tenth edition

FIRE IN THE UNITED STATES

1986–1995

National Fire Center ▪ United States Fire Administration
Federal Emergency Management Agency

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FIRE

in the United States

1986–1995

TENTH EDITION

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Federal Emergency Management Agency
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The National Fire Information Council (NFIC), a nonprofit organization of the state and metro 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.

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The United States Fire Administration also thanks the many state fire marshal offices for their assistance with, and input to, the state profile information presented in Chapter 3.

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EXECUTIVE SUMMARY

Fire kills thousands of Americans each year, injures tens of thousands, destroys billions of dollars in property, and costs tens of billions of dollars overall, but mayors and city managers, school officials, the media, and the general public still are largely unaware of the magnitude of these numbers. Their lack of awareness and failure to realize the seriousness of fire to communities and the country are factors that keep the U.S. fire problem one of the worst in the world per capita.

PURPOSE AND SCOPE

This report is designed to arm the fire service and others with a statistical overview of the fire problem that can motivate corrective action. It can also be used to select priorities and help target fire programs, serve as a model for state or local analyses of fire data, and provide a baseline for evaluating programs.

This Tenth Edition of *Fire in the United States* covers the 10-year period from 1986 to 1995, with emphasis on 1995—the most recent year for which complete data are available at the time of preparation. The primary source of data in this report is the National Fire Incident Reporting System (NFIRS), but National Fire Protection Association (NFPA) annual survey results and data from the various state agencies responsible for state fire information are also used.

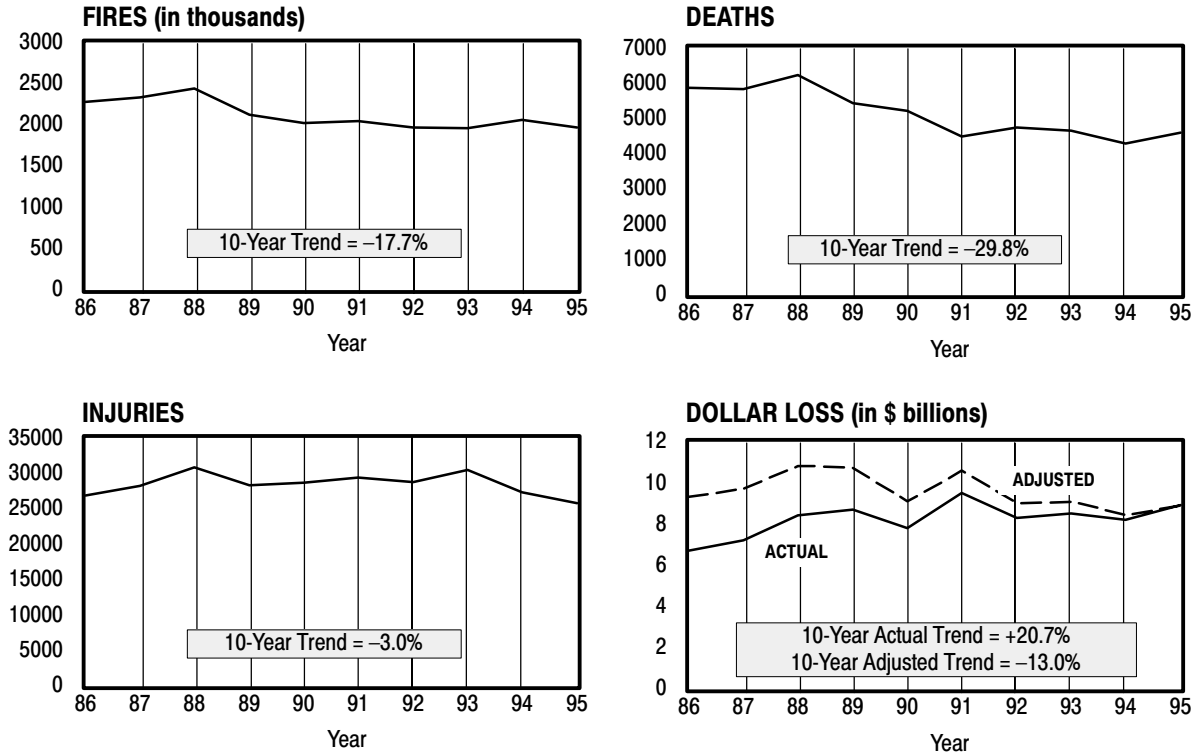
Because of the time it takes to collect data from the more than 13,000 fire departments that participate in NFIRS, edit and obtain corrections, and analyze and display the results, the date of publication lags the date of collection.

This edition of *Fire in the United States* includes a state-by-state analysis and presentation of state-based residential fire statistics. This information is more exhaustive than similar information presented in the past—each state has provided additional information on innovative and successful programs that have positively affected the state's individual fire problem. And, where available, the associated Web site address for the state fire agency has been provided. Previous editions of *Fire in the United States* have included two chapters that detail the residential and nonresidential structure fire problem. Due to the size of the state chapter, these two chapters have been omitted from this edition. The Eleventh Edition of *Fire in the United States* will again address these two key areas of the U.S. fire problem.

As in every edition of *Fire in the United States*, a chapter is provided that focuses on deaths and injuries to firefighters.

THE NATIONAL FIRE PROBLEM

Figure 1 summarizes the national fire problem.[1] During the 10-year period 1986–1995, there was an average of 5,117 civilian fire deaths, 28,400 civilian injuries, 56,260 fireground firefighter injuries, and $9.6 billion dollar loss (adjusted to 1995 dollars) from reported fires each year. The United States averaged 2.1 million reported fires annually during this period.



