percent of U.S. fire departments report; 49 percent report in the new version (Table 3). With nearly half of all fire departments nationwide reporting fire incidents to NFIRS 5.0, the reporting departments represent a very large sample that enables us to make good estimates of various facets of the fire problem. Participation in NFIRS is voluntary, although some States do require their departments to participate in the State system. Additionally, if a fire department is a recipient of a Fire Act Grant, participation is required.[4]

Table 2. States Reporting Fire Incidents to NFIRS (1995–2004)

State	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Alabama	X	X	X	X	X	X	X	X	X	X
Alaska	X	X	X	X	X	X	X	X	X	X
Arizona	X						X	X	X	X
Arkansas	X	X	X	X	X	X	X	X	X	X
California	X	X		X				X	X	X
Colorado	X	X	X		X	X	X	X	X	X
Connecticut	X	X	X	X	X	X	X	X	X	X
Delaware	X	X	X				X	X	X	X
District of Columbia	X	X	X	X	X					X
Florida	X	X	X	X	X	X	X	X	X	X
Georgia	X	X	X	X	X	X	X	X	X	X

continued on next page

[3] The 18,400 fire departments represent NFIRS participation, regardless of the version of the data submitted (NFIRS 4.1 or NFIRS 5.0). In 2004, approximately 16,600 departments submitted data in NFIRS 5.0.

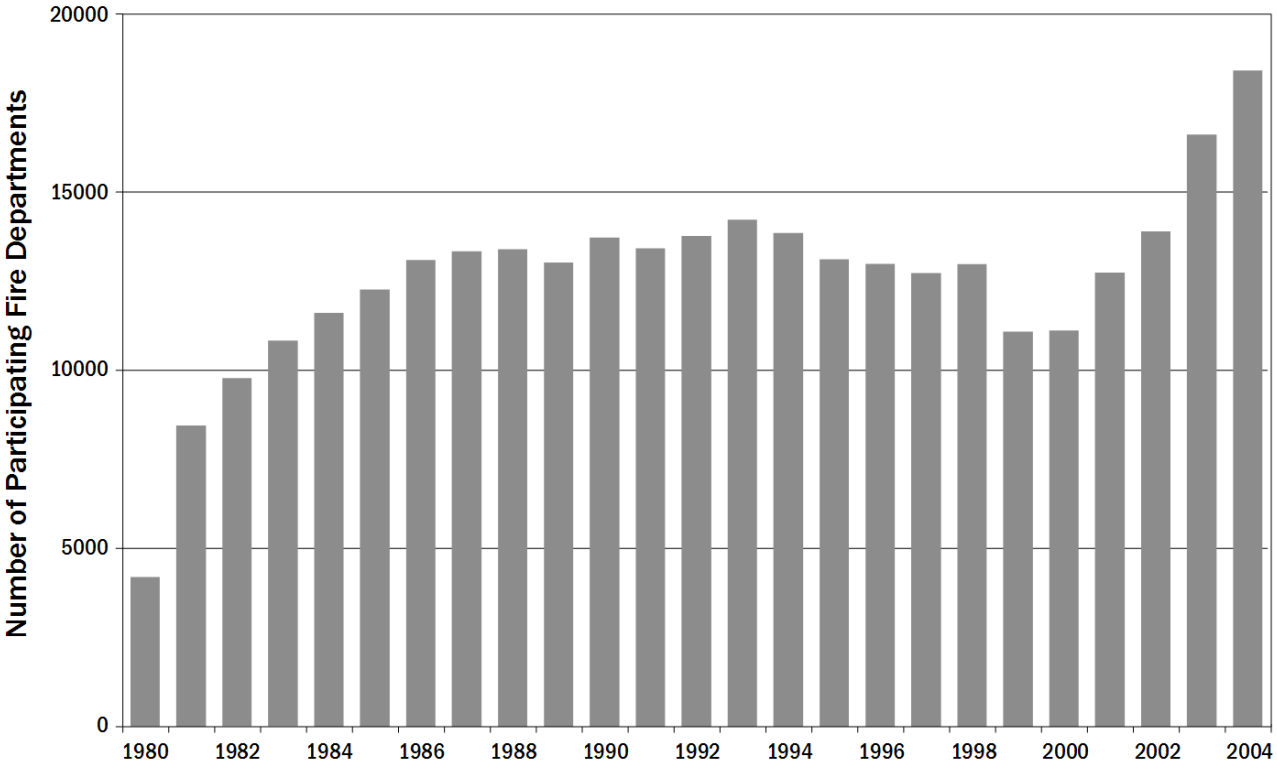
[4] From the Assistance to Firefighters Grant Program guidance, if the applicant is a fire department, the department must agree to provide information, through established reporting channels, to NFIRS for the period covered by the assistance. If a fire department does not currently participate in the incident reporting system and does not have the capacity to report at the time of the award, the department must agree to provide information to the system for a 12-month period that begins as soon as the department develops the capacity to report. See *http://www.firegrantsupport.com/docs/2006AFGguidance.pdf*.

State	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Hawaii		X	X	X	X	X	X	X	X	X
Idaho	X	X	X	X	X	X	X	X	X	X
Illinois	X	X	X	X	X	X	X	X	X	X
Indiana			X	X	X	X	X	X	X	X
Iowa	X	X	X	X	X	X	X	X	X	X
Kansas	X	X	X	X	X	X	X	X	X	X
Kentucky	X	X	X	X	X	X	X	X	X	X
Louisiana	X	X	X	X	X	X	X	X	X	X
Maine			X	X	X	X	X	X	X	X
Maryland	X	X	X	X	X	X	X	X	X	X
Massachusetts	X	X	X	X	X	X	X	X	X	X
Michigan	X	X	X	X	X	X	X	X	X	X
Minnesota	X	X	X	X	X	X	X	X	X	X
Mississippi						X	X	X	X	X
Missouri					X	X	X	X	X	X
Montana		X	X	X	X	X	X	X	X	X
Nebraska	X	X	X	X	X	X	X	X	X	X
Nevada				X	X	X	X	X	X	X
New Hampshire	X	X	X	X		X	X	X	X	X
New Jersey	X	X	X	X	X	X	X	X	X	X
New Mexico		X				X	X	X	X	X
New York	X	X	X	X	X	X	X	X	X	X
North Carolina						X	X	X	X	X
North Dakota							X	X	X	X
Ohio	X	X	X	X	X	X	X	X	X	X
Oklahoma	X	X	X	X	X	X	X	X	X	X
Oregon	X				X	X	X	X	X	X
Pennsylvania							X	X	X	X
Rhode Island	X						X		X	X
South Carolina	X	X	X	X	X	X	X	X	X	X
South Dakota	X	X	X	X	X	X	X	X	X	X
Tennessee	X	X	X	X	X	X	X	X	X	X
Texas	X	X	X	X	X	X	X	X	X	X
Utah	X	X	X	X	X	X	X	X	X	X
Vermont	X	X	X	X	X	X	X	X	X	X
Virginia	X	X	X	X	X	X	X	X	X	X
Washington	X	X	X	X	X	X	X	X	X	X
West Virginia	X	X	X	X			X	X	X	X
Wisconsin	X	X	X	X	X	X	X	X	X	X
Wyoming	X	X	X	X	X	X	X	X	X	X
Native American										X
Total	**40**	**40**	**40**	**40**	**40**	**43**	**49**	**49**	**50**	**52**

Note: Includes fire incidents submitted in both NFIRS versions 4.1 and 5.0.

Source: NFIRS

Figure 1. NFIRS Fire Department Participation (1980–2004, fire incidents only)



Note: Includes participation from NFIRS 4.1 and NFIRS 5.0

Source: NFIRS

Corresponding to increased participation, the number of fires, deaths, and injuries as well as estimates of dollar loss reported to NFIRS also has grown—an estimated 52 percent of all U.S. fires to which fire departments responded in 2004 were captured in NFIRS.

There are, of course, many problems in assembling a real-world database, and NFIRS is no exception. Although NFIRS does not represent 100 percent of incidents reported to fire departments each year, the enormous sample size and good efforts by the fire service result in a huge amount of useful information. Because of advances in computer technology and data collection techniques over the past 30 years and improvements suggested by participants, NFIRS has been revised periodically in response. The newest revision, NFIRS 5.0, became operational in January 1999.

NFIRS 5.0 captures information on all incidents, not just fires, to which a fire department responds. In addition to many data coding improvements, version 5.0 provides modules that recognize the increasingly diverse activities of fire departments today—an EMS Module, a Wildland Fire Module, an Apparatus Module, a Personnel Module, a Hazmat Module, and an Arson Module. The Basic Incident and Fire Modules of NFIRS 5.0 collect data in a different fashion than the precursor NFIRS systems.

The design of NFIRS 5.0 makes the system easier to use than previous NFIRS versions because it captures only the data required to profile the extent of the incident. Some fires, for example, require just basic information to be recorded, whereas others require considerably more detail.

States' participation is voluntary, and each State specifies requirements for its fire departments. States have the flexibility to adapt their State reporting systems to their specific needs. As a result, the design

Table 3. Fire Departments Reporting to NFIRS in 2004

State	No. of Fire Departments in State	No. of Reporting Fire Departments (NFIRS 5.0)	Percent of Reporting Fire Departments (NFIRS 5.0)	No. of Reporting Fire Departments (All NFIRS)	Percent of Reporting Fire Departments (All NFIRS)
Alabama	1,045	225	22%	225	22%
Alaska	210	110	52%	110	52%
Arizona	352	58	16%	59	17%
Arkansas	1,003	454	45%	454	45%
California	1,031	36	3%	36	3%
Colorado	405	121	30%	123	30%
Connecticut	261	238	91%	238	91%
Delaware	61	61	100%	61	100%
District of Columbia	1	1	100%	1	100%
Florida	671	282	42%	355	53%
Georgia	657	178	27%	183	28%
Hawaii	4	4	100%	4	100%
Idaho	247	152	62%	152	62%
Illinois	1,240	604	49%	858	69%
Indiana	861	719	84%	720	84%
Iowa	875	438	50%	438	50%
Kansas	644	373	58%	544	84%
Kentucky	834	434	52%	534	64%
Louisiana	603	272	45%	273	45%
Maine	423	166	39%	166	39%
Maryland	367	201	55%	334	91%
Massachusetts	365	348	95%	348	95%
Michigan	1,030	848	82%	848	82%
Minnesota	789	374	47%	694	88%
Mississippi	767	720	94%	720	94%
Missouri	896	538	60%	538	60%
Montana	432	194	45%	194	45%
Nebraska	483	242	50%	242	50%
Nevada	166	28	17%	28	17%
New Hampshire	243	90	37%	112	46%
New Jersey	745	549	74%	560	75%
New Mexico*	366	46	13%	46	13%
New York	1,995	1,066	53%	1,080	54%
North Carolina	1,287	651	51%	651	51%
North Dakota	384	212	55%	212	55%
Ohio	1,200	988	82%	1,165	97%
Oklahoma	913	244	27%	248	27%
Oregon	327	289	88%	289	88%
Pennsylvania	2,389	585	24%	585	24%
Rhode Island	79	12	15%	12	15%
South Carolina	458	223	49%	230	50%

State	No. of Fire Departments in State	No. of Reporting Fire Departments (NFIRS 5.0)	Percent of Reporting Fire Departments (NFIRS 5.0)	No. of Reporting Fire Departments (All NFIRS)	Percent of Reporting Fire Departments (All NFIRS)
South Dakota	353	75	21%	200	57%
Tennessee	732	419	57%	520	71%
Texas	2,435	910	37%	913	37%
Utah	250	139	56%	150	60%
Vermont	237	153	65%	163	69%
Virginia	601	375	62%	422	70%
Washington	520	383	74%	384	74%
West Virginia	453	275	61%	435	96%
Wisconsin	860	444	52%	447	52%
Wyoming	132	92	70%	92	70%
Native American	100	6	6%	6	6%
Total	**33,782****	**16,645**	**49%**	**18,402**	**54%**

*The number of State fire departments was not available from the State Fire Marshal's office at the time of publication. The number of fire departments was taken from the 13th edition of *Fire in the United States*, 1992 to 2001.

**This total differs from the 2004 NFPA estimate of 30,400 fire departments. The NFPA estimate is the official estimate used by USFA in its National Fire Department Census.

Sources: NFIRS and State Fire Marshals' offices or equivalent organizations

of a State's data collection system varies from State to State. NFIRS 5.0 was designed so that data from State systems can be converted to a single format that is used at the national level to aggregate and store NFIRS data.

One of the most important changes is in the data format itself. All data in the system, regardless of its entry mechanism, are in NFIRS 5.0 format; non-NFIRS 5.0 data are converted to the 5.0 format. The proportion of native 5.0 data has steadily increased since the introduction of NFIRS 5.0 in 1999 (Table 4). At the time of publication, this proportion rose to 96 percent in the preliminary 2006 data. NFIRS 4.1 data will no longer be accepted by the system in 2009. While 4.1 data in its converted form is accepted by the system, USFA only uses native 5.0 data in its analyses.

Table 4. NFIRS Fire Incident Data Reporting by Version (percent)

Year	NFIRS 4.1 (converted to 5.0 format)	Native NFIRS 5.0
1999	92%	8%
2000	77%	23%
2001	48%	52%
2002	31%	69%
2003	19%	81%
2004	11%	89%
2005*	5%	95%
2006*	4%	96%

*Preliminary, based on the January 2007 quarterly data report

Source: NFIRS

U.S. Fire Departments

The number of fire departments in each State is provided by each State's Fire Marshal's office or the equivalent agency. The USFA also maintains a database of fire departments. The USFA established the National Fire Department Census and its subsequent database in the fall of 2001 when the USFA launched a nationwide campaign for voluntary registration of fire departments. By March 2007, more than 25,000 fire departments have registered with the census—approximately 83 percent of the estimated number of U.S. fire departments.

The database created by the census is intended for use by the fire protection and prevention communities, allied professions, the general public, and the USFA. USFA uses the database to conduct special studies, guide program decision-making, and improve direct communication with individual fire departments. The database provides a current directory of registered fire departments and includes basic information such as addresses, department types, Web site addresses (if applicable), number of fire department personnel, and number of stations. The survey also collects information on specialized services that will be released only in summary format. For more information about the National Fire Department Census or to download the list of registered fire departments, visit *http://www.usfa.dhs.gov/applications/census*.

Uses of NFIRS

NFIRS data are used extensively at all levels of government for major fire protection decisions. At the local level, incident and casualty information is used for setting priorities and targeting resources. The data collected are particularly useful for designing fire prevention and educational programs and EMS-related activities specifically suited to the real emergency problems the local community faces.

At the State level, NFIRS is used in many capacities. One valuable contribution is that some State legislatures use these data to justify budgets and to pass important bills on fire-related issues such as sprinklers, fireworks, and arson. Many Federal agencies, in addition to USFA, make use of NFIRS data. NFIRS data are used, for example, by the CPSC to identify problem products and to monitor corrective actions. The Department of Transportation (DOT) uses NFIRS data to identify fire problems in automobiles, which has resulted in mandated recalls. The Department of Housing and Urban Development (HUD) uses NFIRS to evaluate safety of manufactured housing (mobile homes). The USFA uses the data to design prevention programs, to order firefighter safety priorities, to assist in the development of training courses at the National Fire Academy (NFA), and for a host of other purposes. Thousands of fire departments, scores of States, and hundreds of industries have used the data. The potential for even greater use remains. One of the purposes of this report is to give some idea of the types of information available from NFIRS. The information here is highly summarized; much more detail is available. The USFA report, *Uses of NFIRS: The Many Uses of the National Fire Incident Reporting System*, further describes the uses of the data. It may be ordered directly from the USFA or is available online at *http://www.usfa.dhs.gov/applications/publications*.

METHODOLOGY

Each edition of *Fire in the United States* refines and improves upon the last. In this edition, as in previous ones, an attempt has been made to keep the data presentation and analysis as straightforward as possible. It is also the desire of the USFA to make the report widely accessible to many different users, so it avoids unnecessarily complex methodology. Throughout this report, the term *fire casualties* refers to deaths and injuries; the term *fire losses* collectively includes fire casualties and dollar loss.

National Estimates

With the exception of the summary totals at the beginning of each section, the numbers in this report are scaled-up national estimates or percentages, not just the raw totals from NFIRS. Many of the estimates are derived by computing a percentage of fires, deaths, injuries, or dollar loss in a particular NFIRS category and multiplying it by the corresponding total number from the NFPA annual survey. For example, the national estimate for the number of injuries by age group used in the calculation for the fire injury rate per million population (Figure 8, Rate of Fire Casualties by Age and Gender) was computed by taking the percentage of NFIRS fire injuries (with known age) and multiplying it by the estimated total number of fire injuries from the NFPA survey. This methodology is the accepted practice of national fire data analysts.

Ideally, one would like to have all of the data come from one consistent data source. But because the "residential population protected" is not reported to NFIRS by many fire departments and the reliability of that data element is suspect in many other cases, especially where a county or other jurisdiction is served by several fire departments that each report their population protected independently, this data element was not used. Instead, extrapolations of the NFIRS sample to national estimates are made using the NFPA survey for the gross totals of fires, deaths, injuries, and dollar loss.

One problem with this approach is that the proportions of residential, non-residential, mobile property, and outside fires and fire deaths differ between the large NFIRS sample and the NFPA survey sample. To be consistent with approaches being used by the CPSC and NFPA, we have used the NFPA estimates of fires, deaths, injuries, and dollar loss for residential, non-residential, mobile, and outside properties as a starting point. The details of the national fire problem below this level are based on proportions from NFIRS. One will not get the same numbers starting from the total NFIRS proportions of residential, non-residential, etc., as from the NFPA proportions. This inconsistency will remain until all estimates can be derived from NFIRS alone.

Unknowns

On a fraction of the incident reports or casualty reports sent to NFIRS, the desired information for many data items either is not reported or is reported as "unknown." The total number of blank or unknown entries is often larger than some of the important subcategories. For example, 60 percent of fires with fatalities reported in 2004 do not have sufficient data reported to NFIRS to determine cause. The lack of data, especially for these fatal fires, masks the true picture of the fire problem. Many prevention and public education programs use NFIRS data to target at-risk groups or to address critical problems, fire officials use the data in decision-making that affects the allocation of firefighting resources, and consumer groups and litigators use the data to assess product fire incidence. When the unknowns are large, the credibility of the data suffers. Fire departments need to be more aware of the effect of incomplete data reporting.

Incomplete Loss Reporting

As troublesome as insufficient data for the various NFIRS data items can be, equally challenging is the apparent non-reporting of injuries and property loss associated with the fire incident (although the latter loss is notoriously difficult to quantify). It is exceedingly rare that a fire department experiences no firefighter injury of any type. Yet there are fire departments, large and small, that report no firefighter injuries or a minuscule number of them, yet report fires. Fire by its nature is destructive. Yet there are many reported fires where the flame spread indicates damage but no property loss is indicated.

Incomplete reporting of associated civilian deaths is much more difficult to identify, as the numbers of deaths are relatively small. Incomplete reporting of civilian injuries is equally difficult to ascertain, as the injury per fire profiles for most departments are within reason. It is possible that only firefighter injuries and property loss may be at issue.

Adjusted Percentages

In making national estimates, the unknowns should not be ignored. The approach taken in this report is to provide not only the "raw" percentages of each category, but also the "adjusted" percentages computed using only those incidents for which data were provided. This calculation, in effect, distributes the fires for which the data are unknown in the same proportion as the fires for which the data are known, which may or may not be approximately right.

To illustrate using the cause of fire deaths: Incendiary or suspicious (commonly identified as arson) was determined as the fire cause for 10.9 percent of reported fires in 2004; another 60.8 percent of reported fires had cause unknown. Thus, the percent of fires that had their cause reported was 100 – 60.8 = 39.2 percent. With the unknown causes proportioned like the known causes, the adjusted percent of arson fire deaths can then be computed as 10.9/39.2 = 27.9 percent.

As in past editions of *Fire in the United States*, both the reported data and the adjusted data (if unknowns are present) are plotted on the bar charts in this edition.

Representativeness of the Sample

The percentage of fire departments participating in NFIRS varies from State to State, with some States not participating at all in some years. To the best that USFA can determine, the distribution of participants is reasonably representative of the entire Nation, even though the sample is not random. The sample is so large—52 percent of all fires—and so well distributed geographically and by size of community that there is no known major bias that will affect the results.

In a joint study effort, USFA and NFPA examined the biases in NFIRS participation, specifically whether the fire experience of NFIRS-reporting departments differed systematically from the fire experience of other non-reporting departments within the same population. Results based on data from 1997 and 2002 indicated that there were differences in total fire loss estimates derived from NFIRS reporting departments and non-NFIRS reporting departments, however, the degree of difference was not great enough to merit adjusting current scaling methodologies. Thus, this edition of *Fire in the United States* will continue to use the long-standing methodology of scaling NFIRS estimates with NFPA total fire estimates.

USFA is planning a future study to determine the representativeness of the NFIRS data by grouping the data by like characteristics. The proposed study should provide more insight into the NFIRS, and indicate what, if any, adjustments should be made to minimize the impact of possible reporting bias on the fire loss estimates.

Most of the NFIRS data exhibit stability from one year to another, without radical changes. Results based on the full data set are generally similar to those based on part of the data, another indication of data reliability. Although improvements could be made—the individual incident reports could and should be filled out more completely and more accurately than they are today (as can be said about most real-world data collections as large as NFIRS), and all participating departments should have the same reporting requirements—the overall portrayal is a reasonably accurate description of the fire situation in the United States.

Comparing Statistics to Past Editions

Differences between the current NFIRS and older versions have, or may have, an effect on the analyses of fire topics. These differences, the result of both coding changes and data element design changes, necessitated revisions to long-standing groupings and analyses. The definitions of some property types[5], the cause methodology, smoke alarm performance, mutual aid, building data, and streamlined reporting for qualified incidents are among those areas that are approached differently in NFIRS 5.0. As these revisions have resulted in changes in overall trends—some subtle and some substantial—this edition does not include trends based on previous versions of NFIRS data. Subsequent editions will build on the analyses presented here.

The limited reporting of confined, low-loss structure fires allows the fire service to capture incidents that either might have gone unreported prior to the introduction of NFIRS 5.0 or were reported, but as a non-fire fire incident, as no loss was involved.[6] Data from this reporting option were investigated in a 2006 USFA report, *Confined Structure Fires*. The addition of these fires results in increased proportions of cooking and heating fires in analyses of fire cause. In other analyses, the inclusion of confined fires may result in larger unknowns than in previous editions of this report, as detailed reporting of fire specifics (e.g., room of origin) is not required. In 2004, these confined fires accounted for 44 percent of structure fires. Over 80 percent of these confined fires were no- or low-loss cooking fires (61 percent) and heating fires (21 percent).