Sources: NFPA Annual Surveys and Consumer Price Index

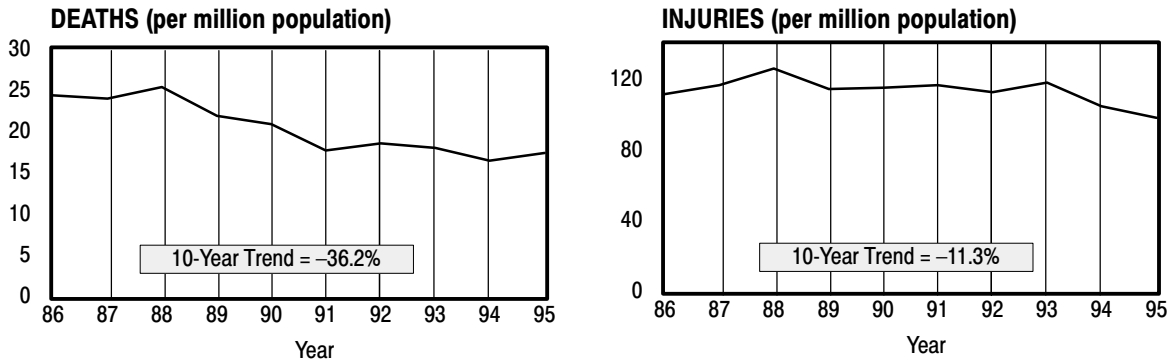
Figure 1. Trends in Fires and Fire Losses

Over the past 10 years, the number of fires reported to the fire service has decreased 18 percent,[2] with a noticeable drop in 1989 and remaining relatively steady since then. Civilian deaths from fire dropped sharply over this period (30 percent). Civilian injuries remained steady over 10 years. The magnitude or trend of injuries from unreported fires is not known. When adjusted for inflation (1995 dollars), losses were down a significant 13 percent over the period.

On a per capita basis, the fire problem is less severe in 1995 than it was 10 years earlier because the population increased faster than did fires and fire casualties (Figure 2). The per capita fire death trend was down 36 percent, and the per capita injury trend was down 11 percent. Although the death rate per fire in the United States has

[1] See page NO TAG for a discussion of how trend percentages were calculated.

[2] The percentages discussed throughout this chapter have been adjusted to apportion the "unknowns" across the other categories.



Sources: NFPA Annual Surveys, Consumer Price Index, and Bureau of the Census

Figure 2. Trends in Severity of Casualties

improved greatly, it remains much higher than the yearly reported fire death rates in countries such as Australia, Japan, Hong Kong, and most of the countries in Western Europe.

Regional Variations

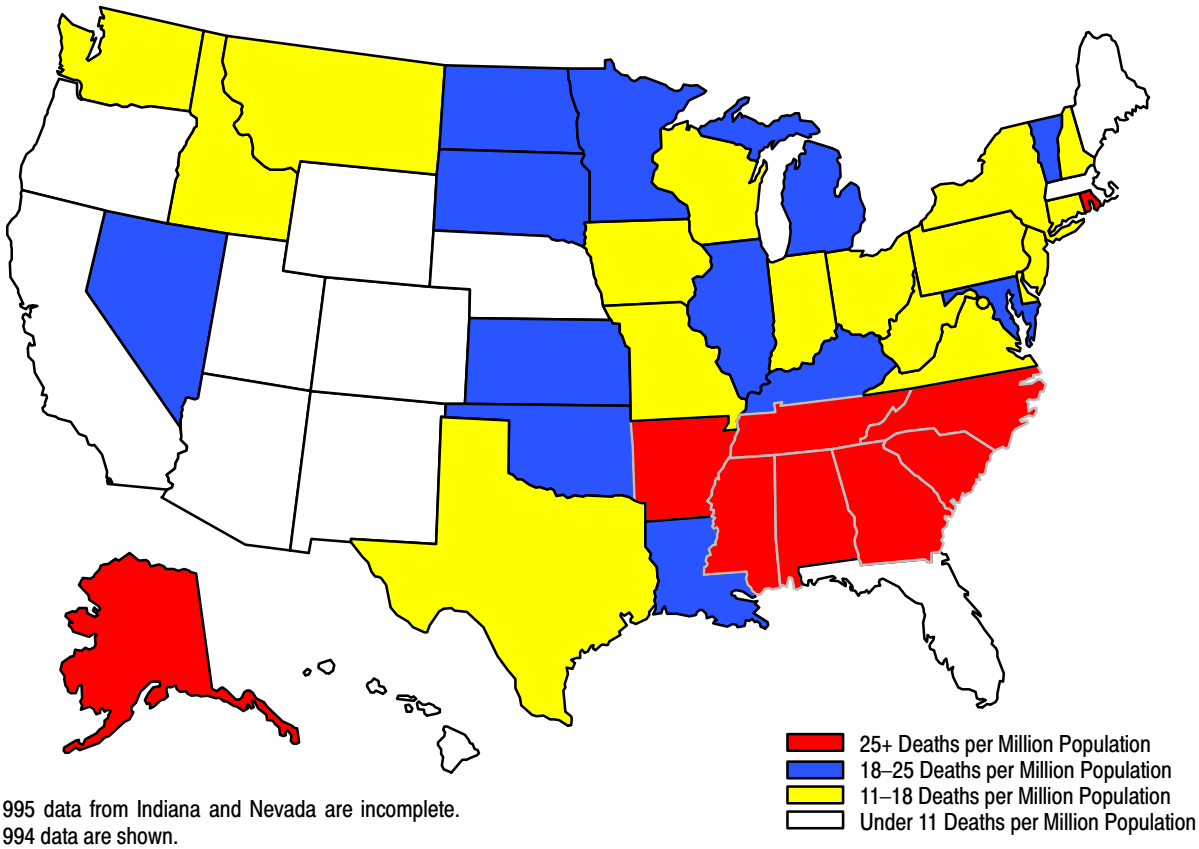
The fire problem varies from region to region and state to state because of variations in climate, poverty, education, demographics, and other factors. The Figure 3 map shows that the fire death rate per capita is highest in the Southeast and a few isolated states. The Southeast and Alaska have been consistently among the highest fire death rate states for many years. The highest death rates in 1995 were in Mississippi, Alabama, Alaska, and Arkansas. States with the lowest fire death rates were Utah, New Mexico, California, and Hawaii; these same states ranked low in 1994.

Another important measure to examine is the absolute number of fire deaths in each state. The 11 states with the most fire deaths account by themselves for nearly half of the national total. As expected, large-population states are at the top of this list. National totals cannot be reduced significantly unless these states reduce their fire problem.

Even though the death rate varies, the leading causes of fires (cooking, heating, and arson) and fire deaths (careless smoking, arson, and heating) are relatively similar around the nation. The rank order and magnitude of these causes vary from state to state and by whether fires, deaths, or injuries are used as the measure. Therefore, the priorities for prevention programs must be tailored to location and purpose.

Where Fire Losses Occur

Although most fires occur outside, the public generally does not appreciate the magnitude of the fire problem in the home nor the importance of doing its share to reduce fires in the home. Based on 1995 data, the vast majority of our civilian fire



Note: 1995 data from Indiana and Nevada are incomplete. 1994 data are shown.

Sources: State Fire Marshals and the United States Fire Administration

Figure 3. Fire Death Rate by State in 1995

deaths (74 percent) and injuries (70 percent) continue to occur in residences, although residences have only 23 percent of the total fires (Figure 4). More than two-thirds of injuries incurred by firefighters are in residences. And residences account for a substantial portion of the dollar loss, 47 percent. The 10-year trend mirrors the 1995 picture.

Non-residential properties include industrial and commercial properties, institutions, educational establishments, vacant and under construction properties, and mobile properties. Fire prevention efforts have focused on protecting non-residential structures, and the results have been successful to a large degree. These structures account for 9 percent of all fires, 7 percent of fire deaths, and 13 percent of injuries. Because non-residential structures tend to have very large dollar values, the 9 percent of total fires equates to 47 percent of the total dollar loss.

As in 1994, about one in four fires attended by the fire service involves vehicles, mainly cars and trucks. In 1995, the fire service responded to more vehicle fires than to residential fires. And this does not include the tens of thousands of fire department responses to vehicle accidents in which there was no fire.

In 1995, vehicles accounted for the second largest percentage of fire deaths reported to NFIRS, 15 percent, and they accounted for 8 percent of the injuries and