Trend Data

A frequently asked question is how much a particular aspect of the fire problem has changed over time. The usual response is in terms of a percentage change from one year to another. As we are dealing with real-world data that fluctuate from year to year, a percent change from one specific year to another can be misleading. This is especially true when the beginning and ending data points are extremes—either high or low. For example, Table 5 shows that the percent change from 1995 of 3,035 deaths to 2004 of 2,680 deaths would be a decrease of 11.7 percent. Yet, if we were to choose 1997 as the beginning data point (2,700 deaths), this change would show a mere 0.7 percent decrease. As we are interested in *trends* in the U.S. fire problem, *Fire in the United States* presents the computed best-fit linear trend line (which smooths fluctuations in the year-to-year data) and presents the change over time based on this trend line. In this example, the overall 10-year trend is a decrease in deaths of 18.4 percent. As noted above, trends that incorporate NFIRS data from the 5.0 system may have subtle changes as a result of the system design and not a true trend change.

[5] Examples of these property type changes: Detached residential garages, a subset of non-residential storage properties previously included under residential structures, are now included with non-residential properties. Vacant and under construction is now an attribute of a structure, and is no longer considered a separate property type.

[6] Some States routinely reported such non-loss fires as smoke scares. The result, from a reporting viewpoint, is that the incident is reported but not coded as a fire incident.

Table 5. Comparison of Percentage Change Indicators

Year	One- and Two- Family Dwelling Fire Deaths	Linear Best Fit Trend	Change between 1995 and 2004	Change between 1997 and 2004
1995	3,035	3,042	3,035	
1996	3,470	2,980		
1997	2,700	2,918		2,700
1998	2,776	2,855		
1999	2,375	2,793		
2000	2,920	2,731		
2001	2,650	2,669		
2002	2,280	2,606		
2003	2,735	2,544		
2004	2,680	2,482	2,680	2,680
Percent change		**-18.4%**	**-11.7%**	**-0.7%**

Source: NFPA

Cause Categories

Often fires are caused by a complex chain of events. To make it easier to grasp the "big picture," 13 major categories of fire causes such as heating, cooking, and children playing are used by the USFA here and in many other reports. The alternative is to present scores of detailed cause categories or scenarios, each of which would have a relatively small percentage of fires. For example, heating includes subcategories such as misuse of portable space heaters, wood stove chimney fires, and fires involving gas central heating systems. Experience has shown that the larger categories are useful for an initial presentation of the fire problem. It then can be followed by a more detailed analysis.

The cause categories displayed in the graphs are listed in the same order to make comparisons easier from one to another. The x-scale varies from figure to figure depending on the largest percentage that is shown; the x-scale on a figure with multiple charts, however, is always the same. The order here also is the same as used in previous *Fire in the United States* editions.

The cause categories used throughout most of this report were designed to reflect the causes of structure fires—where the majority of fatal fire deaths occur. While these categories have usefulness for the other property types, there are limitations. In vehicle fires, for example, these limitations are such that the cause categories are not used in detailed analyses.

An additional problem to keep in mind when considering the rank order of causes in this report is that sufficient data to categorize the cause were not reported to NFIRS for all fires in the database. The rank order of causes might be different than shown here if the cause profile for the fires whose causes were not reported to NFIRS were substantially different from the profile for the fires whose causes were reported. However, there is no information available to indicate that there is a major difference between the knowns and the unknowns, and so our present best estimate of fire causes is based on the distribution of the fires with known causes.

Fires are assigned to one of the 13 general cause groupings using a hierarchy of definitions, approximately as shown in Table 6.[7] A fire is included in the highest category into which it fits on the list. If it

[7]The exact hierarchy and specific definition in terms of the NFIRS 5.0 codes may be found at *http://www.nfirs.fema.gov/_download/50causematrix01012004.xls*. The actual hierarchy involves a large number of subcategories that are later grouped into the 13 major categories.

does not fit the top category, then the second one is considered, and if not that one, the third, and so on. (See Table 6 note for examples.)

Table 6. Hierarchy of Cause Groupings Used in This Report

Cause Category	Definition
Exposure	Caused by heat spreading from another hostile fire
Incendiary/Suspicious	Fire deliberately set or suspicious circumstances
Children Playing	Includes all fires caused by children playing with any materials contained in the categories below
Natural	Caused by the sun's heat, spontaneous ignition, chemicals, lightning, static discharge
Smoking	Cigarettes, cigars, pipes as accidental heat of ignition
Heating	Includes central heating, fixed and portable local heating units, fireplaces and chimneys, water heaters as source of heat
Cooking	Includes stoves, ovens, fixed and portable warming units, deep fat fryers, open grills as source of heat
Electrical Distribution	Includes wiring, transformers, meter boxes, power switching gear, outlets, cords, plugs, lighting fixtures as source of heat
Appliances (including air conditioning/ refrigeration)	Includes televisions, radios, phonographs, dryers, washing machines, vacuum cleaners, hand tools, electric blankets, irons, electric razors, can openers, dehumidifiers, water cooling devices, air conditioners, refrigeration equipment as source of heat
Other Equipment	Includes special equipment (radar, X-ray, computer, telephone, transmitters, vending machine, office machine, pumps, printing press); processing equipment (furnace, kiln, other industrial machines); service, maintenance equipment (incinerator, elevator); separate motor or generator; vehicle in a structure; unspecified equipment
Open Flame, Spark (heat from)	Includes torches, candles, matches, lighters, open fire, ember, ash, rekindled fire, backfire from internal combustion engine as source of heat
Other Heat	Includes fireworks, explosives, heat or spark from friction, molten material, hot material, all other fires caused by heat from fuel-powered objects, heat from electrical equipment arcing or overloading, heat from hot objects not covered by above groups
Unknown	Cause of fire undetermined or not reported

Note: Fires are assigned to a cause category in the hierarchical order shown. For example, if the fire is judged incendiary and a match was used to ignite it, it is classified as incendiary and not open flame because incendiary is higher on the list. One minor deviation: If the fire involves air conditioning or refrigeration, it is included in appliances and not in electrical distribution.

NFIRS fire data can be analyzed in many ways, such as by the form of the heat of ignition, the material ignited, the ignition factor, or many other groupings. The hierarchy used in this report has proved useful in understanding the fire problem and targeting prevention, but other approaches are certainly useful too. Because the NFIRS database stores records fire by fire and not just in summary statistics, a very wide variety of analyses are possible.

Since the introduction of NFIRS Version 5.0, the implementation of the cause hierarchy has resulted in a steady increase in the percentages of unknown fire causes. This increase may be partially due to the fact that the cause hierarchy in Table 6 was developed to capture the causes identified from the data collected in previous NFIRS versions. It appears that, for some fire incidents, a considerable amount of causal information collected as part of the NFIRS Version 5.0 is not being used in the current hierarchy. As a result, the cause category assigned to these incidents is unknown. USFA is currently developing a modified version of the hierarchy of cause groupings for structure fires to address this deficiency. The new schema provides a three-tier level of cause descriptions: a set of more detailed causes, a set of mid-level causes, and a set of general causes intended for very high level use. USFA also plans to investigate and develop cause categories for vehicle and outside fires.

Rounding

Percentages on each chart are rounded to one decimal point. Textual discussions cite these percentages as whole numbers. Thus, 13.4 percent is rounded to 13 percent and 13.5 percent is rounded to 14 percent.

Differences Between NFIRS and NFPA Data

There is an inconsistency between the NFIRS sample and the NFPA annual survey data: For 2003 and 2004, the years for which more native NFIRS 5.0 data are available, the deaths reported to NFIRS are a smaller fraction of the NFPA estimate of deaths than the NFIRS fires are of the NFPA estimate of fires. NFIRS injuries appear to be consistent with the proportions of NFIRS fires, and NFIRS dollar loss is a smaller fraction of the NFPA totals than are fires, deaths, or injuries. This issue is discussed further in Appendix A.

Unreported Fires

NFIRS only includes fires to which the fire service responded. In some States, fires attended by State fire agencies (such as forestry) are included; in other States, they are not.

NFIRS includes fires from all States, but does not include incidents from many fire departments within participating States. However, if the fires from the reporting departments are reasonably representative, this omission does not cause a problem in making useful national estimates for any but the smallest subcategories of data.

An enormous number of fires are not reported to the fire service at all. Most are believed to be small fires in the home or in industry which go out by themselves or are extinguished by the occupant. Based on a study done in the early 1970s, these unreported fires collectively cause a great deal of property loss and a large number of injuries requiring medical attention. The latest study of this problem was a report published by CPSC in 1985.[8]

Perhaps the most disturbing type of unreported fire is one that is not submitted by fire departments that are participating in NFIRS. Some departments submit information on most, but not all, of their fires. Sometimes the confusion is systematic, as when no-loss cooking fires or chimney fires are not reported. Sometimes it is inadvertent, such as when incident reports are lost or accidentally not submitted. The information that is received is assumed to be the total for the department and is extrapolated as such. Although there was no measure of the extent of this problem in the past, NFIRS 5.0 provides fire departments with the capability to report fire incident information in a simplified, straightforward manner.

ORGANIZATION OF REPORT

This report is organized differently from previous editions of *Fire in the United States*. While Chapter 2 still presents an overview of the national fire problem in terms of the total numbers of fires, deaths, injuries, and dollar loss (the four principal measures used to describe the fire problem), the former Chapters 3 and 4 (the residential and non-residential fire problems, respectively) will be published as stand-alone reports with more detail. The new Chapter 3 provides an overview of structures (residential and non-residential), vehicle and other mobile properties, and outside and other properties. The old

[8] 1984 National Sample Survey of Unreported Residential Fires: Final Technical Report, prepared for the U.S. Consumer Product Safety Commission, Contract No. C–83–1239, Audits & Surveys, Inc., Princeton, NJ (1985).

Chapter 5, firefighter casualties, is now published in two sections: the annual *Firefighter Fatalities in the United States* report and a new report, *Fire-related Firefighter Injuries in 2004*. The "Resources" sections at the end of each chapter in the previous edition are now combined into one, comprehensive resource list. The combined resources document can be found at the following URL: *http://www.usfa.dhs.gov/statistics/reports/fius.shtm*.

Appendix A discusses the differences between NFPA and NFIRS data.

Most of the data are presented graphically for ease of comprehension. The specific data associated with the graphs are provided directly with the chart.

This edition of *Fire in the United States* concludes with a topical index.

Chapter 2
The National Fire Problem

The United States has a severe fire problem, more so than is generally perceived. Nationally, there are millions of fires, thousands of deaths, tens of thousands of injuries, and billions of dollars lost—which make the U.S. fire problem one of great national importance. The indirect costs of fire increase the magnitude of economic loss tenfold.

Although the United States had a yearly average of 1,758,000 fires and 4,025 fire deaths from 1995 to 2004 (Figure 2), the numbers of fires and fire fatalities continue to decline.[1] We have made much progress in the last decade, but the United States continues to have fire death rates and property losses that are among the largest of the industrialized nations.

Fire injury statistics in Figure 2 are not as clear-cut as the fire death totals because of ambiguity about the completeness of defining and reporting minor injuries. In addition, many injured people go directly to a medical care facility themselves without a report to, or being treated by, the fire department or local emergency medical services (EMS) responders. Civilian injuries from reported fires averaged 21,700 per year over the 10-year period.[2] Firefighter injuries averaged 42,300 from those fires.[3] Past studies suggest that the number of civilian injuries associated with fires that are not reported to the fire service might be several times that of the number from reported fires, as discussed in Chapter 1. Fire-caused injuries to civilians declined by 33 percent over the 10 years, despite a 10 percent increase in the national population over the period.[4]

In terms of dollar loss, the estimated direct value of property destroyed in fires was $10 billion, down from a peak of nearly $13 billion (in 2004 dollars) in 2003.[5] The total cost of fire (direct losses, the cost of fire departments, built-in fire protection in new buildings, insurance overhead, and other annual fire protection expenditures) is considerably higher, perhaps as much as 8 to 10 times the direct losses. The direct dollar loss increased 28 percent from 1995 to 2004, with much of the increase due to inflation. Using constant 2004 dollars, the loss was up only 3 percent over this period. Still, the direct dollar loss was enormously high, at an average of $11 billion a year in 2004 dollars.

[1] Fires are rounded to the nearest 1,000; deaths to the nearest 5.

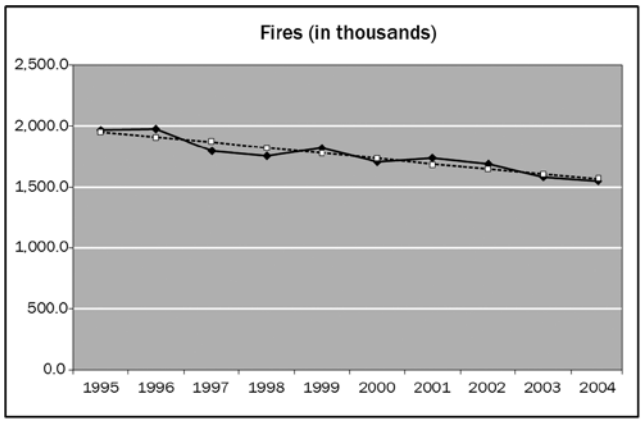
[2] Injuries are rounded to the nearest 100.

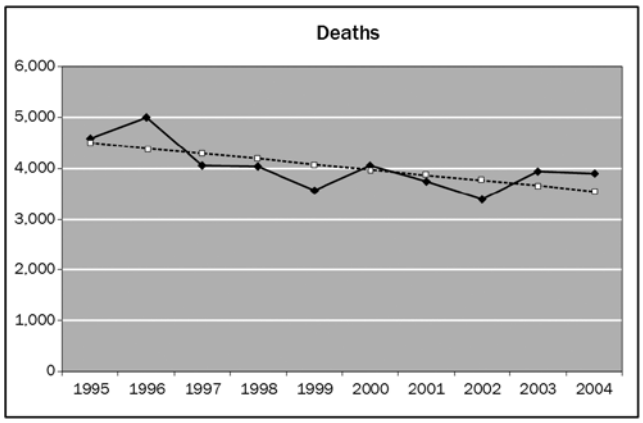
[3] Karter, Michael J., et al., *U.S. Firefighter Injuries,* annual surveys and reports from 1995 to 2004, National Fire Protection Association (NFPA). The 10-year average of firefighter fireground injuries is derived from summary data presented in these reports.

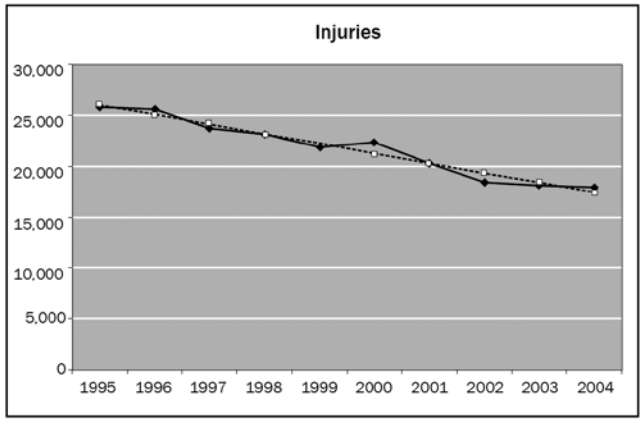
[4] U.S. Census Bureau, Population Estimates. http://www.census.gov/popest/estimates.php

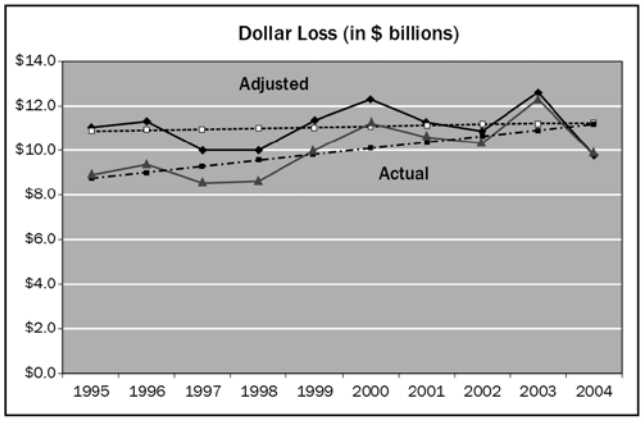
[5] Dollar loss is rounded to the nearest $billion.

Figure 2. Fires and Fire Losses (1995–2004)









Sources: NFPA and Consumer Price Index

FIRES (K)

Year	Value
1995	1,965.5
1996	1,975.0
1997	1,795.0
1998	1,755.5
1999	1,823.0
2000	1,708.0
2001	1,734.5
2002	1,687.5
2003	1,584.5
2004	1,550.5
10-Year Trend (%)	-20.1%

DEATHS

Year	Value
1995	4,585
1996	4,990
1997	4,050
1998	4,035
1999	3,570
2000	4,045
2001	3,745
2002	3,380
2003	3,925
2004	3,900
10-Year Trend (%)	-21.1%

INJURIES

Year	Value
1995	25,775
1996	25,550
1997	23,750
1998	23,100
1999	21,875
2000	22,350
2001	20,300
2002	18,425
2003	18,125
2004	17,875
10-Year Trend (%)	-33.1%

DOLLAR LOSS ($B)

Year	Actual Value	Value Adjusted to 2004 Dollars
1995	$8.9	$11.1
1996	$9.4	$11.3
1997	$8.5	$10.0
1998	$8.6	$10.0
1999	$10.0	$11.4
2000	$11.2	$12.3
2001	$10.6	$11.3
2002	$10.3	$10.9
2003	$12.3	$12.6
2004	$9.8	$9.8
10-Year Trend (%)	27.6%	3.4%

When the U.S. Fire Administration (USFA) was established in 1974, annual fire deaths were estimated at 12,000.[6] The goal was to reduce deaths by 50 percent within 25 years; that goal was met.

Fire incidents have declined 20 percent since 1995. In 2004, reported fires reached their lowest point since national fire data have been recorded.

On a per capita basis, the fire problem appears less severe today than 10 years ago, partially because the population has been increasing and partially because of the overall decline in numbers of reported fires and fire casualties (Figure 3).[7] Over the 10 years, fires per million population declined 28 percent, fire deaths per million population declined 29 percent, and the injury rate declined 40 percent. In 2002, the 12 deaths per million population represented the lowest death rate in NFPA survey history. From 1995 to 2004, dollar loss per capita was up 16 percent, unadjusted. When adjusted for inflation over the 10 years, however, this loss declined 6 percent.

THE BROADER CONTEXT

Fires constitute a much larger problem than is generally known. Deaths and injuries from all natural disasters combined—floods, hurricanes, tornadoes, earthquakes, etc.—are just a fraction of the annual casualties from fire. For example, deaths from disasters average 200 to 250 per year, versus more than 4,000 deaths from fires.[8]

Most fires are relatively small, and their cumulative impact is not easily recognized. Only a few fires each year have the huge dollar losses that are associated with tornados, hurricanes, or floods. The California wildfires of October 2003 resulted in over $2 billion in losses. The New Mexico wildland fires of May 2000 were estimated to have caused $1.0 billion in losses.[9] But because most of the losses from fire are spread over the nearly 1.8 million fires that are reported each year, the total loss is far more than the impression many people have of it from the anecdotal reporting of local fires in the media.

Fires also are an important cause of accidental deaths. For 2003, the National Safety Council (NSC) ranks fires as the fifth leading major category of nontransport accidental deaths, behind poisonings, falls, unspecified accidental factors, and accidental threats to breathing.[10,11]

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[6] NFPA changed their estimation methodology in the mid-1970s. As a result, by 1977 the estimate of fire deaths had already dropped to approximately 7,400 and rose the next year to 7,700. Nevertheless, it is fair to say that the 50-percent reduction in fire deaths was achieved.

[7] Per capita rates are determined by the number of deaths or injuries occurring to a specific population group divided by the total population for that group. This ratio is then multiplied by a common population size. For the purposes of this report, per capita rates for fire deaths and injuries are measured per 1 million persons. Per capita rates are used in the computation of relative risk.

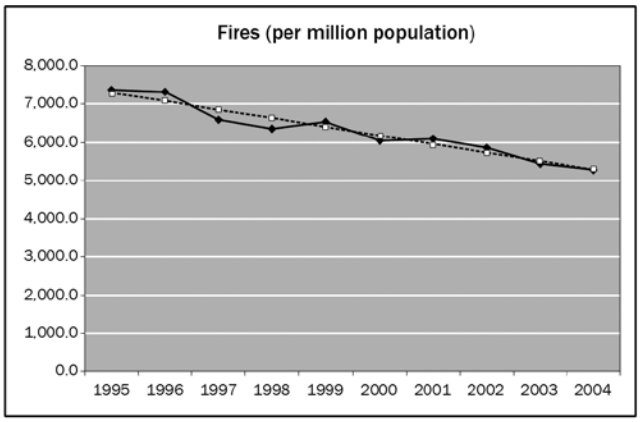
[8] National Safety Council, "What Are the Odds of Dying?" http://www.nsc.org/lrs/statinfo/odds.htm

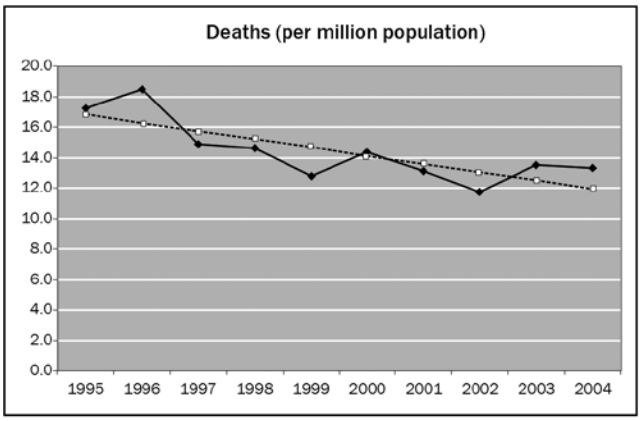
[9] National Fire Protection Association, "Large Loss Fires" http://www.nfpa.org/itemDetail.asp?categoryID=954&itemID=23352&URL=Research%20&%20Reports/Fire%20statistics/Deadliest/large-loss%20fires

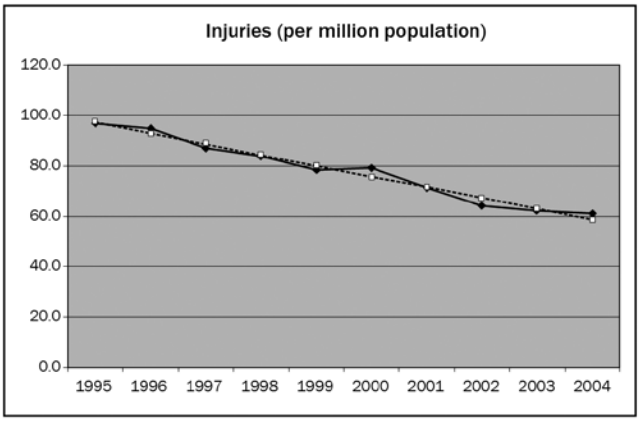
[10] Accidental threats to breathing includes suffocation, accidental ingestion or inhalation of objects that obstruct the airway, and the like. Accidental drownings are not included.