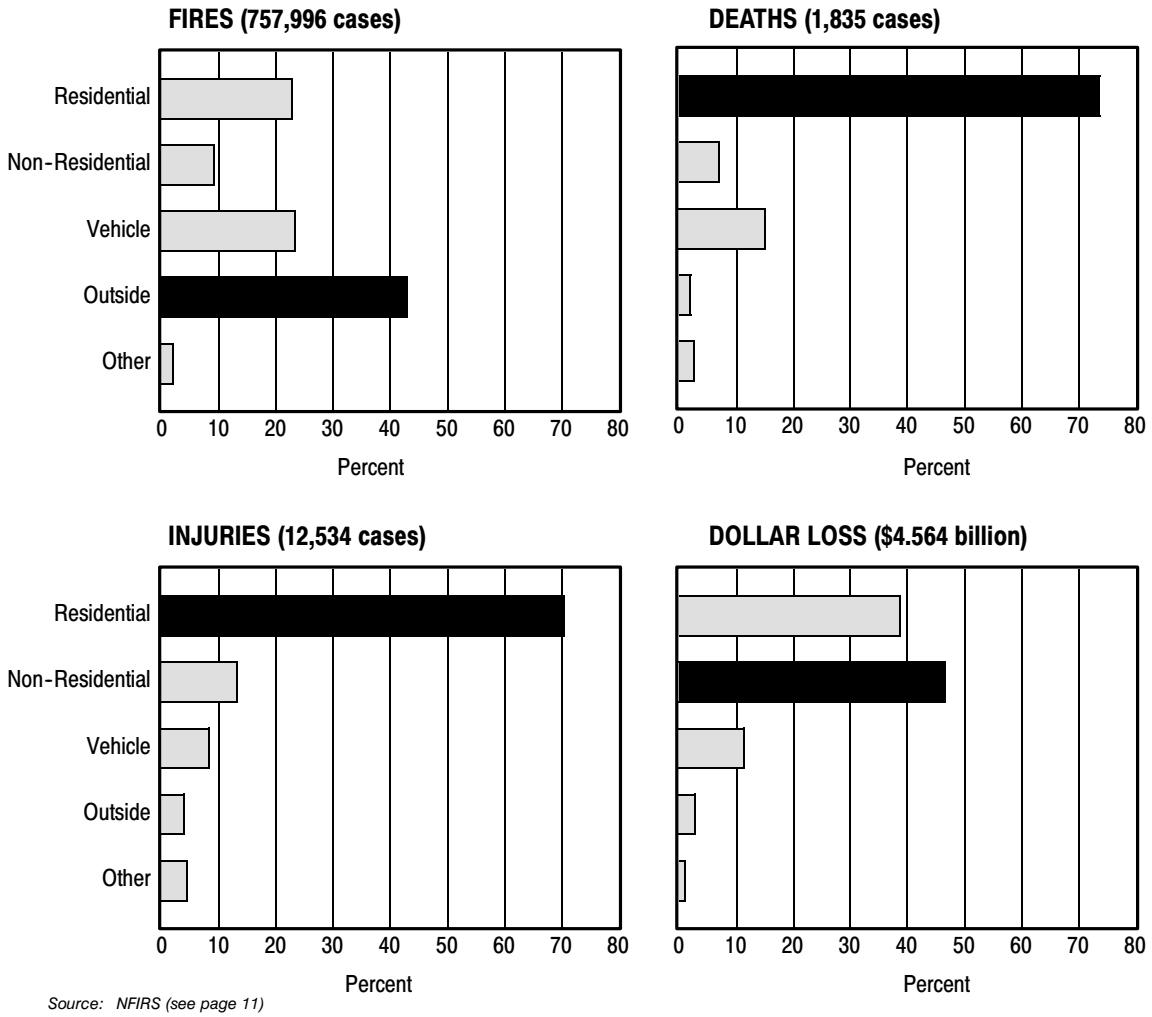


Figure 4. 1995 Fires and Fire Losses by General Property Type

11 percent of the reported dollar loss. The exact number of vehicle fire deaths is uncertain because of the difficulty in determining whether the impact of the accident or the subsequent fire was the cause of death in many cases. The 10-year trend in vehicle casualties has decreased steadily, perhaps due to better safety features that are being built into automobiles. However, there is no doubt that vehicles comprise a much larger segment of the fire problem than most people realize.

More fires occur outside (e.g., fields, vacant lots, wildland) than any of the other major property types. Although this category of property accounts for the highest number of fires, it represents the least amount of deaths (2 percent), injuries (4 percent), and dollar loss (3 percent). Many of the fires to which fire departments respond are intentionally set but result in relatively little damage. Outside fires, however, are cause for concern because they may spread to structures. In 1995, outside fires (fires outside of structures other than vehicles) represented 43 percent of all fires (about the same as in 1994). The 800,000 to 1 million outside fires to which fire departments respond represent a significant burden to the fire service. These numbers may not reflect the true nature of the problem because of underreporting, the difficulty in

setting a price tag on outside fires, and the fact that many wildland fires are not reported to NFIRS or the NFPA annual survey.

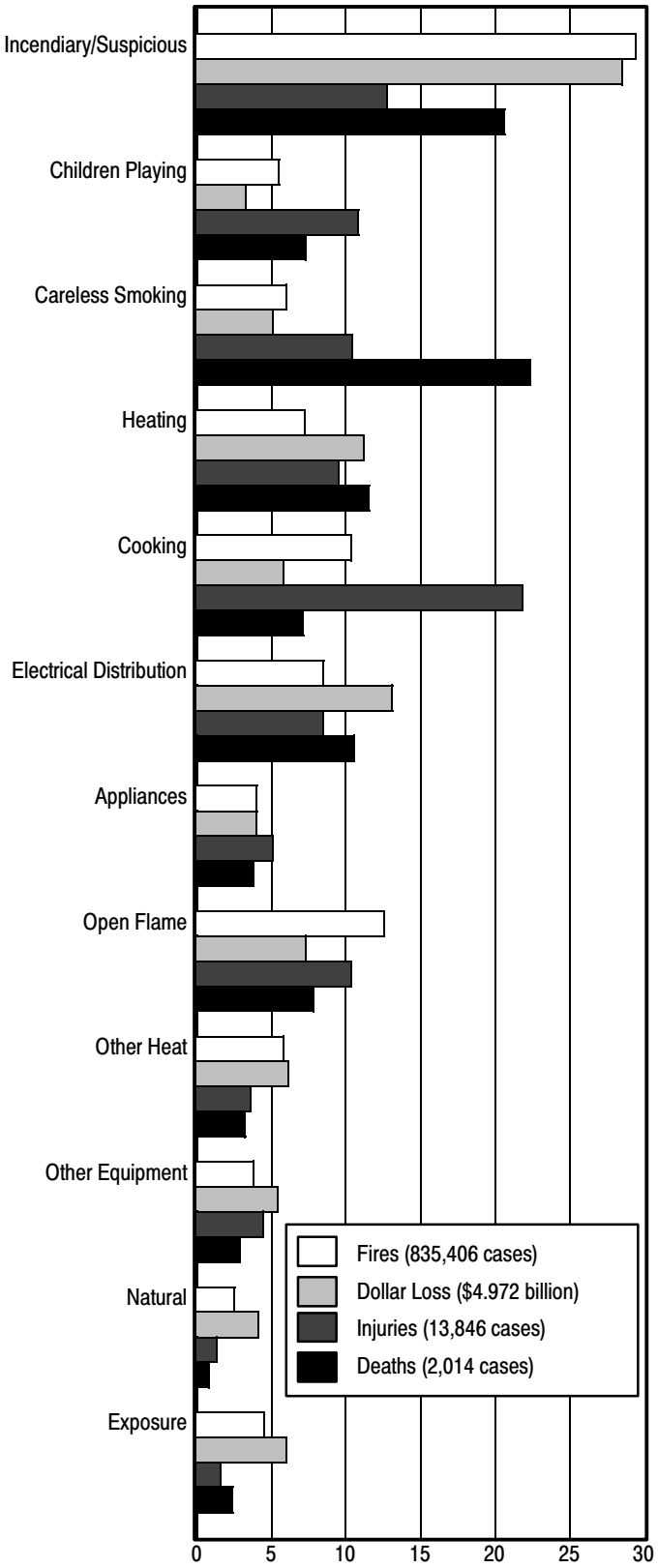
Causes of Fires and Fire Losses

When all fires from all the different occupancies are combined, arson is by far the leading cause of fire and direct dollar loss, accounting for nearly 30 percent of both fires and dollar loss (Figure 5). The leading cause of all fire deaths is careless smoking (22 percent), followed closely by arson (21 percent). The leading cause of injuries is cooking (22 percent) with arson second (13 percent). Since most fire deaths and fire injuries occur in the home, the overall leading causes of deaths and injuries are dominated by causes most closely associated with residential properties.

Who Dies or Gets Injured

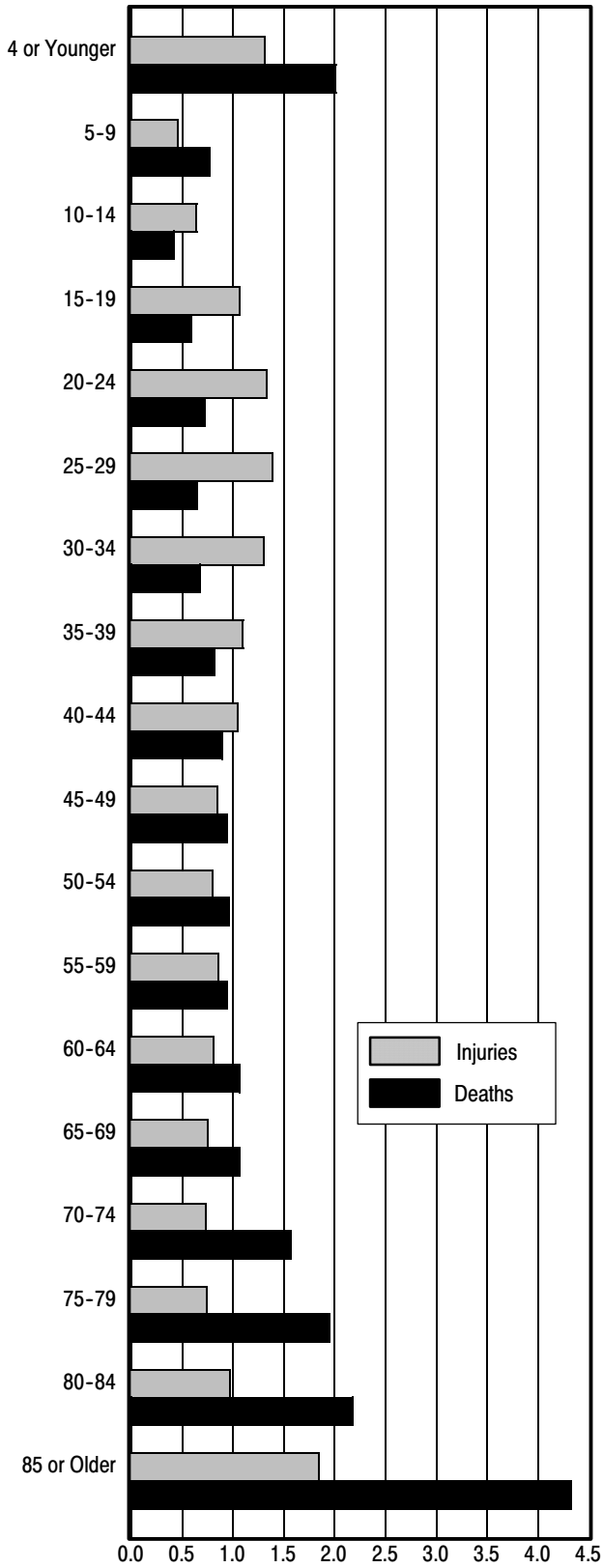
The elderly and the very young are the groups at highest risk. Children under 5 years of age continue to have double the national average fire death rate (Figure 6). Risk of fire death drops off sharply for children between 5 and 14, then increases slowly with age. In 1995, the elderly—people over 70—have one-and-one-half to four times the national average fire death rate, depending on how old they are, with the risk increasing sharply for people over 80. However, two-thirds of the people who die in fires are neither very young nor old; the fire problem affects all age groups.

The risk of fire injury peaks at ages 25–29. Young adults have a 40 percent greater risk than average. They tend to



Sources: NFIRS

Figure 5. Causes of 1995 Fires and Fire Losses (Adjusted)



Sources: NFIRS, NFPA Annual Surveys, and Bureau of the Census

Figure 6. Relative Risk of 1995 Fire Casualties by Age

be involved in the more dangerous activities and demonstrate a higher degree of bravado and fearlessness. People over 85 also have sharply elevated risk of fire injury.

Men are twice as likely to be killed in fires than women in 1995, the same as in previous years. This proportion has remained relatively stable over the past 10 years, is true for virtually every age group, and has been reported every year since NFIRS started in 1975. Males also have a higher fire death rate per capita than females for all age groups. For some age groups, the male rate is nearly triple the female rate. Elderly men have a significantly higher fire death rate than elderly women. The male/female ratio for fire deaths is almost identical to that for fire injuries.

The reasons for the differences between the sexes in fire risk are not known for sure. Some reasons advanced are the greater likelihood of men being highly intoxicated, the more dangerous occupations of men (most industrial fire fatalities are males), the greater use of flammable liquids by men, their greater likelihood of attempting to fight fires or going back to rescue someone, or possibly that men are less safety-conscious than women.