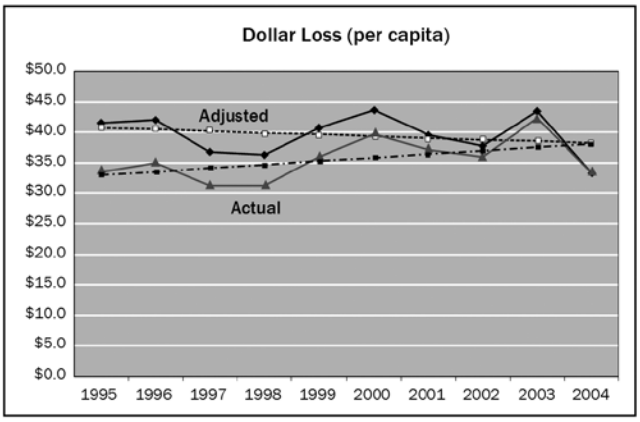
[11] National Safety Council, "What Are the Odds of Dying?" http://www.nsc.org/lrs/statinfo/odds.htm

Figure 3. Fire Loss Rates (1995-2004)









Sources: NFPA, Consumer Price Index, and U.S. Census Bureau

FIRES PER MILLION POPULATION

YEAR	VALUE
1995	7,381.4
1996	7,331.3
1997	6,583.6
1998	6,363.9
1999	6,533.1
2000	6,052.1
2001	6,081.1
2002	5,856.8
2003	5,448.8
2004	5,280.3
10-Year Trend (%)	-27.7%

DEATHS PER MILLION POPULATION

Year	Value
1995	17.2
1996	18.5
1997	14.9
1998	14.6
1999	12.8
2000	14.3
2001	13.1
2002	11.7
2003	13.5
2004	13.3
10-Year Trend (%)	-28.9%

INJURIES PER MILLION POPULATION

Year	Value
1995	96.8
1996	94.8
1997	87.1
1998	83.7
1999	78.4
2000	79.2
2001	71.2
2002	63.9
2003	62.3
2004	60.9
10-Year Trend (%)	-39.6%

DOLLAR LOSS PER CAPITA

Year	Actual Value	Value Adjusted to 2004 Dollars
1995	$33.5	$41.5
1996	$34.9	$42.0
1997	$31.3	$36.8
1998	$31.3	$36.3
1999	$35.9	$40.7
2000	$39.7	$43.6
2001	$37.1	$39.6
2002	$35.9	$37.7
2003	$42.3	$43.4
2004	$33.4	$33.4
10-Year Trend (%)	15.7%	-6.2%

Fire-related injuries to civilians and firefighters are reported with too much uncertainty to properly rank them with confidence. It is clear, however, that they number over 100,000 and possibly two or three times that many when injuries from unreported fires and unreported injuries from reported fires are taken into account. Burn injuries are particularly tragic because of the tremendous pain and suffering they cause. Serious burns tend to cause psychological damage as well as physical damage, and they may well involve not only the victims but also their families, friends, and fellow workers.

U.S. Fire Deaths versus Other Nations

Although the United States no longer has one of the most severe fire problems among the industrialized nations, it continues to experience fire death and property loss rates in excess of its sister industrialized nations. Much progress has been made in 30 years—the death rate is less than half of what it was in the late 1970s and down 29 percent since 1995 (Figure 3). International data, however, indicate that the United States still has a fire death rate two to two and a half times that of several European nations, and at least 20 percent higher than many. The U.S. fire death rate, averaged for 2001 to 2003, was reported at 17.1 deaths per million population (including 2,791 from 9/11).[12] Switzerland's rate, the lowest of the European nations, was 5.6 per million population (1998 to 2000); Sweden's was 16.0. Of the 25 industrial nations examined by the World Fire Statistics Centre, the U.S. rate is still in the upper tier—fourth highest fire death rate out of 25 nations. This general status has been unchanged for the past 25 years.

The declining U.S. trend in the fire death rate is not an extraordinary event; this broad declining trend applies to western European nations and selected industrialized nations of southeastern Asia. The United States has placed greater emphasis on fire suppression than other nations, but these nations tend to surpass the U.S. in practicing fire prevention. The United States would be well-served by studying and implementing international fire prevention programs that have proved effective in reducing the number of fires and deaths. The United States has excellent building technology; public buildings generally have good records. It is the combination of safety built into homes and safety behavior in homes where we fall short of some nations. We have the technology in home sprinkler systems and knowledge of compartmentalization, but they are not widely used.

Total Cost of Fire

The total cost of fire to society is staggering—over $165 billion per year.[13] This includes the cost of adding fire protection to buildings, the cost of paid fire departments, the equivalent cost of volunteer fire departments ($20 plus billion annually), the cost of insurance overhead, the direct cost of fire-related losses, the medical cost of fire injuries, and other direct and indirect costs. Even if these numbers are high by as much as 100 percent, the total cost of fire would range from $50 to $100 billion, still enormous, and on the order of 0.5 to 1.0 percent of the gross domestic product, which was $11.7 trillion in 2004.[14] Thus from an economic viewpoint, fire ranks as a significant national problem.

[12] "World Fire Statistics," Geneva Association Information Newsletter, October 2006, http://www.genevaassociation.org/FIRE%20N°22.pdf. After removing the deaths attributed to the September 11 terrorist attacks, the United States has an equivalent 1.40 fire deaths per 100,000 population for 2001 to 2003; Switzerland has the lowest European death rate at 0.56 per 100,000 population for 1998 to 2000.

[13] Meade, William P., *A First Pass at Computing the Cost of Fire in a Modern Society*, The Herndon Group, Inc., February 1991. Meade estimated the cost of fire at $115 billion in that publication. The figure quoted here is adjusted for inflation to 2004 dollars to match the other loss figures quoted in this document.

[14] U.S. Department of Commerce, Bureau of Economic Analysis, http://www.bea.gov/national/xls/gdplev.xls.

FIRE CASUALTIES BY POPULATION GROUP

The fire problem is more severe for some groups than others. People in the Southeast, males, the elderly, African-Americans, American Indians, and the very young all are at higher risk from fires than the rest of the population. These groups have remained at risk despite continuing downward trends.

State and Regional Profiles

Fire death rates for each State for 2000 to 2004 are shown in Figure 4. An overlay plot on each State chart shows the national fire death rate. Fifteen States and the District of Columbia are consistently above the national average and 18 States are consistently below it.

The rank order of State fire deaths per million population is shown in Figure 5. States with relatively small populations may move up and down on the list from year to year as a result of only a few deaths; their death rate is better viewed as an average over time. For example, Delaware changed from one of the lowest rates in 2000 to one of the highest in 2001. Rhode Island went from the worst fire death rate in 2003 to the best in 2004. The highest States in 2004 were the District of Columbia, Mississippi, Alabama, and Tennessee. The lowest were Rhode Island, Vermont, Colorado, and Wyoming.

Figure 6 shows the rank order of States in terms of the absolute number of fire deaths. Not surprisingly, large population States are at the top of the list. As in previous years, the 10 States with the most fire deaths account for nearly half of the national total. Unless their fire problems are significantly reduced, the national total will be difficult to lower.

The sum of the fire deaths in Figure 6 (3,993) is 93 deaths above the estimate of 3,900 from the NFPA survey for 2004. This difference may be due to the methodology and International Classification of Disease (ICD) codes used to extract fire deaths from the National Center for Health Statistics (NCHS) mortality data, or an underestimate from the extrapolation of the NFPA sample of fire departments, or a combination of both.[15,16] Nevertheless, the correspondence between the sources, while not exact, should be considered good.

The Southeast of the United States continues to have the highest fire death rate in the Nation and one of the highest in the world. Figure 7 shows the States grouped by fire death rates for 2004. As can be seen from the map, blocks of contiguous States often have similar death rates. A special study on the commonality among these similar States might provide useful insights into the reasons for this.

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[15] Although these sources for fire death data may seem quite far apart, they are statistically close. The 95 percent confidence intervals for the NFPA estimate of fire deaths result in a range of 3,500 to 4,300. The NCHS count is within the statistical range. In past editions of *Fire in the United States*, fire death data from State Fire Marshals' offices or equivalent agencies were also considered as a third source of data. This source was not included in this edition, as the data collected indicated incomplete reporting.

[16] For each reported death certificate in the United States, NCHS assigns codes for all reported conditions leading to death. Based on NCHS mortality data, there were 3,993 fire-related deaths in 2004, where both age and race were recorded. These include all deaths in which exposure to fire, fire products, or explosion was the underlying cause of death or was a contributing factor in the chain of events leading to death. This latter condition is an expanded approach to capturing fire and fire-related deaths. With this current approach, deaths where such exposures were a contributing factor (i.e., the death may not have occurred without the exposure) can be captured. Previous data and methodologies were able to capture only those deaths that directly resulted from the exposure to fire and fire products, and yielded more conservative numbers. The most conservative definition (fire and flame only, International Classification of Disease codes X00–09) yields 3,238 fire-related deaths for 2004. The codes included in this report's mortality statistics are F63.1, W39-W40, X00-X09, X75-76, X96-97, Y25-26, and Y35.1.

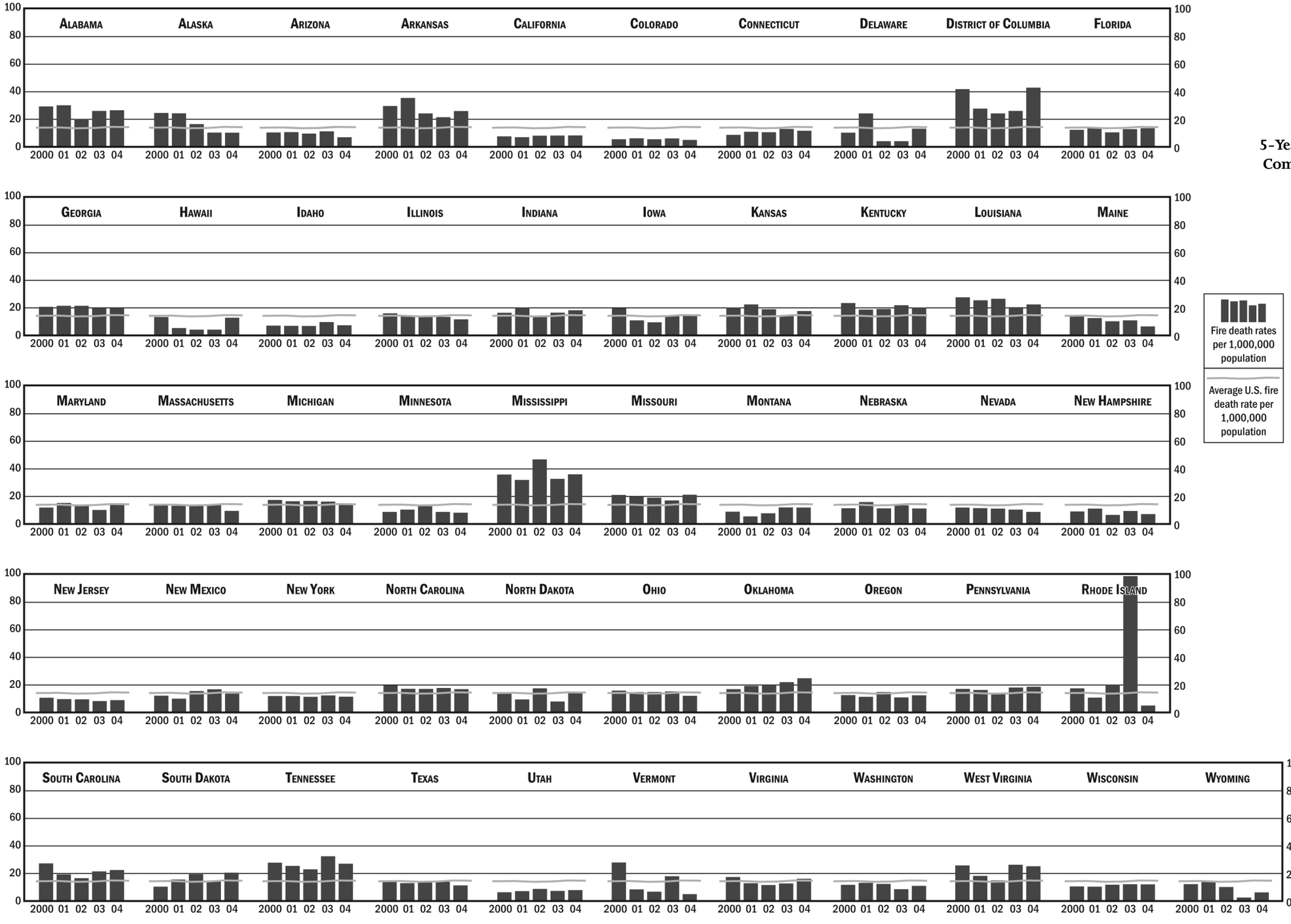

Figure 4.
5-Year Fire Death Rates by State Compared to National Average

Sources: National Center for Health Statistics and U.S. Census Bureau

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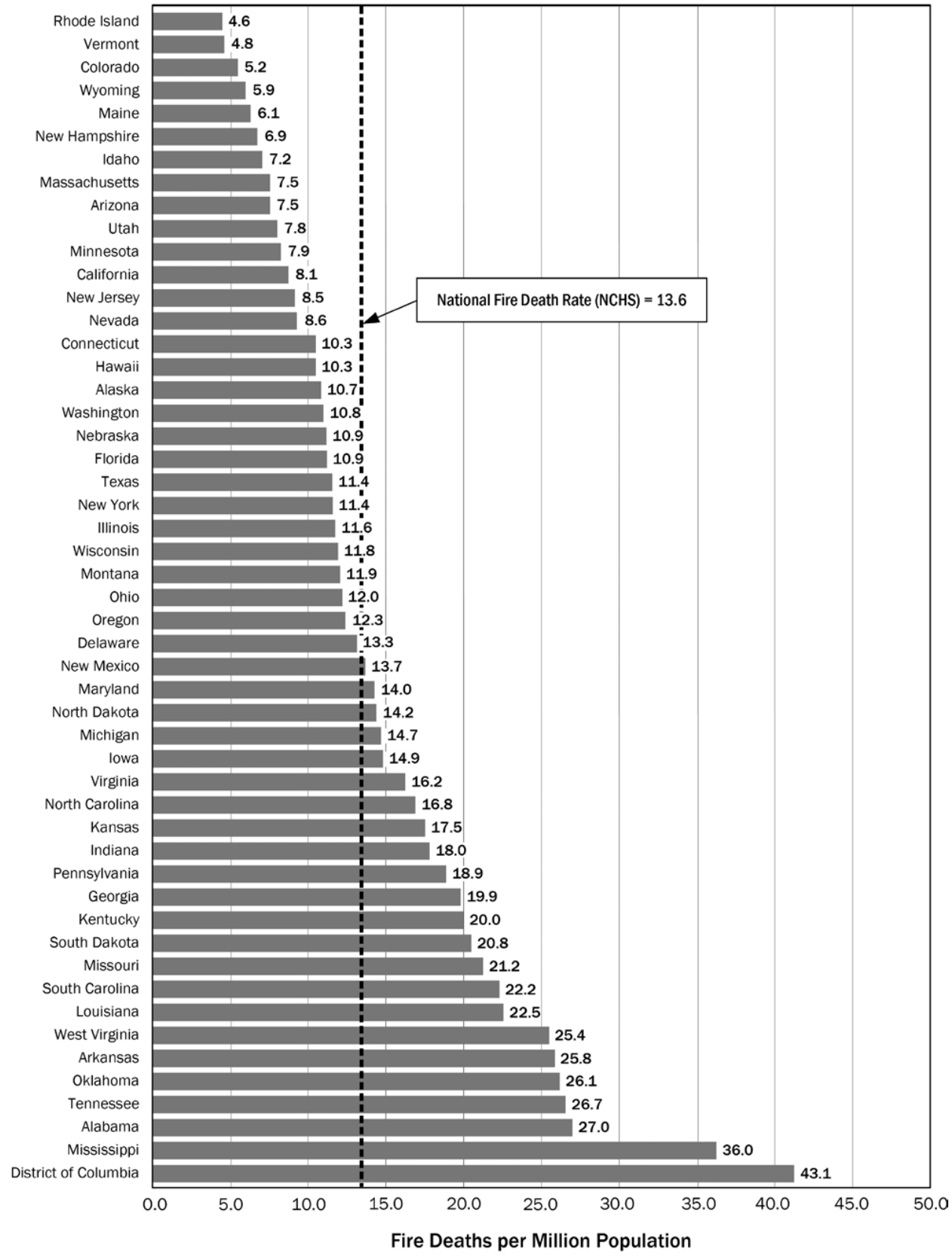
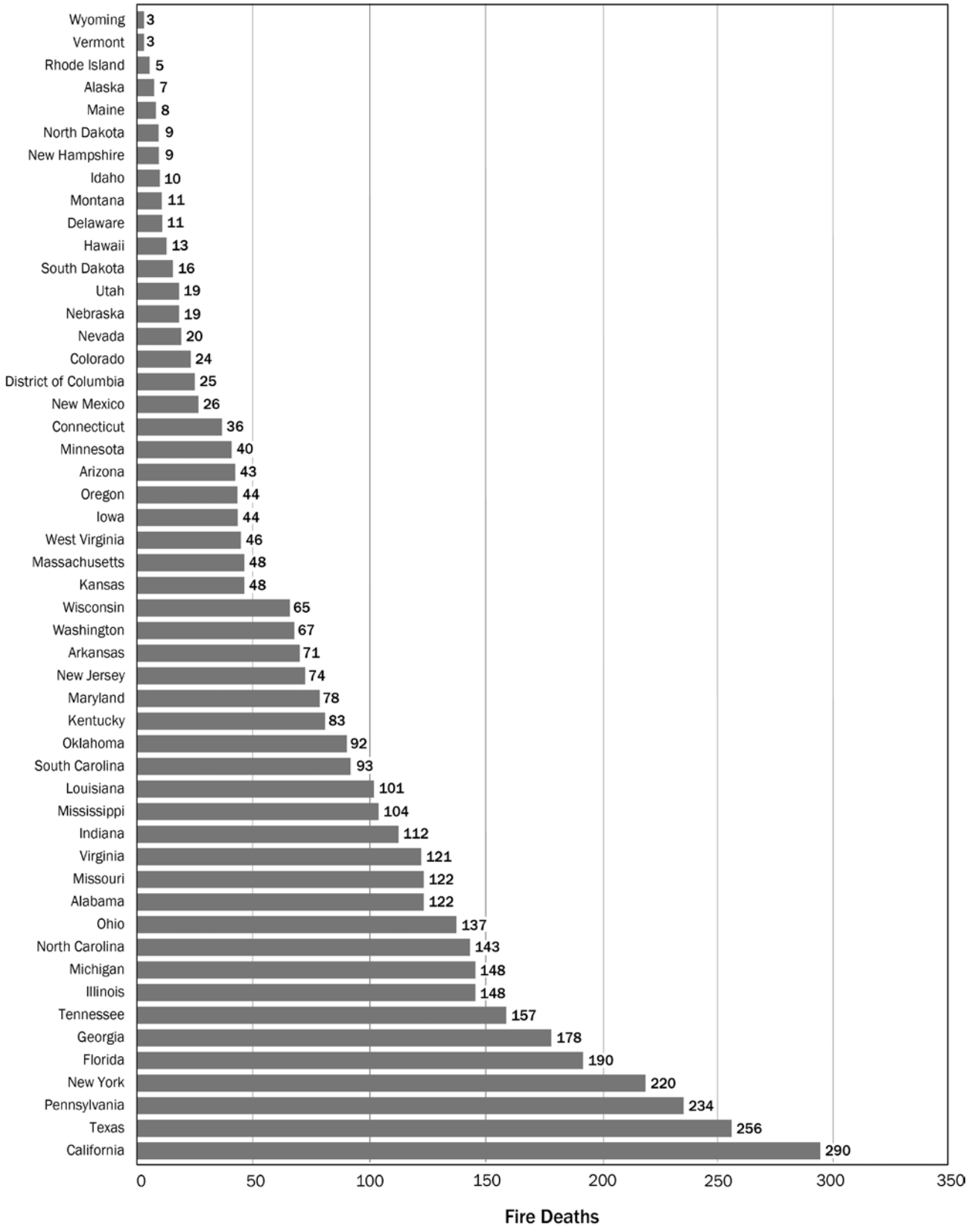
Figure 5. Rank Order of States by Civilian Fire Deaths per Million Population (2004)



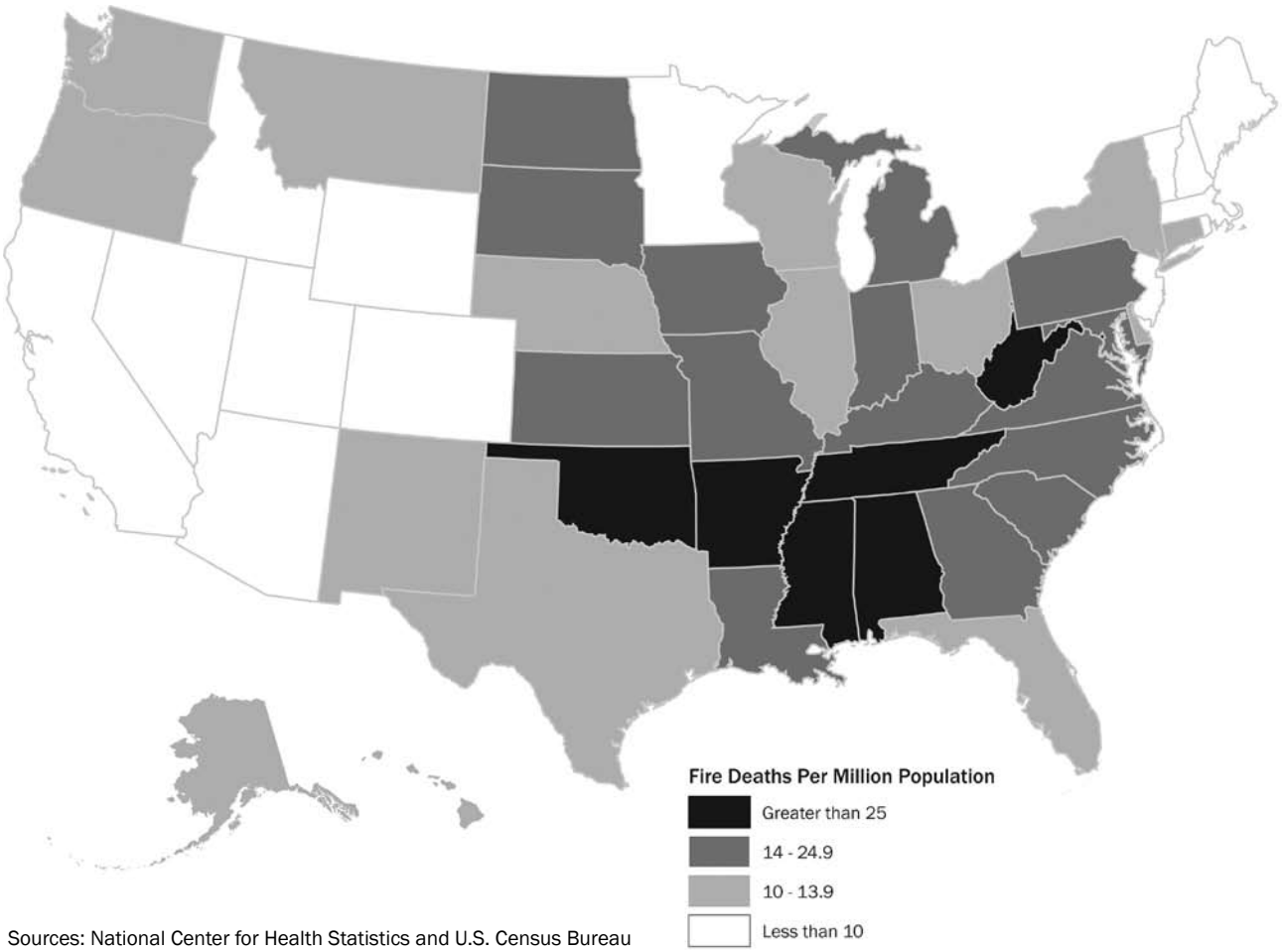
Sources: National Center for Health Statistics and U.S. Census Bureau

Figure 6. Rank Order of States by Civilian Fire Deaths (2004)



Source: National Center for Health Statistics

Figure 7. Fire Death Rate by State (2004)



Sources: National Center for Health Statistics and U.S. Census Bureau

Although the fire death rates of the southeastern States continue to decrease along with the overall U.S. rate, most still have death rates of 20 or more deaths per million population, with the notable exception of Florida.[17] In addition to four States from the Southeast (Mississippi, Alabama, Tennessee, and West Virginia), the District of Columbia, Oklahoma, and Arkansas were in the highest fire death rate category in 2004. The Southeastern States have been among the highest fire death rate areas for many years.