The fire problem cuts across all ethnic, economic, and regional groups. It is higher for some than for others. For example, people in rural areas and large cities have higher fire death rates than people in mid-size communities. The poor, too, suffer a disproportionate share of deaths versus the rest of the population.

STATE PROFILES

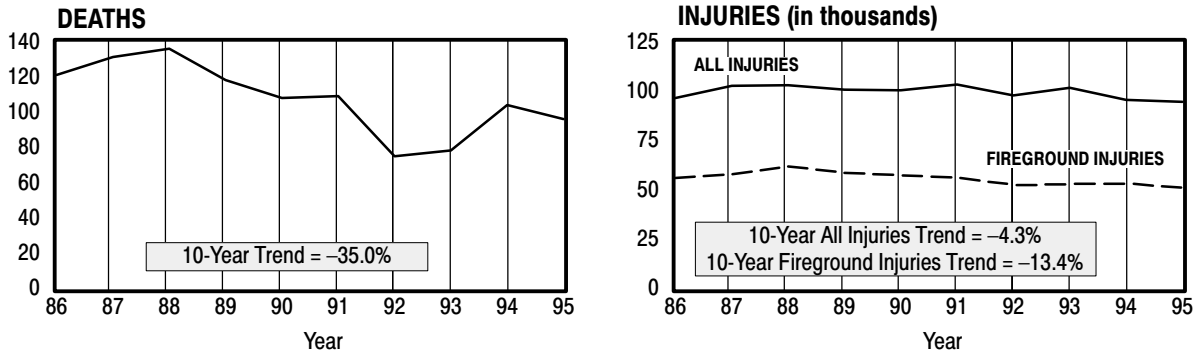
The leading causes of residential fires in 1995 were cooking, heating, and arson. This is the same ranking as reported in 1994. Cooking has been the leading cause of fires in most years, except in the 1970s when heating became the leading cause due to a surge in the use of alternative space heaters and wood heating. Most cooking fires come from unattended cooking rather than from equipment failures.

Although cooking fires are shown as the leading causes of residential fires in most of the states, they were not reported as the leading cause of fire deaths in any state. As in all years, more states showed careless smoking as the leading cause of residential fire fatalities in 1995 than any other cause, followed by heating and arson. This sequence has little changed for many years.

There are a variety of fire prevention programs, outreach programs, and other fire-related initiatives that are offered by the states. These programs range from smoke detector handout and installation to kid's Web pages to instructional materials for educators on juvenile firesetting patterns. Some states have enacted a variety of legislative packages targeted at reducing the toll of fire. Many states have Web sites with up-to-date information available.

FIREFIGHTER DEATHS AND INJURIES

Much progress has been made in reducing firefighter deaths and injuries. Over the period 1986 to 1995, there has been a significant downward trend (35 percent) in firefighter deaths and a 13 percent downward trend in fireground injuries (Figure 7). Overall firefighter injuries have remained relatively constant.



Sources: NFPA Annual Surveys and the United States Fire Administration, Firefighter Fatality Project

Figure 7. Trends in Firefighter Casualties

After a steady decline in firefighter deaths from 1988 to 1992, there was a sharp increase in deaths—from 75 in 1992 to 104 in 1994. The 1994 increase was in part due to the Storm King Mountain tragedy in Colorado in which 14 firefighters were killed. Ninety-six firefighters died in 1995. In 1995, 78 percent of fireground firefighter deaths were at residential and wildland fires.

The number of firefighter injuries continued to average about 100,000 per year. Approximately 54 percent of the firefighter injuries were on the fireground. Of the firefighter injuries associated with fires, 58 percent occurred at residential fires and 28 percent at non-residential structural fires. Slightly more firefighters are injured outside at the scene of the fire than inside. More injuries occur at apartments than in other residential occupancies. Manufacturing and storage occupancies are the most injurious non-residential occupancies.

The torso, arms and hands, and legs and feet are about equally distributed as the body areas most often injured. Firefighter injuries are spread over the day, throughout the year, and across various age groups. They peak at night, in the summer and again in the winter, and between ages 30 and 34. Local fire departments should consider their own profile of injuries and the reasons for any peaks in the profiles.

THE USES OF NFIRS DATA

The National Fire Incident Reporting System is an information system initiated and supported by the U.S. Fire Administration. Developed as a means of assessing the nature and scope of the fire problem in America, the system first came on line in 1975. Since its inception, the system has grown in both participation and use. In 1995, more than 13,000 fire departments in 40 states reported to NFIRS. It is estimated that 42 percent of all fires that fire departments respond to are captured in NFIRS. The nearly one million fires that are entered into the system each year make NFIRS an extremely large and valuable sampling of fires that occur each year. The longevity of the system is valuable in identifying long-term fire trends and tracking the effectiveness of fire prevention initiatives and policies.

Perhaps the most fundamental use of the data is in understanding the nature of the fire problem, whether conceived at the national, state, or local level. One indicator of the system's usefulness is its use by many state and local fire marshal offices in preparing their annual reports.

The uses of NFIRS data are diverse. The data are used by the Consumer Product Safety Commission to evaluate fire hazards associated with specific products; law firms use the data to establish whether a product has a pattern of causing fires and thereby either litigate court cases or settle cases out of court; and the media frequently call USFA or other organizations to get fire-related information as background material for articles and features. Other users of NFIRS data include local, state, and federal agencies; private industry; academic and research groups; and non-profit fire-related organizations. The uses of the data are as varied as the users themselves. NFIRS is a powerful data source that is readily available to the fire community and others.