At the other extreme are the States with no shading—less than 10 deaths per million population. This death rate is in the same range as the nations of Europe and the Far East. They tend to be States in the Southwest and West, but there are some noteworthy exceptions in 2004: Maine, Massachusetts, Minnesota, New Hampshire, New Jersey, Rhode Island, and Vermont all had low rates in 2004. California and Florida continue to have the lowest death rates among the high-population States, as they have had for many years.

[17]The U.S. Census Bureau does not provide a standard definition for the Southeastern United States as a census region. The definition used here includes Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia as noted in the University of California-Riverside Library Glossary, http://lib.ucr.edu/depts/acquisitions/YBP%20NSP%20GLOSSARY%20EXTERNAL%20revised6-02.php.

Gender

More men die in fires than women (Table 7). The high proportion of male-to-female fire deaths has remained remarkably steady throughout previous editions of *Fire in the United States*. Males have a higher fire death rate per million population than females for all age groups save one—the 10 to 14 age group. Females have a slightly elevated rate for this age group in 2004. Males aged 25 to 69 had twice the fire death rate as women in 2004. Males in general have fire death rates 1.5 to 2 times that of females (Figure 8).

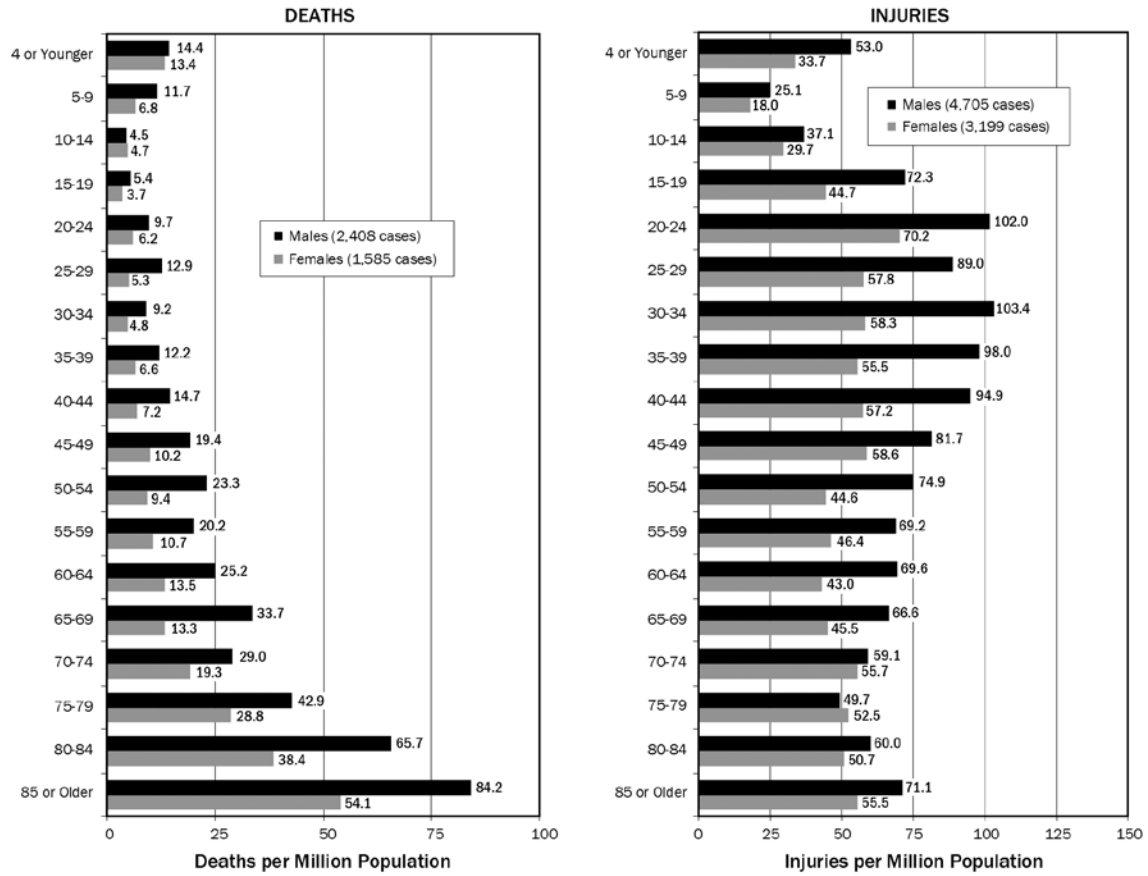
The male-to-female ratio for fire injuries is similar to that for fire deaths, except that the gender gap is slightly smaller (Table 7). Injuries per million population for males are generally one and one-half times the female rate, but this ratio lessens as age increases (Figure 8).

Table 7. Distribution of Fire Casualties by Gender

Casualty Type	Males (percent)	Females (percent)
Deaths	60.3	39.7
Injuries	59.5	40.5

Sources: National Center for Health Statistics and NFIRS

Figure 8. Rate of Fire Casualties by Age and Gender



Note: Data have been adjusted to account for unknown or unspecified ages.

Sources: National Center for Health Statistics and U.S. Census Bureau

Note: Data have been adjusted to account for unknown or unspecified ages.

Sources: NFIRS, NFPA, and U.S. Census Bureau

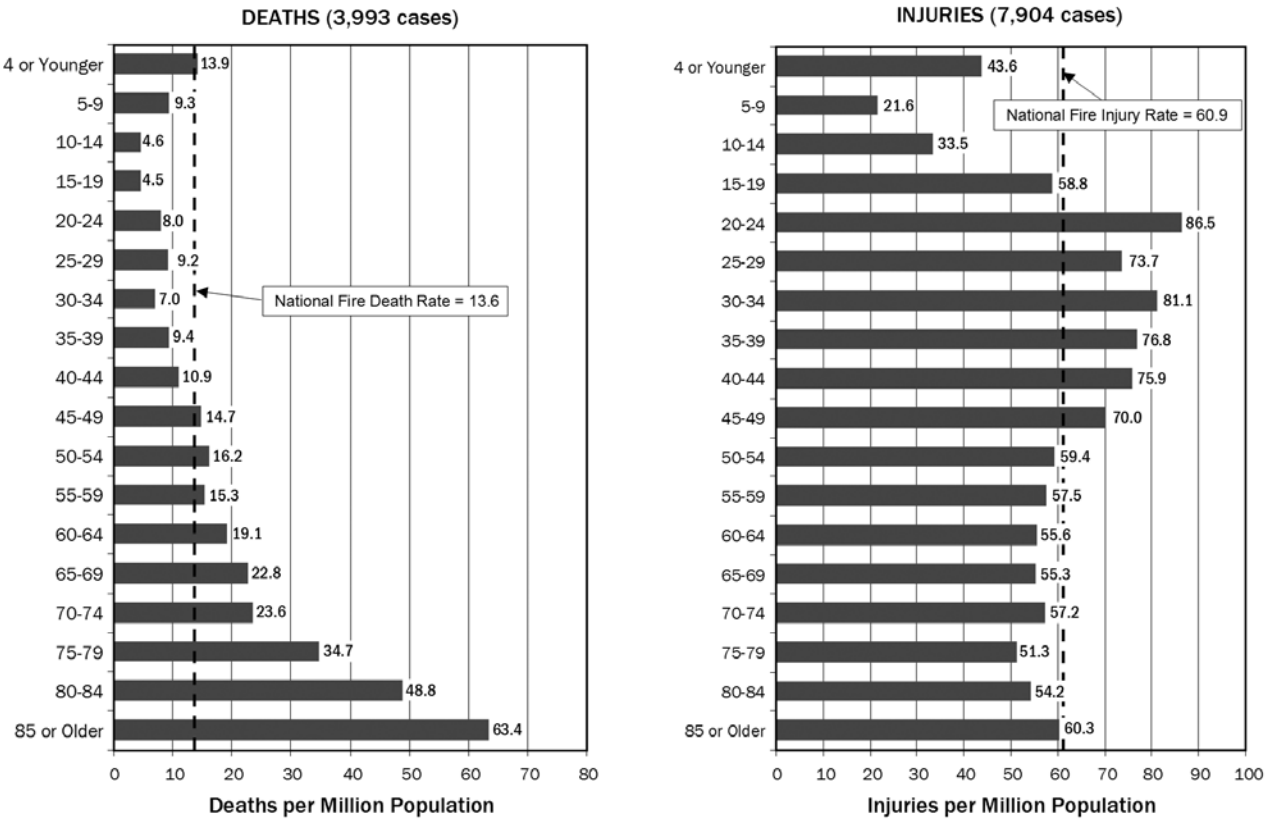
The reasons for the disparity of fire injuries between men and women are not known for certain. Suppositions include the greater likelihood of men being intoxicated and the more dangerous occupations of men (most industrial fire fatalities are males). We also know that men have more injuries trying to extinguish the fire and rescue people than do women.

Age

People over 60 have a much higher fire death rate than the average population (13.6 deaths per million population), as shown in Figure 9. The relative risk of dying and being injured in a fire for various age groups is shown in Figure 10. In 2004, the risk of fire death rose substantially above the national average at age 60 and continued increasing for the older population groups. These profiles have remained relatively constant from year to year.

Contrary to what might be expected, the age profile for injuries is very different from that for deaths (Figure 8, Figure 9, and Figure 10). Adults aged 20 to 49 experienced the highest fire injury rates yet have some of the lowest fire death rates. Fire injury rates are below average for children aged 19 or younger and for people aged 50 and over. Correspondingly, the relative risk of fire injury was lowest for the younger and older age groups and highest for the mid-aged groups.

Figure 9. Casualty Rates by Age (2004)



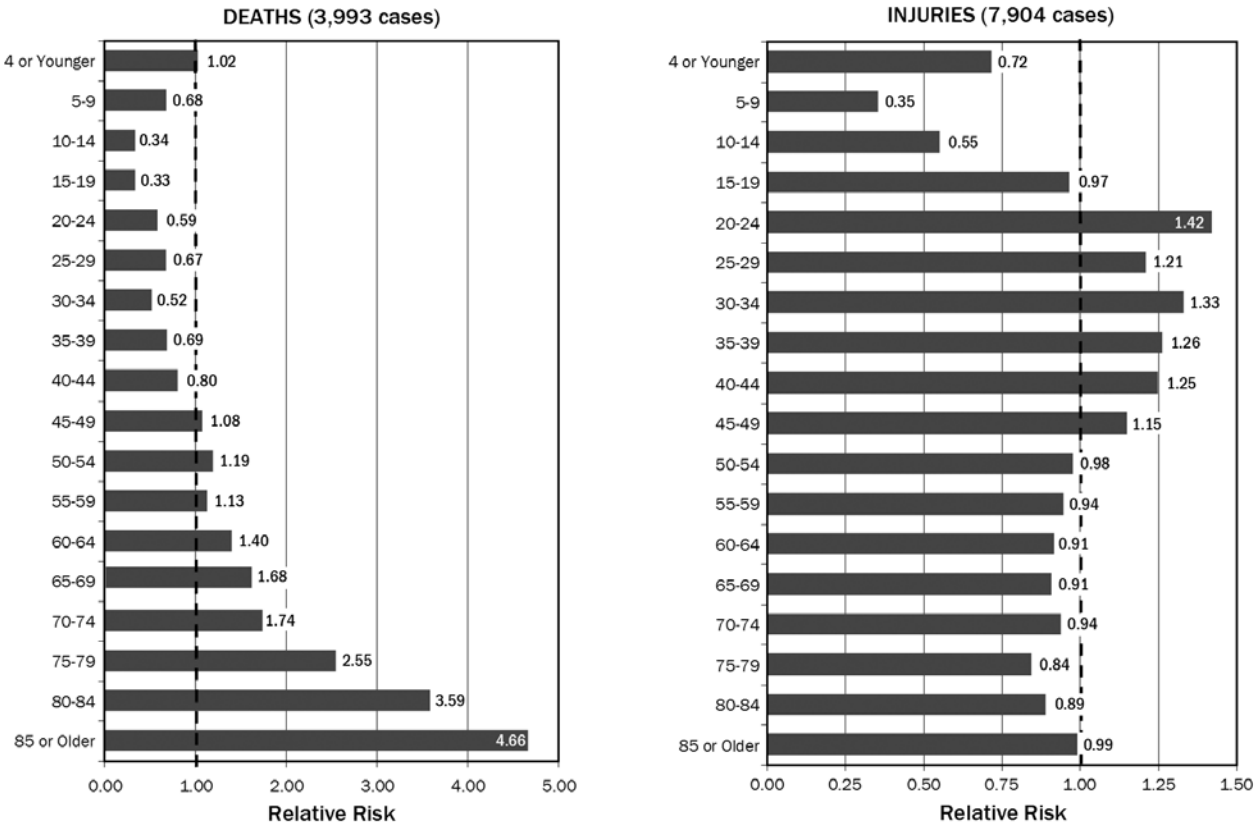
Note: Data have been adjusted to account for unknown or unspecified ages.

Sources: National Center for Health Statistics and U.S. Census Bureau

Note: Data have been adjusted to account for unknown or unspecified ages.

Sources: NFIRS, NFPA, and U.S. Census Bureau

Figure 10. Relative Risk of Fire Casualties by Age



Notes: (1) Relative risk compares the per capita rate (Figure 9) for a particular group (here, an age group) to the overall per capita rate (i.e., the general population). For the general population, the relative risk is set at 1 as indicated by the dashed lines in the above figure.

(2) Data have been adjusted to account for unknown or unspecified ages.

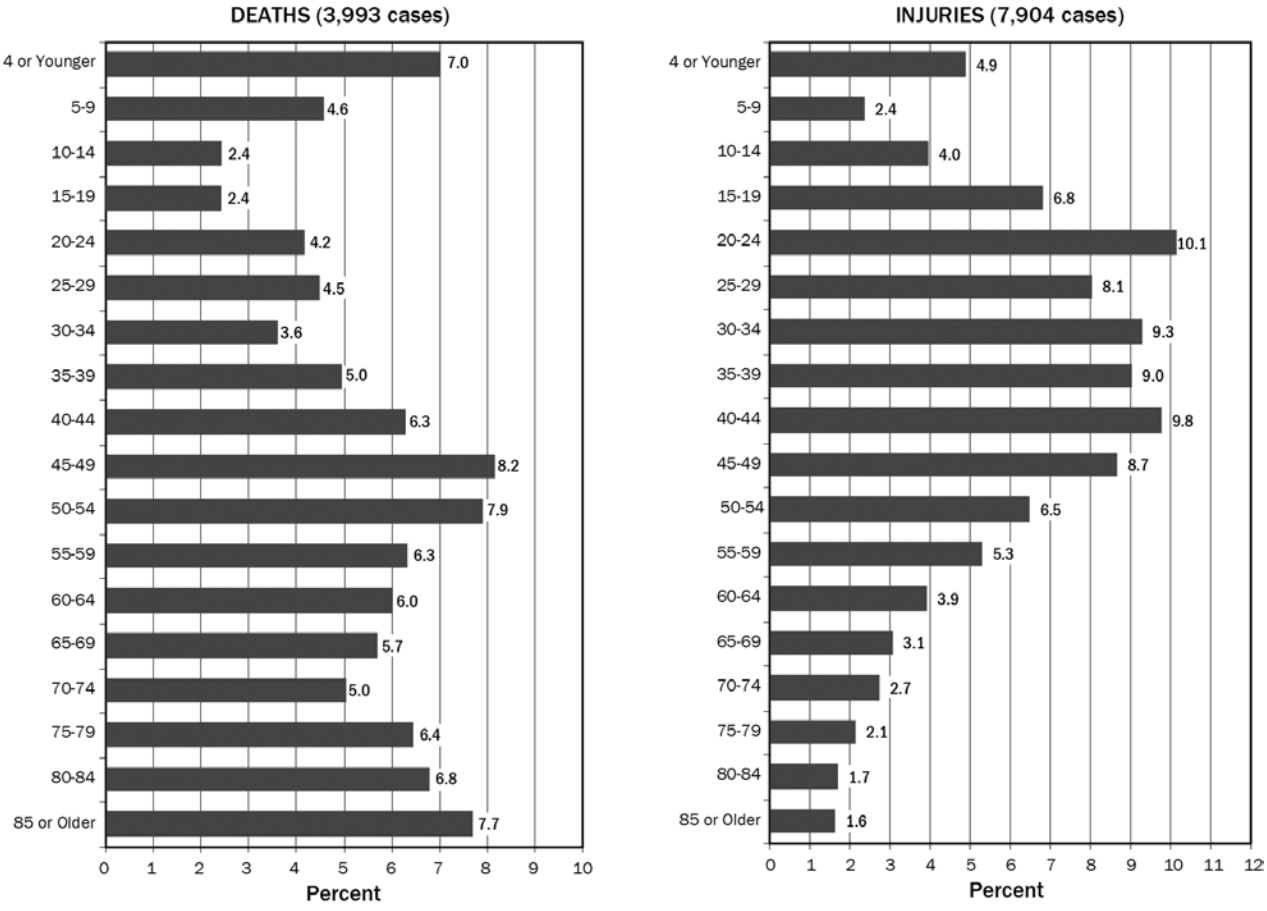
Sources: National Center for Health Statistics and U.S. Census Bureau

Sources: NFIRS, NFPA, and U.S. Census Bureau

Figure 11 shows the percent of 2004 fire deaths and injuries falling into each age group. (This is not the same as risk.) Fire deaths peak at ages 45 to 54 and account for a combined 16 percent of the deaths. Those under 4 years of age account for 7 percent of fire deaths, and those 65 and over comprise 32 percent of the fire deaths. These two high risk groups (the very young and older adults) represent over one-third of all fire deaths. On the other hand, nearly two-thirds of fire deaths fall in age groups that are not at high risk. The bulk of fire deaths occur to the not-so-young and not-so-old. Programs aimed only at the highest risk groups will not reach the majority of potential victims.

Unlike the age distribution of deaths, the injury age distribution tracks closely to the relative risk profile by age. The exception to this, however, is the elderly (Figure 11). Ages 20 to 49 account for over half of the 2004 fire injuries. The young, under age 10, account for 7 percent; older adults over age 70 account for 8 percent. Although the elderly have an average level of fire injury risk, there are fewer of them in the total population. If their risk continues to be the same, we could expect more and more elderly fire injuries and deaths as the elderly proportion of the population increases. In the meantime, the focus for injury prevention should be on adults 20 to 49. It is believed that males in this age group are greater risk takers during fires, resulting in a higher proportion of injuries.

Figure 11. Fire Casualties by Age



Note: Data have been adjusted to account for unknown or unspecified ages.

Source: National Center for Health Statistics

Note: Data have been adjusted to account for unknown or unspecified ages.

Source: NFIRS

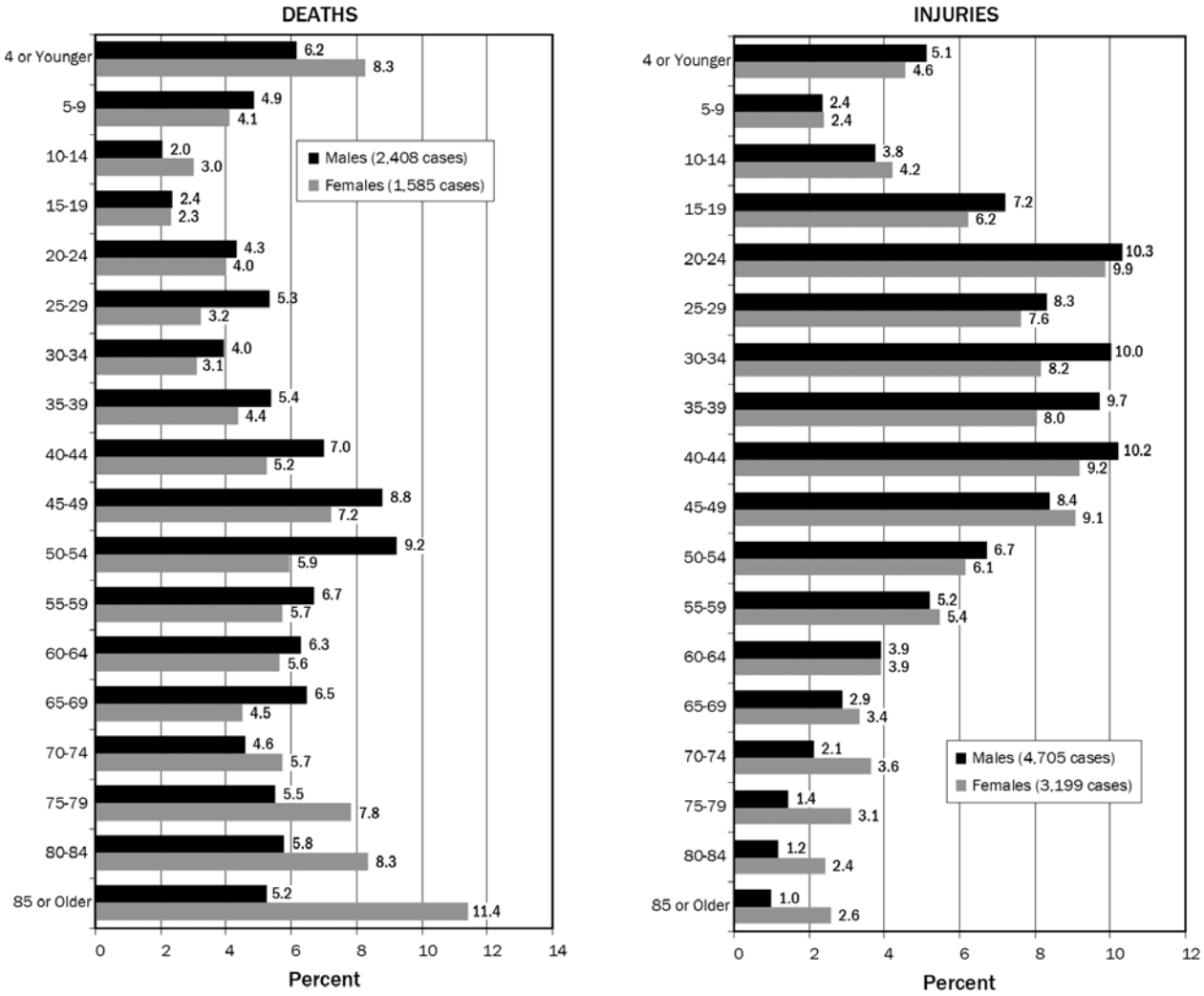
The distribution of fire deaths and injuries by age is somewhat different for males versus females (Figure 12). Males tend to have a slightly higher proportion of deaths until age 70 and injuries until age 55. As age increases, the male/female proportions are reversed. The proportion of male fire deaths is higher for people ages 20 to 69. By contrast, elderly females have twice the proportion of both deaths and injuries than elderly males.

Race

The fire problem cuts across all groups and races, rich and poor, North and South, urban and rural. But it is higher for some groups than for others.

Data on race of victims are somewhat ambiguous in a society where many people are of mixed heritage. In addition, many citizens, including firefighters, find it distasteful to report on race. On the other hand, there seems to be a higher fire problem for some groups, and it can be helpful to identify their problems for use within their own communities and by fire educators.

Figure 12. Fire Casualties by Age and Gender (2004)



Note: Data have been adjusted to account for unknown or unspecified ages.

Source: National Center for Health Statistics

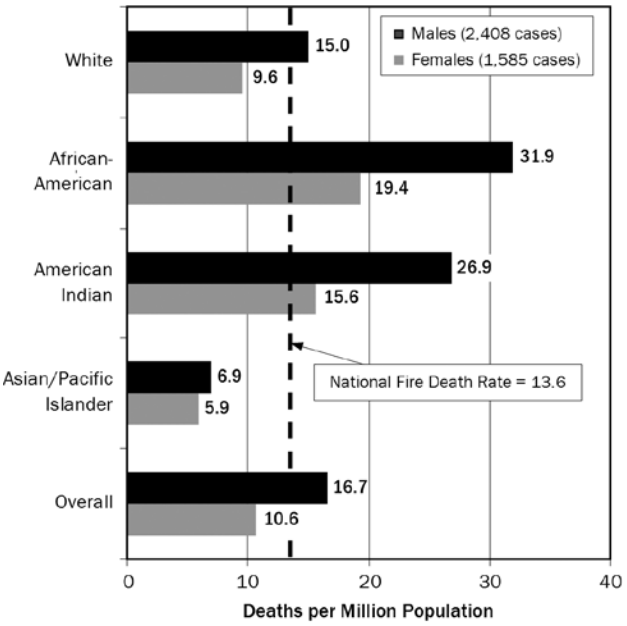
Note: Data have been adjusted to account for unknown or unspecified ages.

Source: NFIRS

African-Americans and American Indians have higher fire death rates per capita than the national average (Figure 13). African-American fire death victims comprise a large and disproportionate share of total fire deaths. Although African-Americans comprise 13 percent of the population, they accounted for 24 percent of fire deaths. On the other hand, Asians have a very low death rate—male fatalities are 41 percent and women fatalities are 55 percent of the overall average for their respective genders.

As noted earlier, male fire death rates exceed that of females by 1.5 to 2 times, and the elderly of all ethnic groups have the highest fire death rates. The result of these statistics is that elderly African-Americans and Native Americans (85 and older) have the highest fire death rates in the Nation at more than 14 and 12 times the national average, respectively. In 2004, elderly African-American males had a fire death rate 18 times the U.S. average, while elderly Native American males had by far the highest relative fire death risk at 25 times the U.S. average.

Figure 13. Death Rate by Race and Gender (2004)



NUMBER OF FIRE DEATHS

Race	Males	Females	Total
White	1,757	1,144	2,901
African-American	570	380	950
American Indian	38	22	60
Asian/Pacific Islander	43	39	82
Overall	**2,408**	**1,585**	**3,993**

Notes: (1) The overall male and female estimates include individuals with "2+ races" per the Census. The "2+ races" category accounts for approximately 1.5 percent of the population. NCHS does not include this race category.

(2) This figure uses NCHS data in the computation of the national fire death rate for data consistency within this chart. With NFPA fire death estimates, this rate is 13.3.

Sources: National Center for Health Statistics and U.S. Census Bureau

KINDS OF PROPERTIES WHERE FIRES OCCUR

This section describes the proportions of the fire problem by property type: residential structures, non-residential structures, vehicles, outside properties, and other or unknown properties.[18]

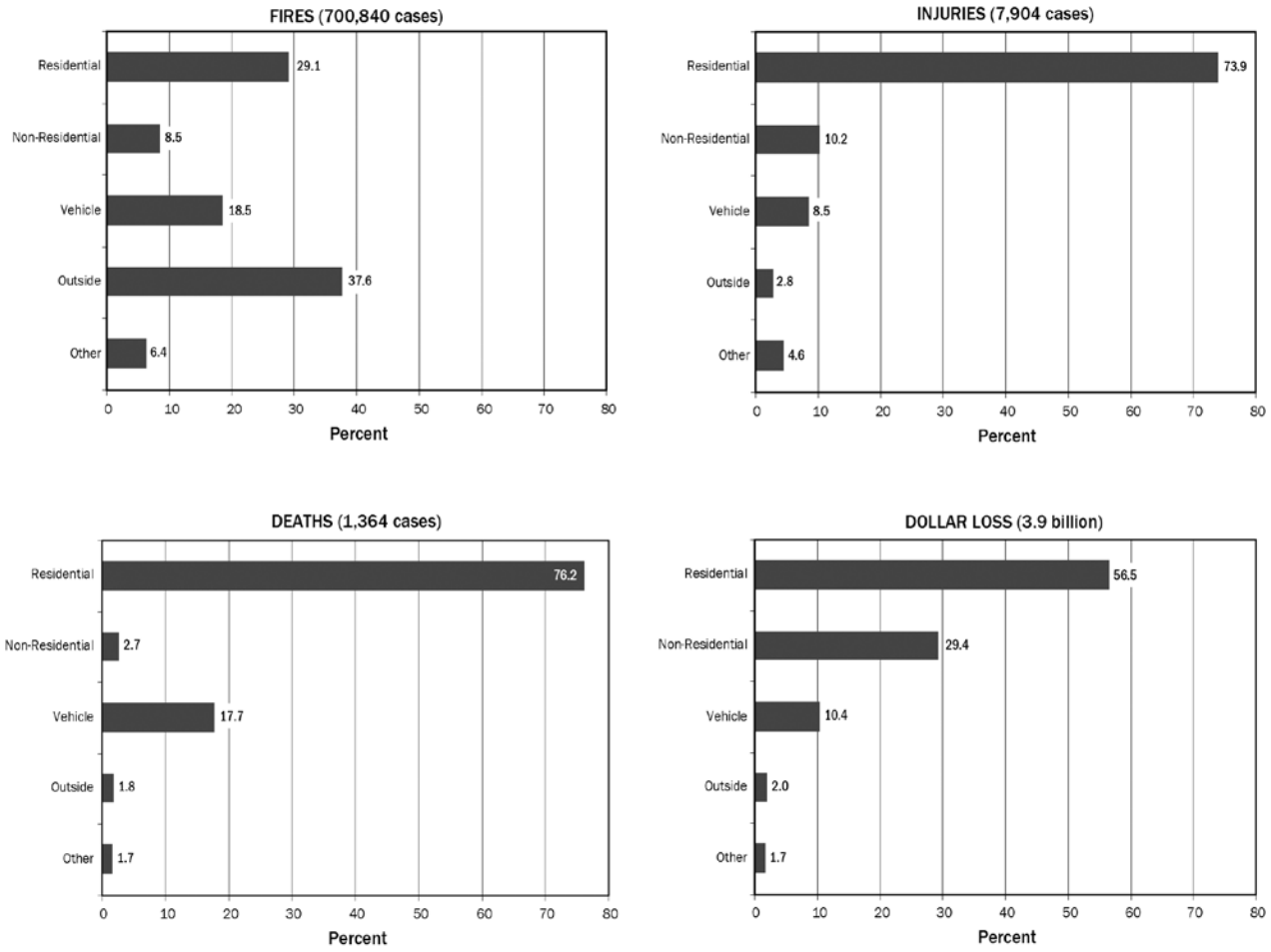
Property Types

Over the years, there has been little change in the proportion of fires, deaths, injuries, and dollar loss by the type of property involved. In terms of numbers of fires, the largest category continues to be outside fires (38 percent)—in fields, vacant lots, trash, etc. (Figure 14). Many of these fires are intentionally set but do not cause much damage. Residential and non-residential structure fires together now comprise as many fires as outside fires (also 38 percent), with residential structure fires outnumbering non-residential structure fires by over three to one. What may surprise some is the large number of vehicle fires. In fact, nearly one out of every five fires to which fire departments respond involves a vehicle.

By far, the largest percentage of deaths, 76 percent in 2004, occurs in residences, with the majority of these in one- and two-family dwellings. Vehicles accounted for the second largest percentage of fire deaths at 18 percent. Great attention is given to large, multiple-death fires in public places such as hotels, nightclubs, and office buildings. But the major attention-getting fires that kill 10 or more people are few in number and have constituted only a small portion of overall fire deaths. Firefighters generally are doing a good job in protecting public properties in this country. Furthermore, these properties generally are required by local codes to have built-in fire suppression systems. The area with the largest problem is where it is least suspected—in people's homes. Prevention efforts continue to be focused on home safety.

[18]The percentage of fire deaths in the major property types differs somewhat between NFIRS and the NFPA annual survey. These differences are discussed in Appendix A.

Figure 14. Fire and Fire Losses by General Property Type (2004)



Source: NFIRS

Only 3 percent of the 2004 fire deaths occurred in commercial and public properties. Outside and other miscellaneous fires, including wildfires, were also a small factor (4 percent combined) in fire deaths.

As Figure 14 shows, the picture is generally similar for fire injuries, with 74 percent of all injuries occurring in residences. Fire injuries are distributed to the other property types as follows: non-residential structures, 10 percent; vehicles, 9 percent; and outside and other fires, 7 percent.

The picture changes somewhat for dollar loss. While residential structures are the leading property for dollar loss, non-residential structures play a considerable role. These two property types account for 86 percent of all dollar loss. The proportion of dollar loss from outside fires may be understated because the destruction of trees, grass, etc., is often given zero value in fire reports if it is not commercial cropland or timber.

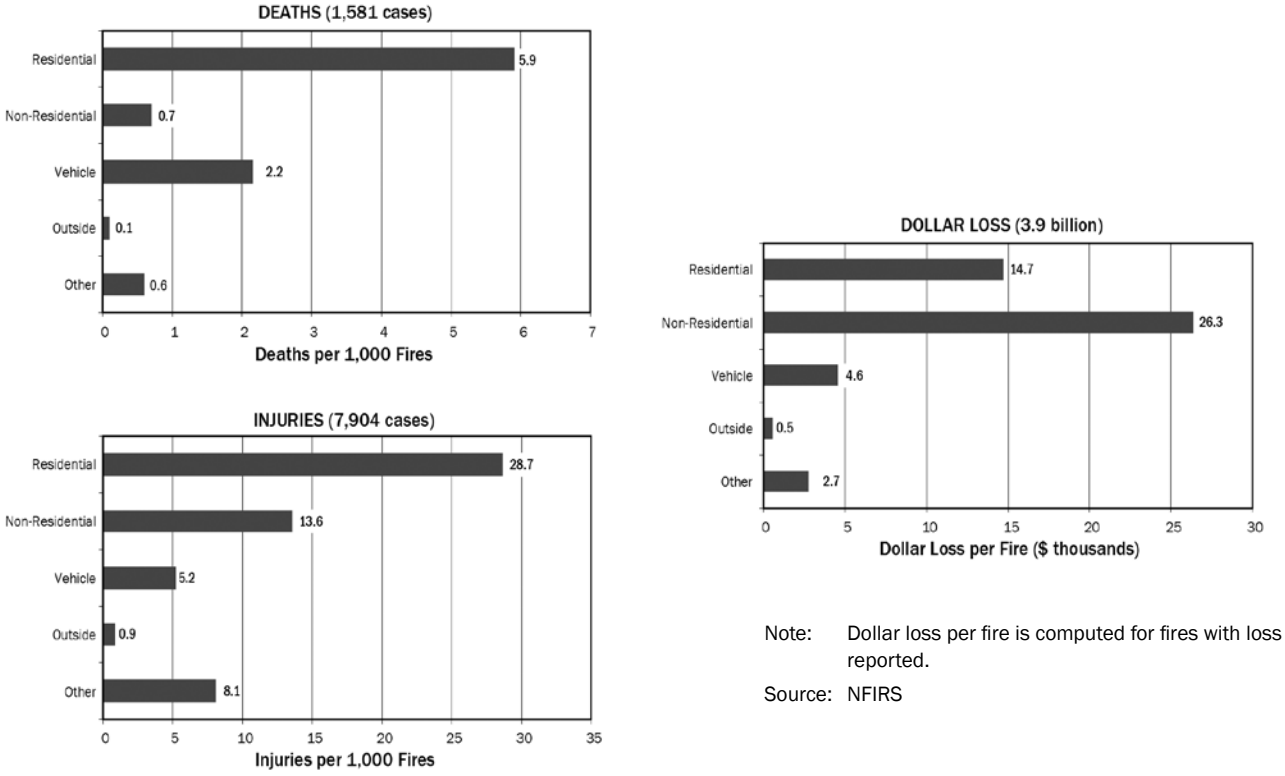
As a final observation on property types, structures (residential and non-residential) account for 38 percent of fires, but they account for more than 79 percent of fire deaths, injuries, and property loss. More fire prevention efforts should be focused on this part of the overall fire problem.

Losses

Figure 15 shows casualties and losses per fire. These indicators represent the severity of fires but are somewhat ambiguous because they can increase if there are more casualties or damage per fire (the numerators) or if fewer minor fires are reported (the denominators).

Residential fires have the highest number of deaths and injuries per fire—another important reason for prevention programs to focus on home fire safety. Non-residential structure fires have by far the highest dollar loss per fire.

Figure 15. Fire Casualties and Dollar Loss per Fire by General Property Type (2004)



Note: Dollar loss per fire is computed for fires with loss reported.

Source: NFIRS

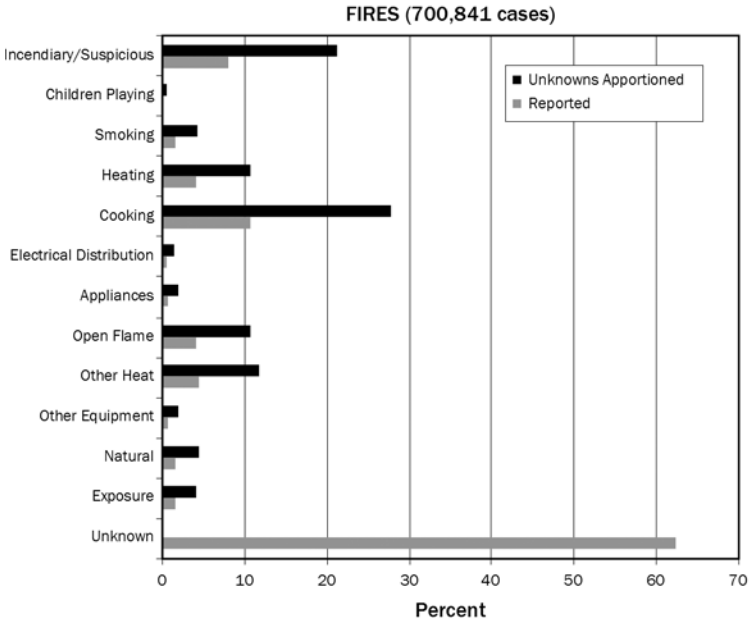
CAUSES OF FIRES AND FIRE LOSSES

Figure 16 shows the profile of the major causes of fires, fire deaths and injuries, and direct dollar loss in 2004 for all property types grouped together. At 28 percent, cooking is the leading cause of fires. Incendiary or suspicious fires (arson) cause another 21 percent. These percentages (and those that follow) are adjusted, which proportionally spreads the unknowns over the other 12 causes.

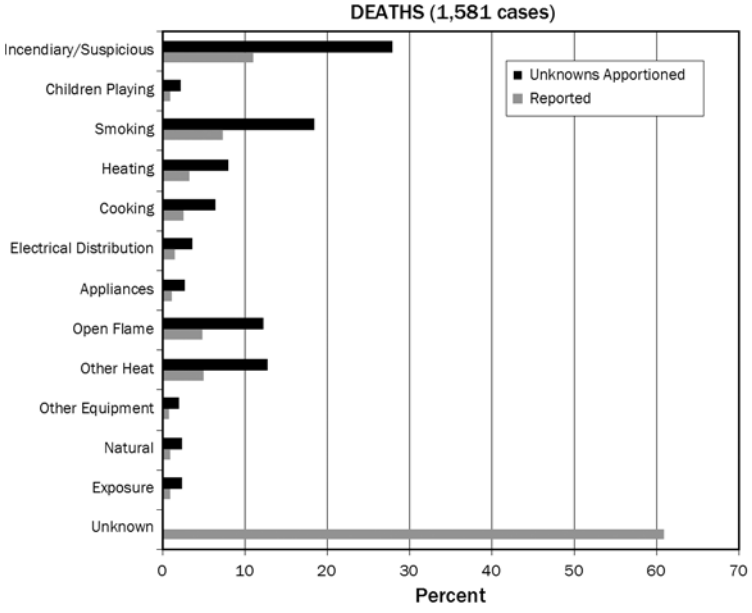
The two leading causes of civilian deaths are arson at 28 percent and smoking at 18 percent. The leading cause of injuries is cooking (24 percent), followed by open flame (18 percent) and arson (17 percent).[19] Arson is by far the leading cause of property loss at 26 percent.

[19] In principle, it is the cause of the ***fire*** which results in deaths and injuries that should be analyzed, not numbers of deaths and injuries associated with fire causes. However, as most casualty-producing fires result in single casualties (an injury or a death), the differences in the cause distributions from the two analyses are marginal. As such, the cause distributions for fires is a reasonable proxy for this analysis.

Figure 16. Causes of Fire and Fire Losses (2004)



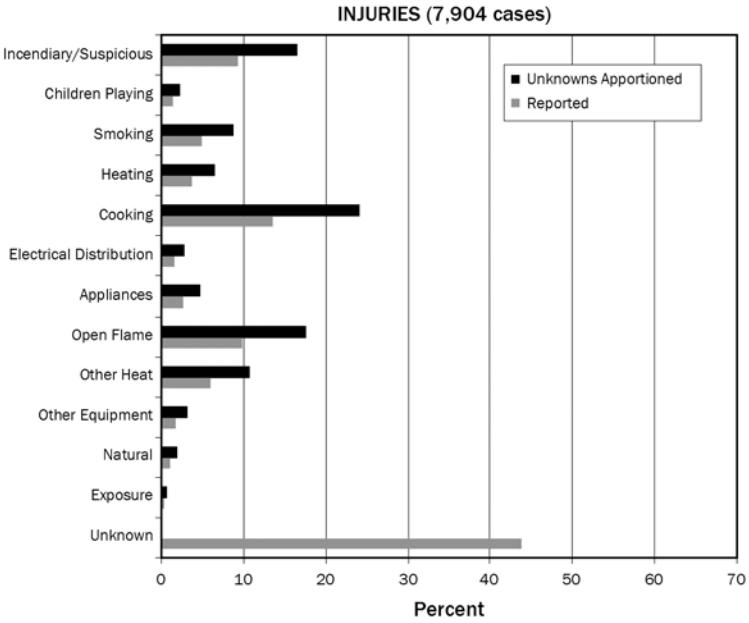
Cause	Reported	Unknowns Apportioned
Incendiary/Suspicious	8.0	21.0
Children Playing	0.2	0.6
Smoking	1.6	4.3
Heating	4.0	10.6
Cooking	10.5	27.6
Electrical Distribution	0.6	1.5
Appliances	0.8	2.0
Open Flame	4.0	10.6
Other Heat	4.4	11.6
Other Equipment	0.7	1.9
Natural	1.7	4.4
Exposure	1.6	4.1
Unknown	61.8	0.0



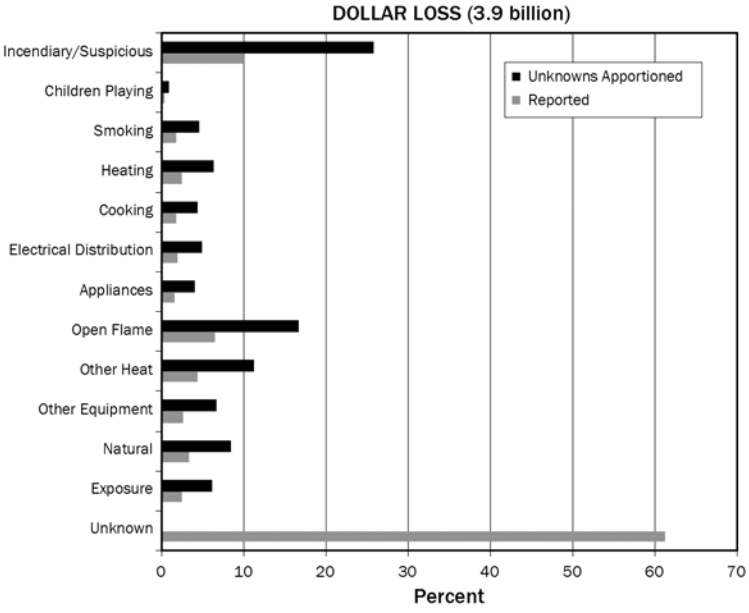
Cause	Reported	Unknowns Apportioned
Incendiary/Suspicious	10.9	27.9
Children Playing	0.8	2.1
Smoking	7.2	18.4
Heating	3.1	7.9
Cooking	2.5	6.3
Electrical Distribution	1.4	3.5
Appliances	1.0	2.6
Open Flame	4.7	12.1
Other Heat	5.0	12.7
Other Equipment	0.8	1.9
Natural	0.9	2.3
Exposure	0.9	2.3
Unknown	60.8	0.0

The causes of fire deaths and injuries are similar for both males and females (Figure 17). For deaths, the most notable differences are (1) in other heat and other equipment fires, where the proportion of male deaths is 15 to 20 percent greater than the proportion of female deaths and natural fires, where the proportion of male deaths is 45 percent greater than the proportion of female deaths; and (2) in cooking, electrical, and appliance fires, where the proportion of female deaths is 33 to 47 percent higher than the proportion of male deaths. A much higher proportion of men are injured in natural,