SOCIOECONOMIC FACTORS AND THE INCIDENCE OF FIRE

Research indicates that the risk of fires in the home is not the same for everyone. Climate, building stock characteristics, and human factors importantly influence fire rates. Socioeconomic factors are associated with increased fire rates at three different levels—the neighborhood, the household, and the individual.

The well-being of an urban residential neighborhood is generally tied to the quality of its housing stock. The quality of the stock, however, can be diminished by the interrelated processes of fire and building abandonment. Poorer neighborhoods may be more vulnerable to the threat of fire than their more affluent counterparts for several reasons: the presence of vacant and abandoned buildings, the resulting neighborhood decline, and increased rates of arson. A statistical analysis of fires in Toledo, Ohio, revealed that the poorest group of census tracts experienced over 14 times the number of incendiary or suspicious fires versus the wealthiest census tracts.

Household-level factors relevant to fire rates include the quality of individual housing units, their affordability to residents, and the social structure of the households that reside in them. In the United States, housing quality and housing affordability are closely related. The cost of a housing unit, whether for sale or to rent, is priced according to the quality of the unit given its location, amenities, and the like. The resulting effect is that higher income households can generally afford to live in higher quality units than lower income households.

Socioeconomic factors associated with increased fire risk at the individual level include the incidence of smoking, the incidence of alcohol and drug abuse, education levels, and the type of housing tenure. Research has shown that cigarette smoking is inversely related to income. Low income households can be at greater risk from fires caused by careless smoking. In the Toledo study, this relationship was confirmed. The rate of careless smoking fires for the lowest median income group was 8.5 times the rate for the highest median income group.

More research is needed to develop, clarify, and fully understand the range of socioeconomic characteristics associated with increased fire risk. Information about these socioeconomic characteristics can help the fire service design effective public education programs. With materials designed with specific audiences in mind, the fire service can design campaigns to target fire prevention in communities and neighborhoods most at risk.

1
INTRODUCTION

The United States continues to have one of the most severe fire problems in the world relative to its population size. Most Americans are not aware of this nor of the nature of the fire problem.

This report is a statistical portrait of the fire problem in the United States over the period 1986–95. 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. One specific focus is on firefighter casualties—causes, types of injuries, etc.

This document represents the seventh major edition of *Fire in the United States* published by the U.S. Fire Administration: the First Edition, published in 1978, covered 1975–76 fire data; the Second Edition, published in 1982, covered 1977–78; the Sixth Edition, published in 1987, covered 1983; the Seventh Edition, published in 1990, covered 1983–87; the Eighth Edition, published in 1991, covered 1983–90; the Ninth Edition covered 1985–94 and focused on the residential and nonresidential fire problem, and this Tenth Edition covers 1986–95 and focuses on state profiles. There were also three editions—the Third, Fourth, and Fifth—produced and used as working papers though not published.

SOURCES

The report is primarily based on the National Fire Incident Reporting System (NFIRS) data, but uses other sources as well, especially the National Fire Protection Association's (NFPA's) annual survey of fire departments.

National Fire Incident Reporting System

The National Fire Incident Reporting System was started in 1975 as one of the first programs of the National Fire Prevention and Control Administration, which later became the U.S. Fire Administration (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 fire and casualty reports using a common set of definitions. The data may be written by hand on paper forms or entered directly into a computer. Fire departments send these data as a bundle of paper reports, as an

electronic file, or on a computer tape to their state fire data office, which edits and collates the data. Semiannually, the state's data are sent to the U.S. Fire Administration. There, the data are further validated. Data summaries and error reports may be sent back to the states to correct suspicious, incorrect, or incomplete information. Data on individual fire incidents and casualties are preserved incident by incident at local, state, and national levels.

The system has gradually grown from an initial 6 states in 1976 to 39 states and the District of Columbia in 1995. Table 1 lists the participating states over the 1986 to 1995 period. Thirty-nine percent of the more than 33,000 fire departments provide data to the system (Table 2). Some states require their departments to participate. The future goal is voluntary participation by all states and the District of Columbia.

Corresponding to the increased participation, the number of fires, deaths, and injuries and the amount of dollar loss reported to NFIRS also grew considerably from 1975 to 1995. In 1995, data on over 835,400 fire incidents were collected, about 42 percent of the estimated total attended by fire departments.

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 allow a tremendous amount of useful information to be collected and used. Because of the enormous advances in computer technology over the past 20 years, the NFIRS has been revised to take advantage of these new capabilities and other improvements suggested by the participants. The system, NFIRS 5.0, will be available in the third quarter of 1998.

Uses of NFIRS

The NFIRS data are used extensively for major fire protection decisions. At the federal level, for example, the Consumer Product Safety Commission uses the data to identify problem products and to monitor corrective actions. The Department of Transportation has used these data to identify car fire problems and has ordered recalls triggered by NFIRS data. The Department of Housing and Urban Development uses NFIRS to evaluate safety of manufactured housing (mobile homes). And of course the U.S. Fire Administration 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, 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 wide variety of the uses of NFIRS data is presented in more detail in Chapter 5, Special Topics.