Figure 16. Causes of Fire and Fire Losses (2004) (*continued*)



Cause	Reported	Unknowns Apportioned
Incendiary/Suspicious	9.3	16.5
Children Playing	1.3	2.4
Smoking	4.9	8.8
Heating	3.6	6.4
Cooking	13.6	24.1
Electrical Distribution	1.6	2.8
Appliances	2.7	4.8
Open Flame	9.9	17.6
Other Heat	6.0	10.7
Other Equipment	1.8	3.2
Natural	1.1	1.9
Exposure	0.4	0.7
Unknown	43.8	0.0



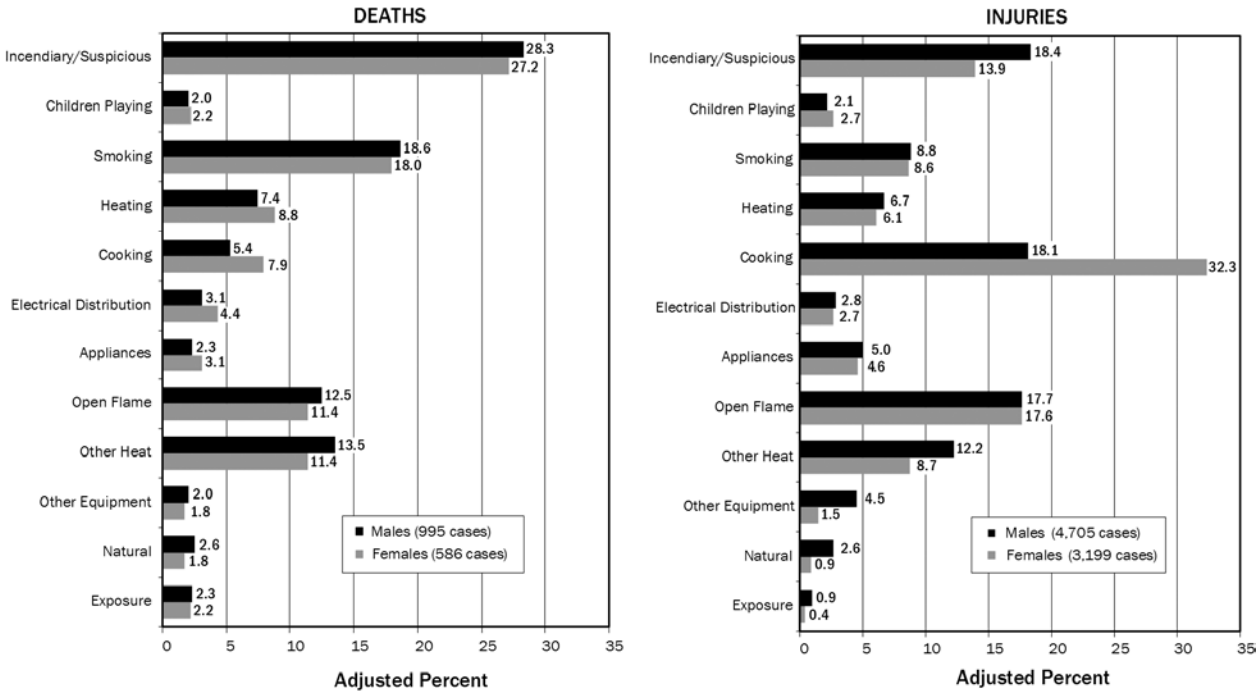
Cause	Reported	Unknowns Apportioned
Incendiary/Suspicious	10.0	25.9
Children Playing	0.3	0.8
Smoking	1.8	4.6
Heating	2.5	6.3
Cooking	1.7	4.3
Electrical Distribution	1.9	4.9
Appliances	1.5	4.0
Open Flame	6.5	16.7
Other Heat	4.4	11.3
Other Equipment	2.6	6.6
Natural	3.3	8.4
Exposure	2.4	6.2
Unknown	61.2	0.0

Source: NFIRS

other equipment, and exposure fires, and a substantially higher proportion of women are injured in cooking fires.

For both men and women, the two leading causes—arson and smoking—account for approximately 45 percent of fire deaths. The two leading causes of injuries to women—cooking and open flame—account for 50 percent of injuries, whereas the two leading causes of male injuries—cooking and arson—account for only 37 percent of injuries.

Figure 17. Causes of Fire Casualties by Gender



Notes: (1) Data have been adjusted to account for unknown or unspecified causes.

(2) The unknowns here are quite large. The adjusted percentages may not accurately reflect the true distributions.

Source: NFIRS

Chapter 3
Structures and Other Properties

This chapter provides an overview of the fire problem in structures, vehicle and other mobile properties, and outside and other properties over the 10-year period from 1995 to 2004, with specific focus on 2004. Stand-alone reports for residential and non-residential structures will be published with more detail. Substantial changes from the last published statistics on structures and other properties—the 13th Edition, 1992 to 2001—are noted.

STRUCTURES

This analysis of structure fires is discussed in two major sections: residential (including one- and two-family dwellings, apartments, and other residential structures) and non-residential (including industrial and commercial properties, institutions, educational establishments, mobile properties, and storage properties).

Residential

The residential structure category is discussed in four subsections: an overview of all residential structures, one- and two-family dwellings, apartments, and other residential structures and property uses reported as residences.

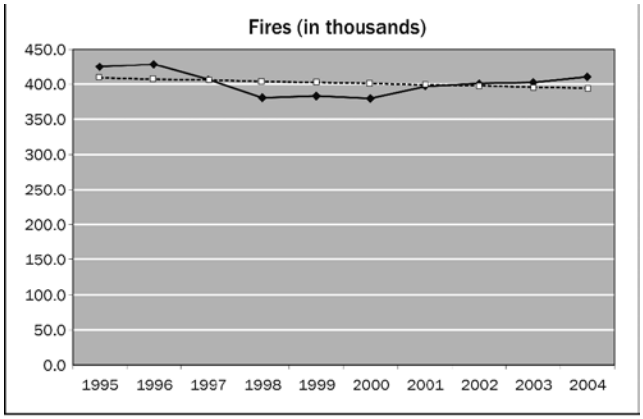
Overview of All Residential Structures

The residential structure portion of the fire problem continues to account for the vast majority of civilian casualties. The National Fire Protection Association (NFPA) estimates reflect that 83 percent of fire deaths and 79 percent of fire injuries occur in residential structures.[1]

The term "residential", as used in the National Fire Incident Reporting System (NFIRS), includes what are commonly referred to as "homes", whether they are one- or two-family dwellings or multifamily apartment buildings. It also includes manufactured housing, hotels and motels, residential hotels, dormitories, assisted living facilities, and halfway houses—residences for formerly institutionalized individuals (mental patients, drug addicts, or convicts) that are designed to facilitate their readjustment to private life. The term "residential" does not include institutions such as prisons, nursing homes, juvenile care facilities, or hospitals, though many people may reside in them for short or long periods of time.

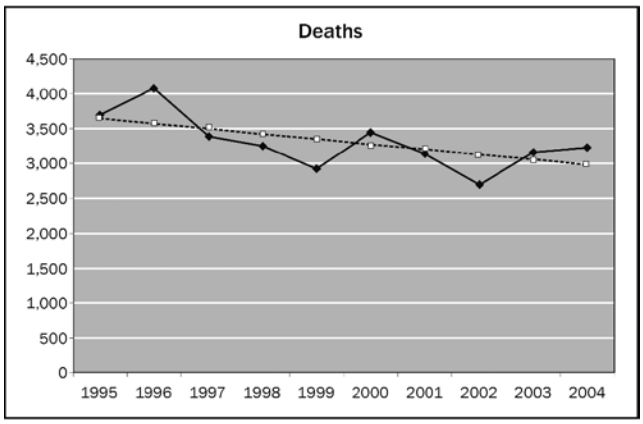
[1] Karter, Michael J., *Fire Loss in the United States During* 2004, National Fire Protection Association, September 2005. These percentages are derived from summary data presented in this report.

Figure 18. Trends in Residential Structure Fires and Fire Losses (1995–2004)



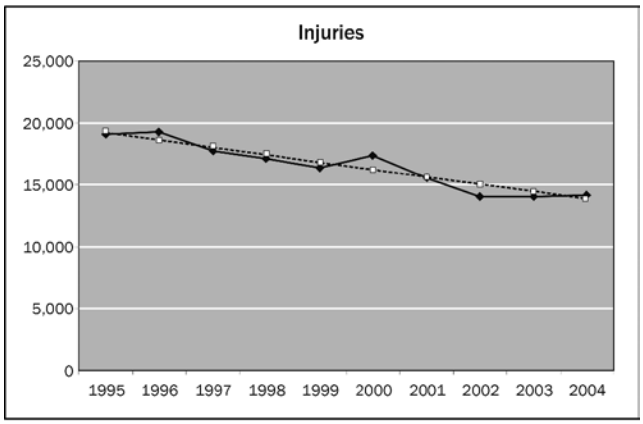
FIRES (THOUSANDS)

Year	Value
1995	425.5
1996	428.0
1997	406.5
1998	381.5
1999	383.0
2000	379.5
2001	396.5
2002	401.0
2003	402.0
2004	410.5
10-Year Trend (%)	–4.0%



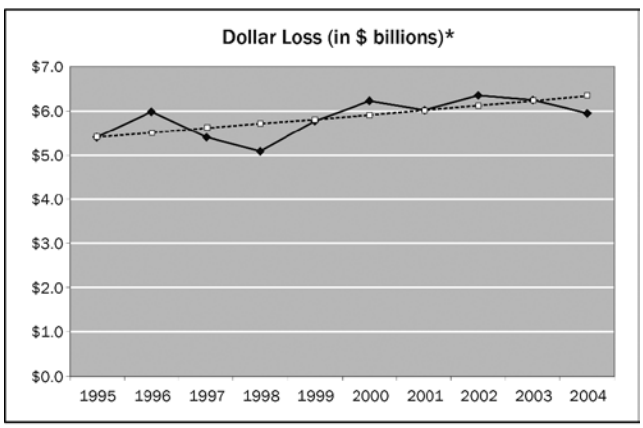
DEATHS

Year	Value
1995	3,695
1996	4,080
1997	3,390
1998	3,250
1999	2,920
2000	3,445
2001	3,140
2002	2,695
2003	3,165
2004	3,225
10-Year Trend (%)	–20.6%



INJURIES

Year	Value
1995	19,125
1996	19,300
1997	17,775
1998	17,175
1999	16,425
2000	17,400
2001	15,575
2002	14,050
2003	14,075
2004	14,175
10-Year Trend (%)	–29.2%



DOLLAR LOSS ($B)*
*ADJUSTED TO 2004 DOLLARS

Year	Value
1995	$5.4
1996	$6.0
1997	$5.4
1998	$5.1
1999	$5.8
2000	$6.2
2001	$6.0
2002	$6.4
2003	$6.2
2004	$5.9
10-Year Trend (%)	14.8%

Sources: NFPA and Consumer Price Index

Figure 18, based on the NFPA annual surveys of fire departments, shows the 10-year trend in residential fires, deaths, injuries, and dollar loss. The trend in number of residential structure fires, deaths, and injuries declined 4, 21, and 29 percent, respectively. These decreases continue the downward trends estimated in past editions of this report. The decreases would be even greater if they were weighted against the number of residences that existed in 1995 versus the much higher number in 2004. Dollar losses (adjusted for inflation), however, increased 15 percent over the 1995 to 2004 period.

Because fires resulted in an average of 3,300 civilian deaths, 16,500 injuries, and $5.8 billion in dollar loss over the 10-year period, the fire problem in U.S. residences is of significant concern.

One- and Two-Family Dwellings

One- and two-family dwellings are where nearly three-quarters of the people in the United States reside.[2] The residential structure fire profile is, therefore, dominated by this category. Manufactured housing (mobile homes used as fixed residences) is included here in the profile for one- and two-family homes.

Trends

As with the residential trends, one- and two-family fires, deaths, and injuries declined during the 10-year period (6, 18, and 26 percent respectively), and dollar loss increased (16 percent), as shown in Figure 19. The increased use of smoke alarms has been a major factor in the reduction in the number of reported fires. Fires that are detected early often are extinguished before they are reported to the fire department, so the number of reported fires decreases. When smoke alarms are not present, the fire burns longer before detection and does more damage.

Apartments

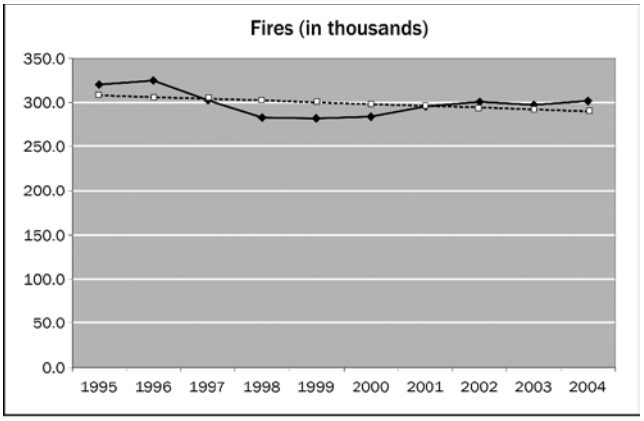
Multifamily dwellings, referred to as "apartments" in this report, tend to be regulated by stricter building codes than one- and two-family structures. Most apartments are rental properties, often falling under more stringent fire prevention statutes. Many apartment communities also have a different socioeconomic mix of residents compared to single-family-dwelling communities. They may have more low-income families in housing projects or more high-income families in luxury highrises, or they may be centers of living for the elderly. In large cities, all of these groups are represented in apartments.

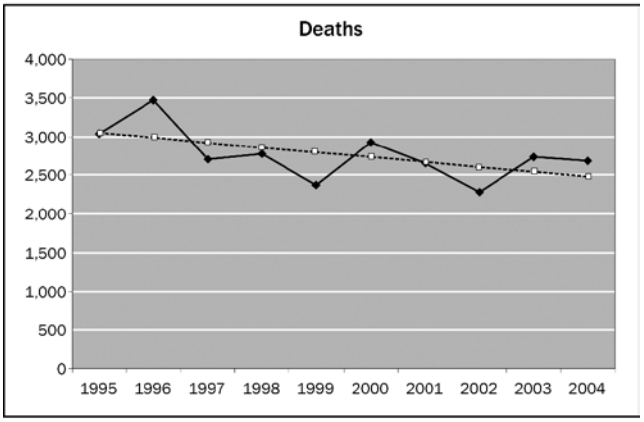
Trends

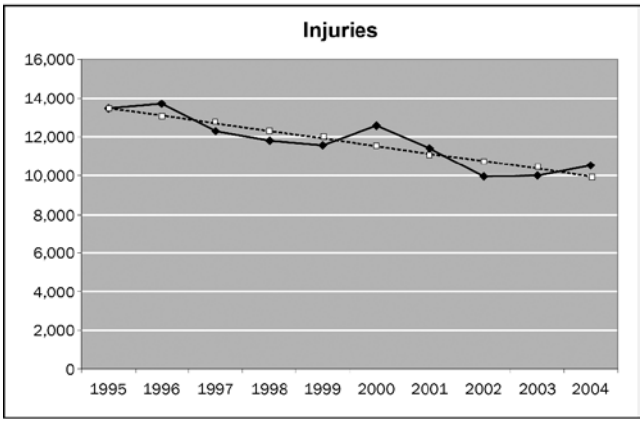
Figure 20 shows the 10-year trends in apartment fires and losses. The number of apartment fires declined modestly (2 percent); fire deaths and injuries declined considerably. Fire deaths in apartments dropped by 30 percent; injuries were down 39 percent. These downward trends in casualties were much larger than those in one- and two-family dwellings, even though the decline in fires in one- and two-family dwellings was larger. Apartment fire injuries reached their lowest level in 2004 with 3,200 injuries. Dollar losses in both types of structures continued the upward trends shown in the previous 10-year

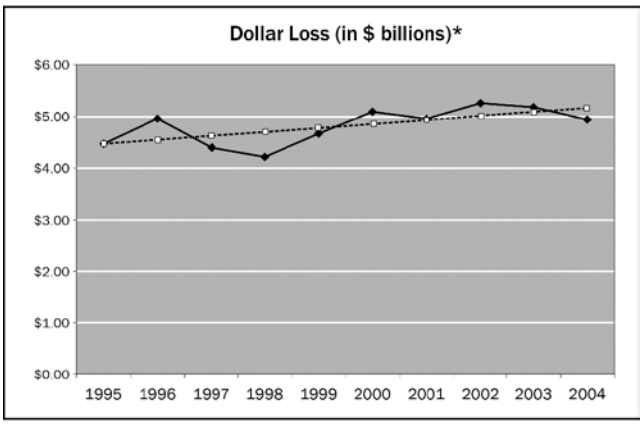
[2]The U.S. Census Bureau shows that, in 2004, 75.1 percent (82.5 million) of households lived in one-unit attached and detached structures or mobile homes (*http://factfinder.census.gov/servlet/STTable?_bm=y&-geo_id=01000US&-qr_name=ACS_2004_EST_G00_S2504&-ds_name=ACS_2004_EST_G00_&-redoLog=false&-format=* for occupied housing). Household size was estimated at 2.6 people per household (*http://factfinder.census.gov/servlet/ACSSAFFFacts?_submenuId=factsheet_1&_sse=on*). Thus, 82.5 million households x 2.6 people per household = 214.5 million. With the 2004 U.S. population given as 293.6 million, (*http://www.census.gov/popest/states/tables/NST-EST2006-01.xls*), approximately 73.0 percent of the population lived in what NFIRS defines as one- and two-family housing.

Figure 19. Trends in One- and Two-Family Dwelling Fires and Fire Losses (1995-2004)









Sources: NFPA and Consumer Price Index

FIRES (THOUSANDS)

Year	Value
1995	320.0
1996	324.0
1997	302.5
1998	283.0
1999	282.5
2000	283.5
2001	295.5
2002	300.5
2003	297.0
2004	301.5
10-Year Trend (%)	-5.8%

DEATHS

Year	Value
1995	3,035
1996	3,470
1997	2,700
1998	2,776
1999	2,375
2000	2,920
2001	2,650
2002	2,280
2003	2,735
2004	2,680
10-Year Trend (%)	-18.4%

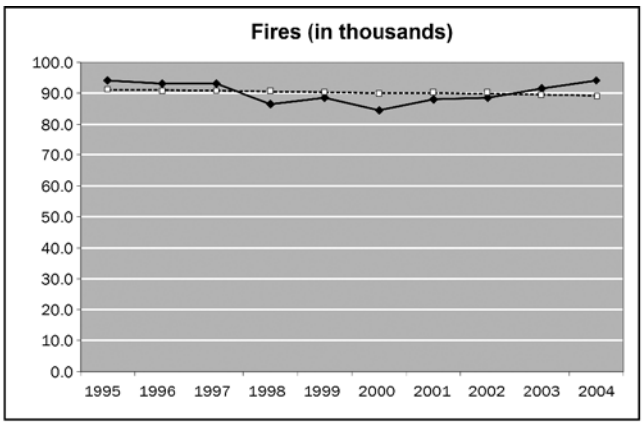
INJURIES

Year	Value
1995	13,450
1996	13,700
1997	12,300
1998	11,800
1999	11,550
2000	12,575
2001	11,400
2002	9,950
2003	10,000
2004	10,500
10-Year Trend (%)	–26.1%

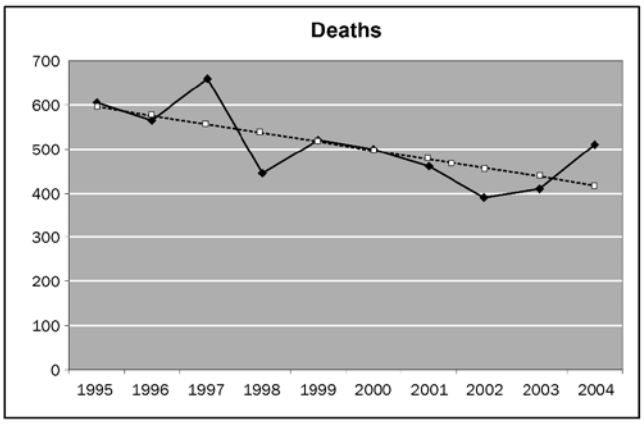
DOLLAR LOSS ($B)*
*ADJUSTED TO 2004 DOLLARS

Year	Value
1995	$4.5
1996	$5.0
1997	$4.4
1998	$4.2
1999	$4.7
2000	$5.1
2001	$5.0
2002	$5.3
2003	$5.2
2004	$4.9
10-Year Trend (%)	15.5%

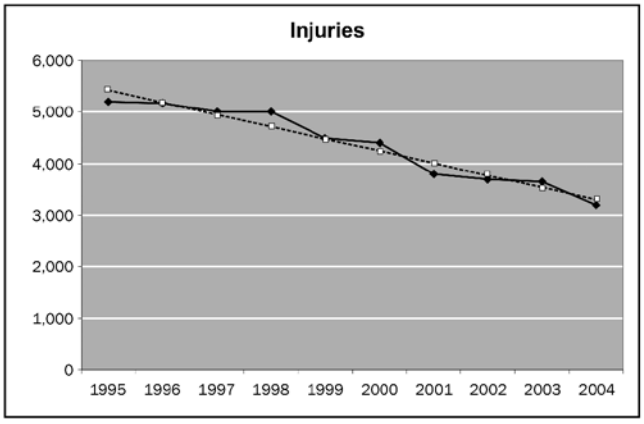
Figure 20. Trends in Apartment Fires and Fire Losses (1995–2004)



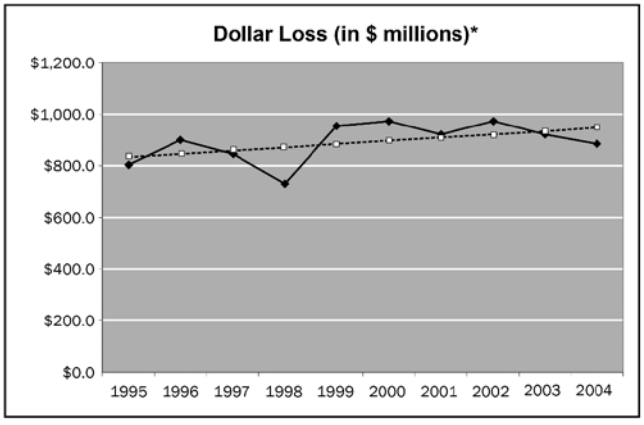
FIRES (THOUSANDS)	
Year	Value
1995	94.0
1996	93.0
1997	93.0
1998	86.5
1999	88.5
2000	84.5
2001	88.0
2002	88.5
2003	91.5
2004	94.0
10-Year Trend (%)	-1.9%



DEATHS	
Year	Value
1995	605
1996	565
1997	660
1998	445
1999	520
2000	500
2001	460
2002	390
2003	410
2004	510
10-Year Trend (%)	-29.9%



INJURIES	
Year	Value
1995	5,200
1996	5,175
1997	5,000
1998	5,000
1999	4,500
2000	4,400
2001	3,800
2002	3,700
2003	3,650
2004	3,200
10-Year Trend (%)	-39.1%



DOLLAR LOSS ($M)* *ADJUSTED TO 2004 DOLLARS	
Year	Value
1995	$804.4
1996	$900.6
1997	$845.0
1998	$731.3
1999	$954.7
2000	$971.9
2001	$921.6
2002	$972.3
2003	$920.9
2004	$885.0
10-Year Trend (%)	13.7%

Sources: NFPA and Consumer Price Index

period (1992 to 2001): adjusted dollar losses were up 14 percent in apartments, similar to the 16 percent increase in one- and two-family structures.

The declines in apartment deaths and injuries may be due to compliance with stricter building codes, the required presence of smoke alarms, and the increase in the number of sprinkler systems. More detailed study of socioeconomic and demographic changes over time might reveal some of the other factors involved in fire incidence.

Other Residential Structures

Other residential structures include rooming houses, dormitories, residential hotels, halfway houses, hotels and motels, and miscellaneous and unclassified structures reported as residences. This category does not include homes for the elderly, prisons, orphanages, or other institutions. These categories are addressed as part of non-residential structures in the next section.[3]

Trends

Figure 21 shows a large 10-year increase (29 percent) in the number of other residential fires, while showing a substantial decrease in the number of fire deaths (49 percent). Injuries decreased slightly, down 4 percent. Fire deaths ranged from 20 to 55 per year; injuries ranged from 375 to 475. Adjusted dollar loss has decreased 3 percent over 10 years, with a low of $112 million in 1996 and a high of $163 million in 2000.

Non-Residential

The non-residential structure category includes industrial and commercial properties, institutions (such as hospitals, nursing homes, and prisons), educational establishments (from preschool through university), mobile properties, and storage properties.

The terrorists' attacks on the World Trade Center and the Pentagon on September 11, 2001, killed 2,451 civilians (i.e., non-firefighters), injured 800, and caused an estimated $33.4 billion in dollar loss.[4] In large part, these losses are excluded from the following analysis of non-residential structures. The magnitude of such losses from a single event must be considered an outlier when studying fire events across an entire year, or even 10 years. The omission of the September 11 losses from this report, however, is in no way meant to diminish the enormity of the event.

Trends

Substantial public and private fire-prevention efforts have focused on protecting non-residential structures. The results have proven effective in the main, especially relative to the residential fire problem. Non-residential structures annually account for only 7 percent of fires, 2 percent of deaths, and 8 percent of injuries. These properties, however, account for a disproportionately large annual dollar loss, 24 percent.[5]

The 10-year trends for fires, deaths, injuries, and dollar loss decreased during the 1995 to 2004 period.

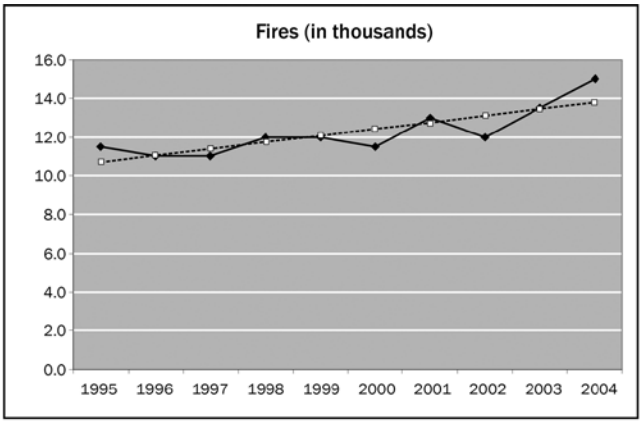
---

[3] Prior to 1994, the "Other Residential Structures" category did not include hotels and motels in the yearly NFPA estimates of fires and fire losses; hotel/motel fires were reported separately. Since 1994, however, hotels and motels have been included as part of the "Other Residential" category. The trends shown here are compatible only with the previous three editions of *Fire in the United States* (11th, 12th, and 13th).

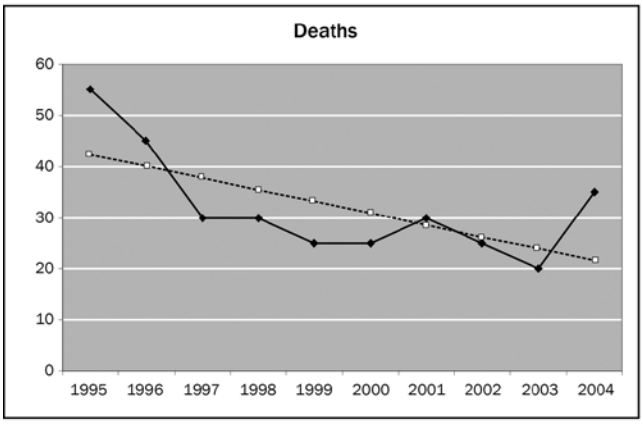
[4] Karter, Michael J., *Fire Loss in the United States During 2001*, National Fire Protection Association, November 2002. In terms of 2004 dollars, the dollar loss associated with the Sept. 11 attacks is $35.6 billion.

[5] Karter, Michael J., *Fire Loss in the United States During 2004*, National Fire Protection Association, September 2005. These percentages are derived from summary data presented in this report.

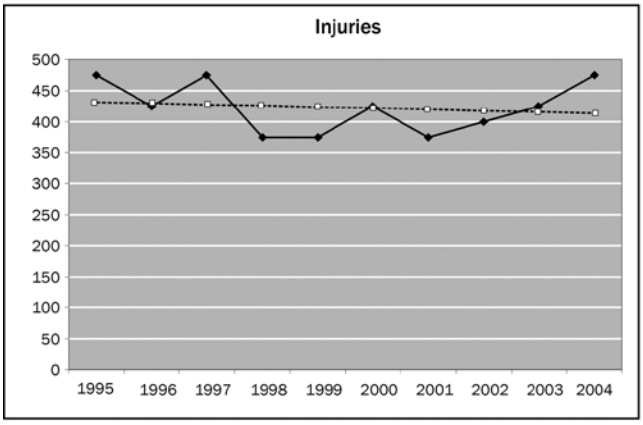
Figure 21. Trends in Other Residential Fires and Fire Losses (1995-2004)



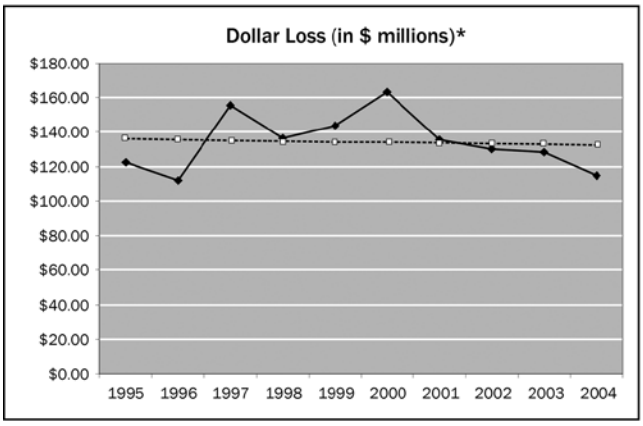
FIRES (THOUSANDS)	
Year	**Value**
1995	11.5
1996	11.0
1997	11.0
1998	12.0
1999	12.0
2000	11.5
2001	13.0
2002	12.0
2003	13.5
2004	15.0
10-Year Trend (%)	**28.8%**



DEATHS	
Year	**Value**
1995	55
1996	45
1997	30
1998	30
1999	25
2000	25
2001	30
2002	25
2003	20
2004	35
10-Year Trend (%)	**-48.9%**



INJURIES	
Year	**Value**
1995	475
1996	425
1997	475
1998	375
1999	375
2000	425
2001	375
2002	400
2003	425
2004	475
10-Year Trend (%)	**-4.1%**



DOLLAR LOSS ($M)* *ADJUSTED TO 2004 DOLLARS	
Year	**Value**
1995	$122.7
1996	$112.0
1997	$155.4
1998	$136.7
1999	$144.0
2000	$163.5
2001	$135.5
2002	$130.2
2003	$128.3
2004	$115.0
10-Year Trend (%)	**-2.6%**

Sources: NFPA and Consumer Price Index

Figure 22 shows the downward trend for each of these measures (fires, 26 percent; deaths, 53 percent; injuries, 51 percent; and dollar loss, 30 percent). In absolute numbers, fires, deaths, injuries, and dollar loss reached 10-year lows in 2004.

There were an estimated 80 deaths in non-residential structure fires in 2004. The 1995 peak (290 deaths) is attributed to the 168 people killed in the bombing of the Federal Building in Oklahoma City in 1995. The 2003 peak (220 deaths) includes 100 deaths in The Station nightclub fire in Rhode Island, and 31 deaths in nursing home fires in Connecticut and Tennessee. Although difficult to discern from the chart, the $4 billion peak in dollar losses in 1995 includes $135 million for the Oklahoma City building, $200 million at a Georgia manufacturing plant fire, and $500 million at a Massachusetts industrial complex fire (values in 1995 dollars).

VEHICLES AND OTHER MOBILE PROPERTIES

Vehicle fires account for a larger portion of the fire problem than many people realize. In 2004, vehicles accounted for 14 percent of fire deaths overall, 8 percent of fire injuries, 13 percent of dollar losses, and 19 percent of all reported fires—nearly one in every five fires.[6]

The vast majority of fires, casualties, and dollar losses from mobile property involve cars and trucks, with cars clearly dominating this group. Fire departments respond to about as many fires involving vehicles as they do to fires involving one- and two-family residences.

Trends

The trends in mobile property fires, deaths, injuries, and dollar losses are shown in Figure 23. The numbers of fires, deaths, and injuries and the dollar loss continue to decrease (28, 13, 37, and 9 percent, respectively), according to the NFPA estimates. The downward trend of mobile property fire deaths would have been even greater but for the 1996 ValueJet crash which killed 110 people.

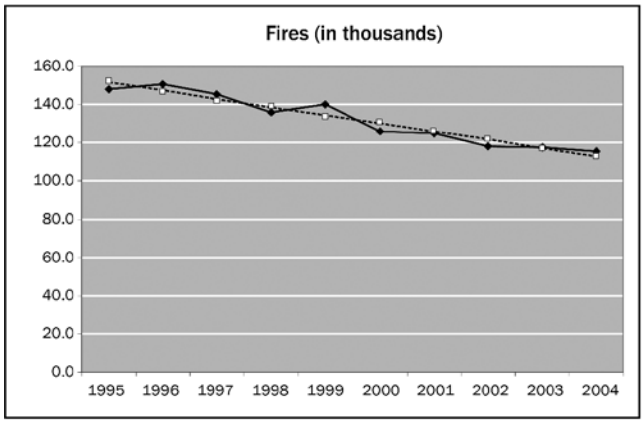
Figure 24 shows that the vast majority of mobile property fires and losses are from highway vehicles. The complexity and ambiguity in counting losses associated with accidents are described below in "Special Data Problems." The 10-year trends in highway vehicle fires, deaths, injuries, and dollar loss show substantial decreases (31, 2, 40, and 17 percent, respectively).

Special Data Problems

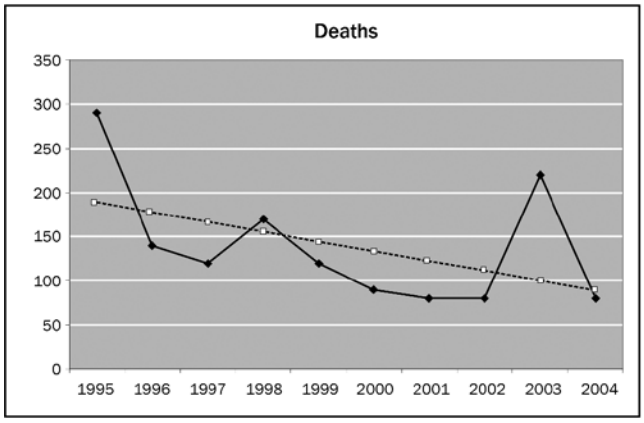
When there are fatalities associated with a mobile property accident such as a collision between two cars, it is often difficult to determine whether the fatalities were the result of the mechanical forces or the fire that ensued. Because of the very large number of vehicle fatalities occurring in this country each year and the frequency of fires associated with these accidents, there can be a substantial error in estimating the total number of fire deaths if this issue is not carefully addressed. A fire fatality should be counted only if a person was trapped and killed by the fire, rather than killed on impact and subsequently exposed to the fire.

[6] Karter, Michael J., *Fire Loss in the United States During* 2004, National Fire Protection Association, September 2005. These percentages are derived from summary data presented in this report.

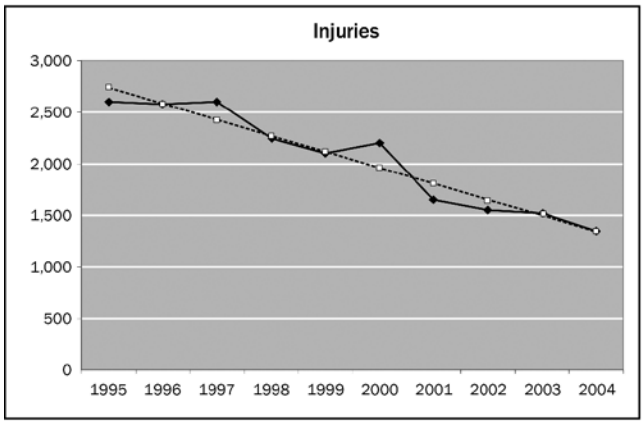
Figure 22. Trends in Non-Residential Structure Fires and Fire Losses (1995-2004)



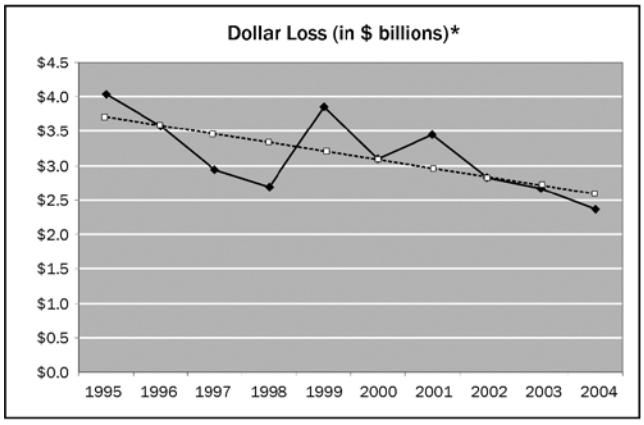
FIRES (THOUSANDS)	
Year	**Value**
1995	148.0
1996	150.5
1997	145.5
1998	136.0
1999	140.0
2000	126.0
2001	125.0
2002	118.0
2003	117.5
2004	115.5
10-Year Trend (%)	**-25.5%**



DEATHS	
Year	**Value**
1995	290
1996	140
1997	120
1998	170
1999	120
2000	90
2001	80
2002	80
2003	220
2004	80
10-Year Trend (%)	**-52.8%**



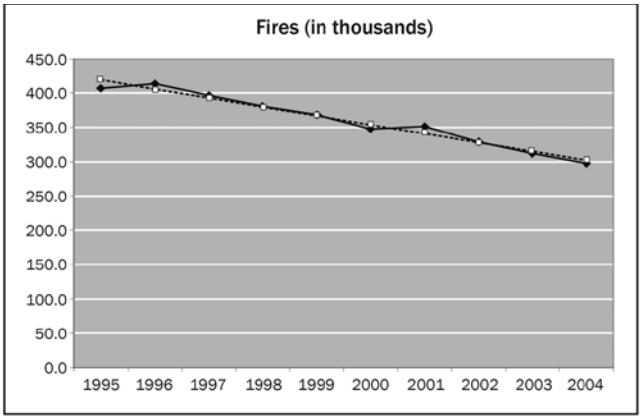
INJURIES	
Year	**Value**
1995	2,600
1996	2,575
1997	2,600
1998	2,250
1999	2,100
2000	2,200
2001	1,650
2002	1,550
2003	1,525
2004	1,350
10-Year Trend (%)	**-50.9%**

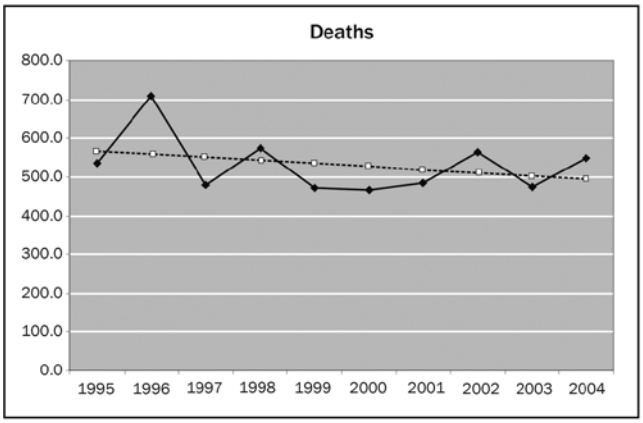


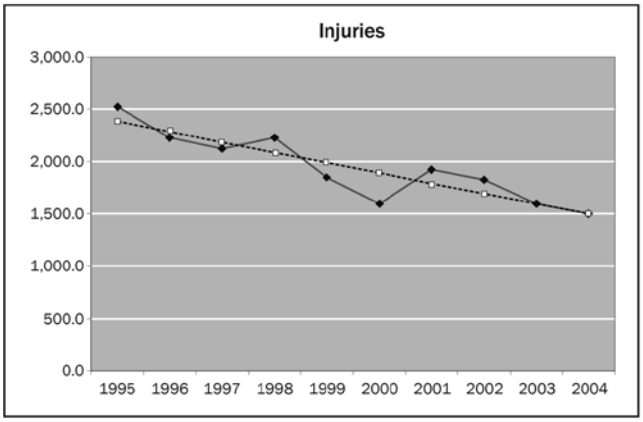
DOLLAR LOSS ($B)* *ADJUSTED TO 2004 DOLLARS	
Year	**Value**
1995	$4.0
1996	$3.6
1997	$2.9
1998	$2.7
1999	$3.9
2000	$3.1
2001	$3.4
2002	$2.8
2003	$2.7
2004	$2.4
10-Year Trend (%)	**-30.1%**

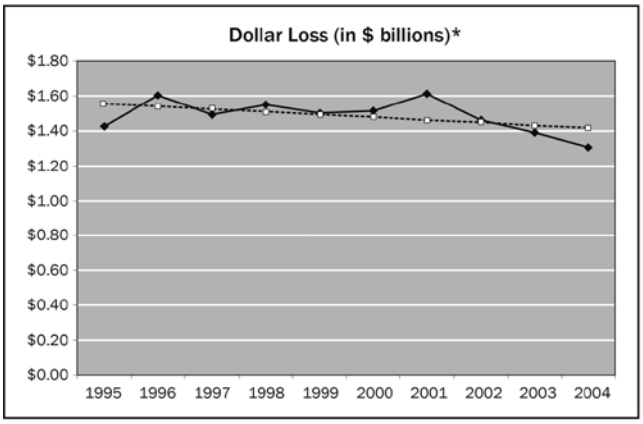
Sources: NFPA and Consumer Price Index

Figure 23. Trends in Mobile Property Fires and Fire Losses (1995–2004)









Sources: NFPA and Consumer Price Index

FIRES (THOUSANDS)

Year	Value
1995	406.5
1996	413.5
1997	397.0
1998	381.0
1999	368.5
2000	348.5
2001	351.5
2002	329.5
2003	312.0
2004	297.0
10-Year Trend (%)	-27.9%

DEATHS

Year	Value
1995	535
1996	710
1997	480
1998	575
1999	470
2000	465
2001	485
2002	565
2003	475
2004	550
10-Year Trend (%)	-13.1%

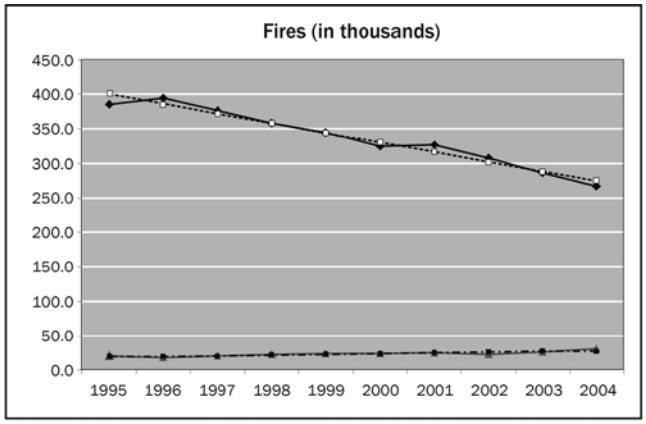
INJURIES

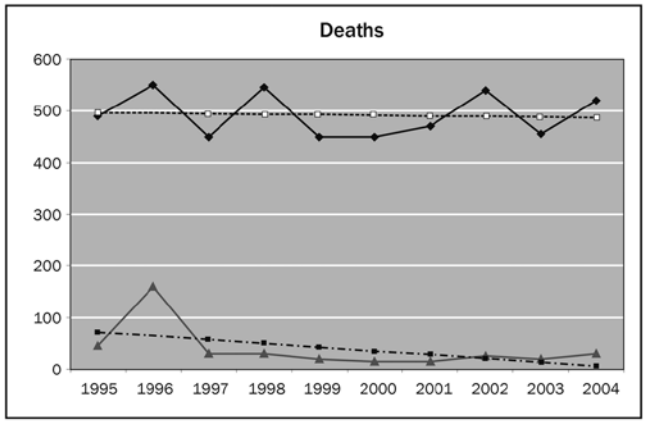
Year	Value
1995	2,525
1996	2,225
1997	2,125
1998	2,225
1999	1,850
2000	1,600
2001	1,925
2002	1,825
2003	1,600
2004	1,500
10-Year Trend (%)	-37.2%

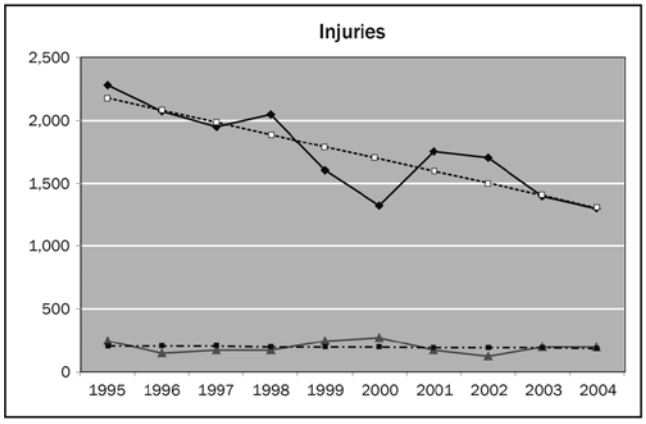
DOLLAR LOSS ($B)*
*ADJUSTED TO 2004 DOLLARS

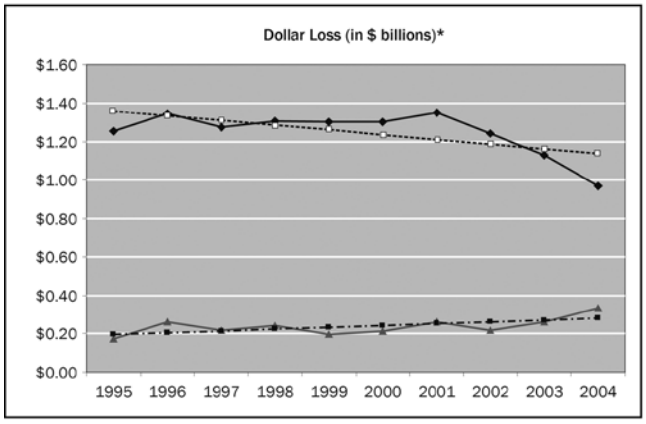
Year	Value
1995	$1.4
1996	$1.6
1997	$1.5
1998	$1.5
1999	$1.5
2000	$1.5
2001	$1.6
2002	$1.5
2003	$1.4
2004	$1.3
10-Year Trend (%)	-9.0%

Figure 24. Trends in Highway vs. Other Mobile Property Fires and Fire Losses (1995-2004)









Sources: NFPA and Consumer Price Index

FIRES (THOUSANDS)

Year	Highway Value	Other Value
1995	386.0	20.5
1996	395.0	18.5
1997	377.0	20.0
1998	358.5	22.5
1999	345.0	23.5
2000	325.0	23.5
2001	327.0	24.5
2002	307.0	22.5
2003	286.0	26.0
2004	266.5	30.5
10-Year Trend (%)	-31.4%	46.7%

DEATHS

Year	Highway Value	Other Value
1995	490	45
1996	550	160
1997	450	30
1998	545	30
1999	450	20
2000	450	15
2001	470	15
2002	540	25
2003	455	20
2004	520	30
10-Year Trend (%)	-1.9%	-90.8%

INJURIES

Year	Highway Value	Other Value
1995	2,275	250
1996	2,075	150
1997	1,950	175
1998	2,050	175
1999	1,600	250
2000	1,325	275
2001	1,750	175
2002	1,700	125
2003	1,400	200
2004	1,300	200
10-Year Trend (%)	-39.9%	-8.6%

DOLLAR LOSS ($B)*
*ADJUSTED TO 2004 DOLLARS

Year	Highway Value	Other Value
1995	$1.3	$0.2
1996	$1.3	$0.3
1997	$1.3	$0.2
1998	$1.3	$0.2
1999	$1.3	$0.2
2000	$1.3	$0.2
2001	$1.4	$0.3
2002	$1.2	$0.2
2003	$1.1	$0.3
2004	$1.0	$0.3
10-Year Trend (%)	-16.5%	43.4%

OUTSIDE AND OTHER PROPERTIES

The "Outside and Other Properties" category includes all fires that are neither structure nor vehicle fires. In NFIRS terminology, this includes fires where the incident types are coded as fires outside of structures, either where the burning material has a value or where the fires are confined to trees, brush, grass, or refuse. A subset of outside fires is wildland fires. Grouped in the "Other" category are fires where the incident types are not classified or are outside gas or vapor combustion incidents.

Outside and other fires comprise roughly half of all fires. This proportion has remained steady over the 10 years (1995-2004). Although large in number, they accounted for only 1 percent of fire deaths in 2004, 5 percent of reported injuries, and 2 percent of reported dollar losses.[7] These numbers may not, however, reflect the true nature of the problem because of under-reporting and the difficulty in setting a price tag on outside fires. Also, many wildland fires are not reported to agencies reporting to NFIRS or to the NFPA annual survey.

Trends

Figure 25 shows the trends in outside and other fires. The numbers of reported outside fires alone are enormous—averaging 720,000 over the 10-year period. The "Other" category of fires adds, on average, an additional 144,000 fires to this already large number. Over 10 years, an average of 52 deaths resulted each year from outside fires plus the miscellaneous other properties not covered elsewhere; injuries averaged 1,225. Although deaths have a 10-year downward trend of 24 percent, this is due primarily to the fluctuations in the small numbers of deaths; injuries have trended downward 43 percent. Dollar loss for outside properties decreased 31 percent, even including a $390 million timber loss in 1998 Florida wildfires.

Estimating dollar loss for these fires is difficult. To illustrate this problem, consider a comparison of property loss from outside fires derived from NFPA's annual 2004 survey and from NFIRS 2004 data. The total loss reported in the NFIRS sample and the NFPA estimate is not remarkably different—$79 million versus $108 million. The NFIRS sample, however, is slightly less than half the fires reflected in the NFPA survey, yet it captures nearly three-quarters of the NFPA property loss. If NFIRS data were extrapolated to the NFPA estimate for outside fires, the NFIRS average loss for outside fires would be approximately $175 million. Part of the difference in property loss estimates is because NFPA assigns property loss for outside fires "with value," whereas NFIRS permits property loss data collection for any fire. Which method is correct? Both are reasonable approaches, but neither may be definitive.

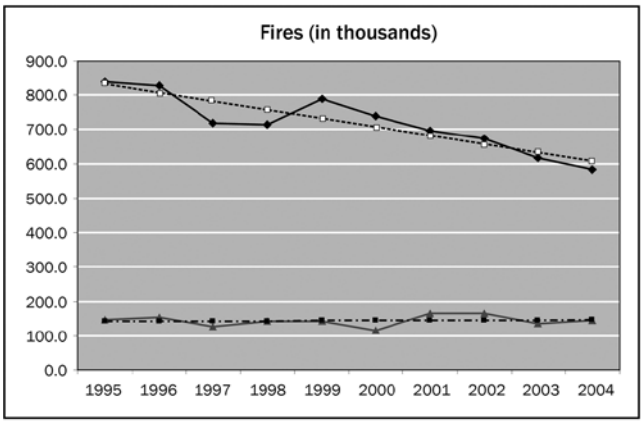
Special Data Problems

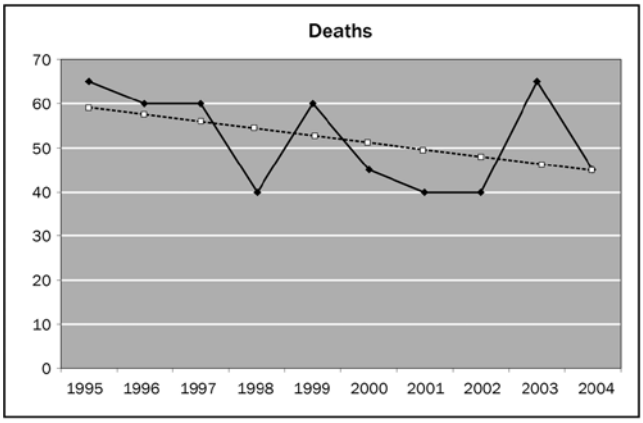
Setting a value for outside fire damage is always a problem. It is difficult to assign a dollar value to grass, tree, and rubbish fires, yet the damage from these fires often requires labor beyond that of the fire department to clean up and restore the area. They also cause esthetic problems that are intangible. Some outside fires spread to structural properties and may be reported as structural fires rather than an outside fire with exposure to structures. Outside fires can have other indirect costs, such as the financial impact on agricultural communities where a fire destroys crops.

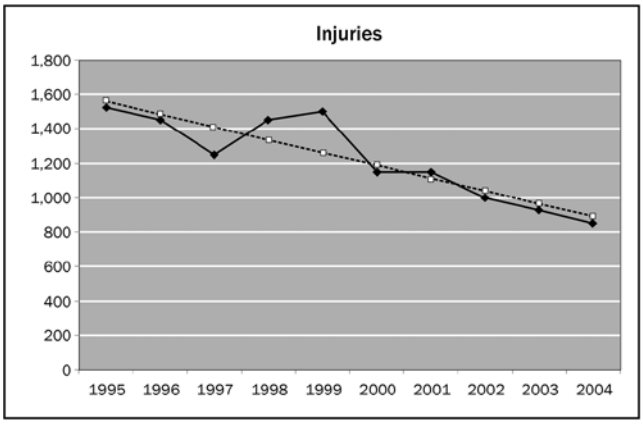
Forest fires and other wildfires to which local departments are not called will not be reported to NFIRS if the State or Federal agency with principal authority for fighting the fire does not participate in NFIRS. To more fully analyze outside fires, NFIRS data need to be complemented with data from these other agencies.

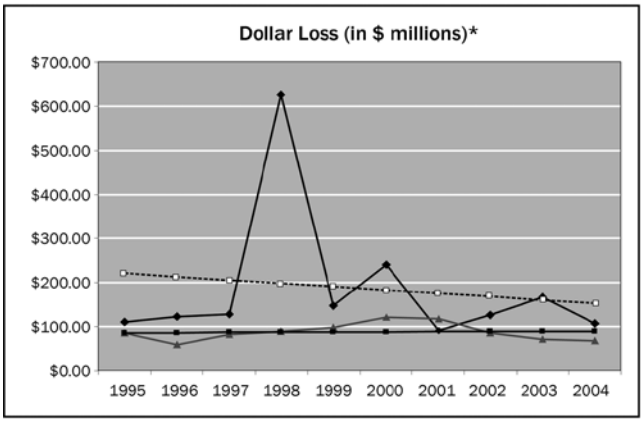
[7] Karter, Michael J., *Fire Loss in the United States During 2004*, National Fire Protection Association, September 2005. These percentages are derived from summary data presented in this report.

Figure 25. Trends in Outside and Other Property Type Fires and Fire Losses (1995–2004)









Sources: NFPA and Consumer Price Index

FIRES (THOUSANDS)

Year	Outside Value	Other Value
1995	838.5	147.0
1996	828.5	154.5
1997	719.0	127.0
1998	715.0	142.0
1999	788.5	143.0
2000	738.5	115.5
2001	697.5	164.0
2002	674.0	165.0
2003	616.5	136.5
2004	583.0	144.5
10-Year Trend (%)	**-27.0%**	**3.1%**

DEATHS

Year	Value
1995	65
1996	60
1997	60
1998	40
1999	60
2000	45
2001	40
2002	40
2003	65
2004	45
10-Year Trend (%)	**-24.0%**

INJURIES

Year	Value
1995	1,525
1996	1,450
1997	1,250
1998	1,450
1999	1,500
2000	1,150
2001	1,150
2002	1,000
2003	925
2004	850
10-Year Trend (%)	**-42.9%**

DOLLAR LOSS ($M)*
*ADJUSTED TO 2004 DOLLARS

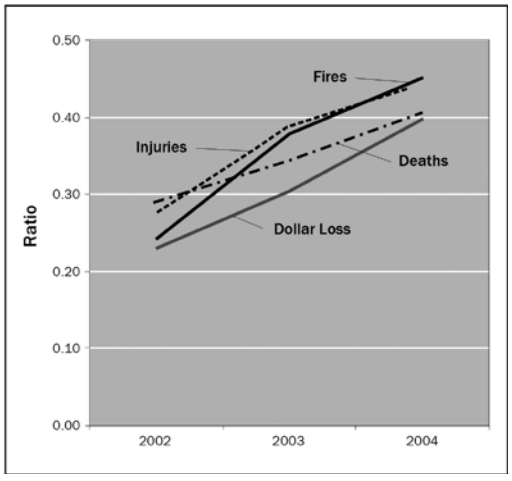
Year	Outside Value	Other Value
1995	$110.9	$85.5
1996	$123.7	$59.0
1997	$128.6	$82.4
1998	$625.8	$90.4
1999	$148.3	$98.6
2000	$241.4	$121.8
2001	$91.7	$118.4
2002	$127.1	$86.1
2003	$166.3	$72.9
2004	$108.0	$68.0
10-Year Trend (%)	**-30.7%**	**4.1%**

Appendix A

Differences Between NFPA and NFIRS Estimates

The National Fire Incident Reporting System (NFIRS) collects data from an average of 18,400 fire departments each year. The National Fire Protection Association's (NFPA) annual survey of fire departments[1] collects data from approximately 3,000 fire departments. Neither is a perfect random sample; not all fire departments asked or selected to participate do so. The distribution of fire departments is not the same in the two samples. And, the NFPA survey collects tallied totals, whereas NFIRS collects individual incident reports. During the period examined, the proportion of native NFIRS 5.0 fire data rose from about 70 percent of all NFIRS fire incidents collected in 2002 to nearly 90 percent of all NFIRS fire incidents in 2004. Not surprisingly, therefore, there are differences between the NFPA annual survey results and the NFIRS results. In the years examined (2002 to 2004), the common thread is the increase in the ratios of NFIRS data to the NFPA estimates as more version 5.0 data are collected.[2] For the latter 2 years, a pattern appears to emerge: in a reversal of NFIRS 4.1 data collection, the deaths reported to NFIRS represent a smaller fraction of the NFPA national estimate of deaths than the NFIRS number of fires is of the NFPA estimate of fires. Other changes are that NFIRS injuries appear to be consistent with the proportions of NFIRS fires and NFIRS dollar loss is a smaller fraction of the NFPA totals than are fires, deaths, or injuries (Figure 26).

Figure 26. Ratio of Raw NFIRS Sample to NFPA National Estimates



	Fires	Deaths	Injuries	Dollar Loss
2002	0.24	0.29	0.28	0.23
2003	0.38	0.34	0.39	0.30
2004	0.45	0.41	0.44	0.40

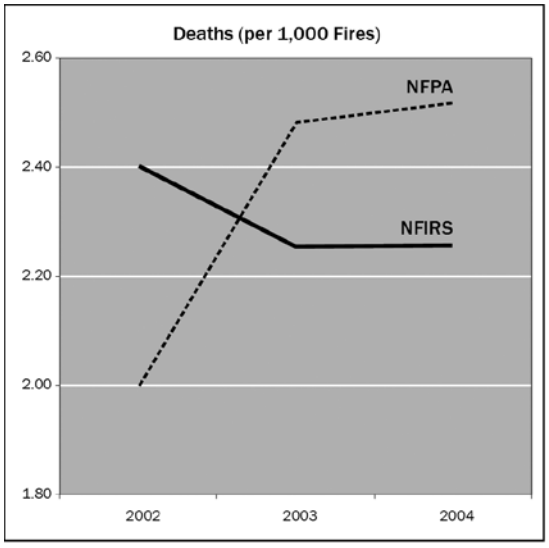
Note: 2003 Dollar Loss excludes the one-time large loss of an estimated $2.04B associated with 2003 Southern California wildfires. This loss does not have associated property uses.

Sources: NFPA and NFIRS

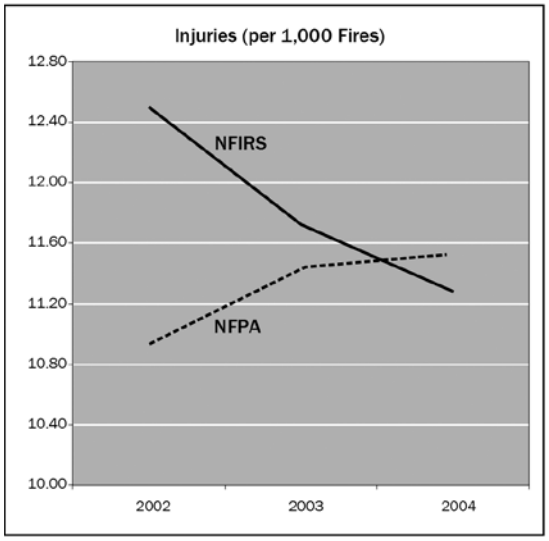
[1] "Fire Loss in the United States," *NFPA Journal*, generally the September/October issue each year.

[2] 2001 data are not included in this examination, as only slightly more than half of the NFIRS data (52 percent) were collected as native 5.0 data.

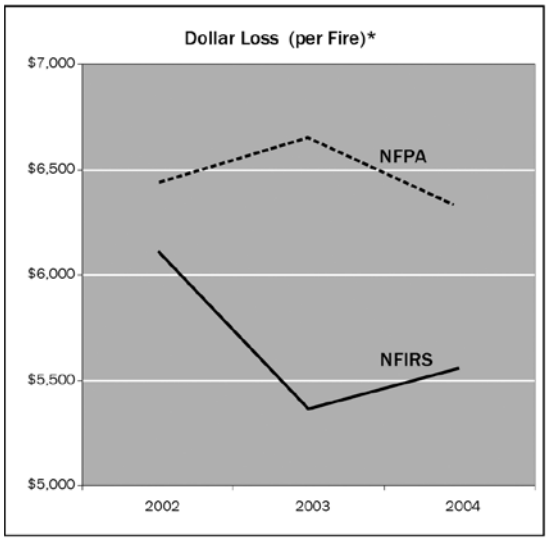
Figure 27. NFIRS versus NFPA Survey: Losses per Fire



DEATHS (per 1,000 Fires)		
Year	NFIRS	NFPA
2002	2.40	2.00
2003	2.25	2.48
2004	2.26	2.52



INJURIES (per 1,000 Fires)		
Year	NFIRS	NFPA
2002	12.51	10.92
2003	11.72	11.44
2004	11.28	11.53



DOLLAR LOSS (per Fire)* *ADJUSTED TO 2004 DOLLARS		
Year	NFIRS	NFPA
2002	$6,114	$6,432
2003	5,362	6,652
2004	5,558	6,317

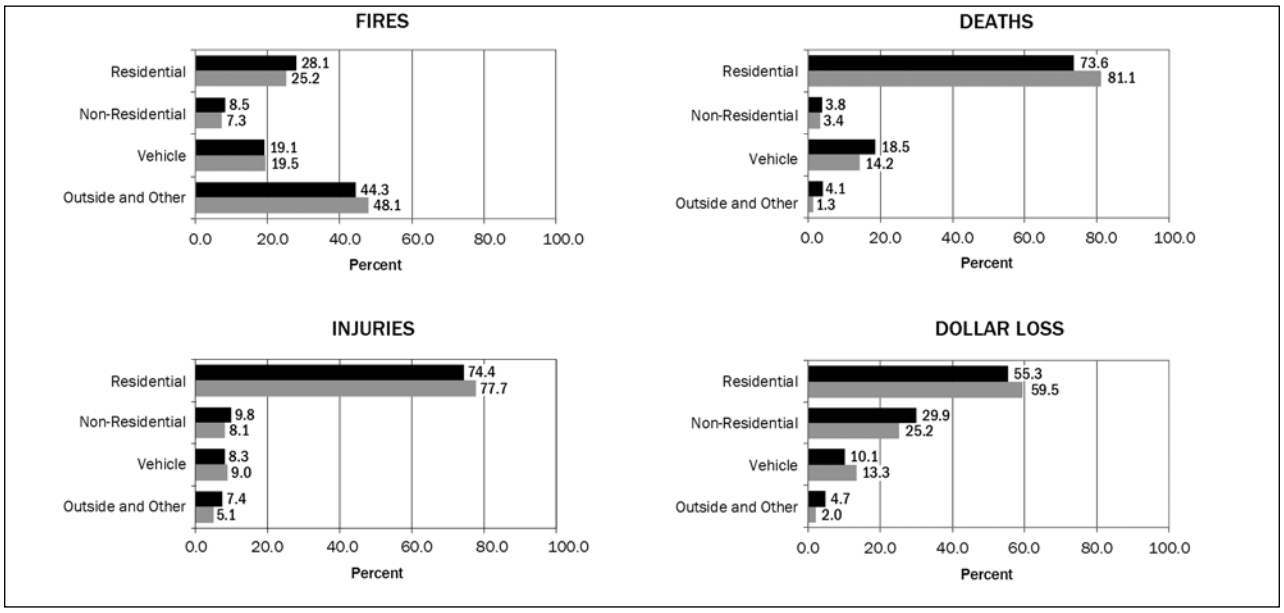
Note: 2003 Dollar Loss excludes the one-time large loss of an estimated $2.04B associated with 2003 Southern California wildfires. This loss does not have associated property uses.

Sources: NFPA, NFIRS, and Consumer Price Index

Looking at the problem another way, Figure 27 shows the number of deaths per thousand fires, injuries per thousand fires, and dollar loss per fire from NFIRS and NFPA from 2002 to 2004. The 2003 and 2004 NFIRS data again show more consistency. Deaths per thousand fires are lower for NFIRS than for NFPA in these 2 years, with an average annual difference of 10 percent. This difference may be the result of more low-loss fires being reported to NFIRS as a result of the abbreviated reporting option for these fires. Injuries per thousand fires are quite close between the two data sets with an annual difference of 2 percent. Dollar loss per fire, however, shows much greater disparity.

Other minor differences appear when reviewing losses by property type as shown in Figure 28. Of interest, the distributions of fires across property types between NFIRS and NFPA are quite similar, with only small differences, which is quite reassuring. Over the 3-year period, the proportion of structure fires (both residential and non-residential) is slightly higher in the NFIRS sample while vehicles, outside, and other fires are slightly more represented in the NFPA estimate. Regardless of the specifics, the distributions are quite comparable.

Figure 28. Comparison of NFIRS Data with NFPA Estimates by General Property Type (3-year average)



Sources: NFPA and NFIRS ■ NFIRS Data ■ NFPA Estimates

The deaths, injuries, and dollar losses that result from these fires are consistently more heavily represented in residential structures in the NFPA estimates. For the other major property categories (except vehicular fire injuries and dollar loss), the NFPA percentages of losses are consistently less than those resulting from NFIRS data.

One of the more important consequences of these distributions is in the creation of estimates of the various parts of the U.S. fire problem. For example, in Chapter 3, it is noted that the 2004 NFPA residential structure fire estimates reflect 83 percent of fire deaths (3,225 of 3,900) and 79 percent of fire injuries (14,175 of 17,875). If the 2004 NFIRS percentages for deaths (76 percent) and injuries (74 percent) were applied to the overall 2004 NFPA estimates, as is the general case when creating national estimates of the fire problem, the estimates would yield approximately 2,970 deaths and 13,225 injuries, both of which are substantially less.

The reasons for these differences are not known. It may be that some departments reporting summary data to NFPA inadvertently undercount their casualties and losses when reporting on the NFPA survey forms. Another possibility is that there are data entry errors in NFIRS, with larger numbers of deaths, injuries, and dollar loss per incident record creeping into the database despite edit checks at State and Federal levels. (It appears that at least some of the dollar loss difference is due to this.)

A third possibility for the differences is that with the introduction of abbreviated reporting of small, no-loss confined fires in NFIRS, the NFPA sample of these fires is not adequately represented. It is known that, prior to abbreviated NFIRS reporting, some departments did not fill out NFIRS forms for minor fires such as food on stoves or chimney fires. It is not clear whether these fires were or were not included in the department's report to NFPA and whether this reporting has changed. Also unknown is the actual extent of this problem.

A fourth possibility is that some jurisdictions use NFIRS as a tracking system for fire casualty information without providing the related incident data or vice versa. We know that this possibility does indeed occur from time to time in NFIRS. Again, we are unsure of how these incidents and their corresponding losses are reported to NFPA.

Lastly, it could be that techniques used to generate the NFPA estimates unintentionally favor residential structures or that the NFIRS sample, because it is not a true random sample, may have a bias that results in fewer residential losses.

Resolving the differences between the two major sources of fire statistics in the United States is important to prevent confusion among users of the data.

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