Table 1. States Participating in NFIRS, 1986–1995

State	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
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			X	X	X
Arkansas	X	X	X	X	X	X	X	X	X	X
California	X	X	X	X	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
District of Columbia	X	X		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
Hawaii	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					
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										
Missouri										
Montana	X	X	X	X	X	X	X	X	X	
Nebraska	X	X	X	X	X	X	X	X	X	X
Nevada										
New Hampshire	X	X	X	X	X	X	X	X	X	X
New Jersey	X	X	X	X	X	X	X	X	X	X
New Mexico									X	
New York	X	X	X	X	X	X	X	X	X	X
North Carolina										
North Dakota										
Ohio	X	X	X	X	X	X	X	X	X	X
Oklahoma						X	X	X	X	X
Oregon	X	X	X	X	X	X	X	X	X	X
Pennsylvania										
Rhode Island	X	X	X	X	X	X	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
West Virginia	X	X	X	X	X	X	X	X	X	X
Wisconsin	X	X	X	X	X	X		X	X	X
Wyoming	X	X	X	X	X	X	X	X	X	X
Total	42	41	41	43	41	41	40	41	41	40

Table 2. Fire Departments Reporting to NFIRS—1995

State	No. of Participating Fire Departments	No. of Fire Departments in State	Fire Departments Reporting (percent)
Alabama	1	1,038	0.1
Alaska	93	253	37
Arizona	3	258	1
Arkansas	410	824	50
California	345	930	37
Colorado	21	400	5
Connecticut	221	274	81
Delaware	49	61	80
District of Columbia	1	1	100
Florida	324	674	48
Georgia	171	718	24
Hawaii	0	4	0
Idaho	141	263	54
Illinois	853	1,330	64
Indiana	0	952	0
Iowa	516	869	59
Kansas	571	680	84
Kentucky	569	794	72
Louisiana	314	700	45
Maine	0	460	0
Maryland	285	370	77
Massachusetts	335	364	92
Michigan	964	1,030	94
Minnesota	662	804	82
Mississippi	0	735	0
Missouri	0	921	0
Montana	0	385	0
Nebraska	393	483	61
Nevada	0	210	0
New Hampshire	97	253	38
New Jersey	219	788	28
New Mexico	0	356	0
New York	1,633	1,834	89
North Carolina	0	1,400	0
North Dakota	0	390	0
Ohio	955	1,252	76
Oklahoma	105	863	12
Oregon	336	325	103**
Pennsylvania	0	2,400	0
Rhode Island	38	81	47
South Carolina	161	655	25
South Dakota	224	343	65
Tennessee	201	655	31
Texas	580	2,317	25
Utah	133	211	63
Vermont	112	243	46
Virginia	428	600	71
Washington	50	655	8
West Virginia	424	442	96
Wisconsin	153	872	18
Wyoming	109	133	82
Total	13,100*	33,656	39

* Some states assign more than one Fire Department ID to large fire departments. As a result, this total is slightly less than the number of Fire Department IDs reported in NFIRS.

**While this percentage exceeds 100, it is based on the information provided by NFIRS and the Oregon Office of the State Fire Marshal.

NFPA and Other Data Sources

In addition to NFIRS, this report makes use of the summary numbers for fires, deaths, injuries, and dollar loss from the National Fire Protection Association's (NFPA) annual survey of fire departments and NFPA *Fire Command* and *Journal* articles on firefighter casualties. It also uses data obtained from state fire marshals, the National Center for Health Statistics, the Bureau of the Census, and the Consumer Product Safety Commission. The U.S. Fire Administration gratefully acknowledges the use of their information. Sources are cited for each graph and table in the report.[1]

METHODOLOGY

An attempt was made to keep the data presentation and analysis as straightforward as possible. It was also the desire of the USFA to make the report accessible to the largest group of users, and therefore an attempt was made to avoid any unnecessarily complex methodology.

National Estimates

Most numbers in this report are national estimates or percentages, not raw totals from NFIRS. The reader does not have to scale the data.

Many of the estimates are derived by computing a percentage from NFIRS and multiplying it by the total number of fires, deaths, injuries, or dollar loss from the NFPA annual survey. For example, the national estimate for the number of residential cooking fires was computed by taking the percentage of NFIRS residential fires (with known causes) that were attributed to cooking and multiplying it by the estimated total number of residential fires from the NFPA survey.

Ideally, one would like to have all of the data come from one self-consistent data source. But because the "residential population protected" was 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 is served by several fire departments which 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 Consumer Products Safety Commission and NFPA, however, 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 NFIRS proportions of residential, non-residential, etc., as from the

[1] The term *fire losses* in captions refers to deaths, injuries, and dollar loss; the term *fire casualties* refers to deaths and injuries.

NFPA proportions. This inconsistency will remain until all estimates can be derived from NFIRS alone.

In the future, the national estimates will be derivable solely from NFIRS if a statistically sufficient number of fire departments participating in NFIRS provide reasonably accurate estimates of their population protected.

Unknowns

On a fraction of the incident reports or casualty reports sent to NFIRS, the desired information for many data items is either left blank or reported as "unknown." The total number of blank or "unknown" entries is often larger than some of the important subcategories. For example, 47 percent of the fires in 1995 do not have sufficient data reported to NFIRS to determine cause. The lack of data, especially for fatal fires, masks the true picture of the fire problem. Many prevention and public education programs use the NFIRS data to target at-risk groups or to address critical problems, fire officials use the data in decisionmaking 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 reporting.

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 the cause was provided. This in effect distributes the fires for which the cause is unknown in the same proportion as the fires for which the cause is known, which may or may not be approximately right. That is the best we can do without additional knowledge of the nature of the unknowns.

To illustrate: Heating was reported as the fire cause for 9.8 percent of residential fire fatalities; another 32.6 percent of residential fatalities had cause unknown; thus, the percent of fatalities that had their cause reported was $100 - 32.6 = 67.4$ percent. With the unknown causes proportioned like the known causes, the adjusted percent of residential fire fatalities caused by heating can then be computed as $9.8 \div 67.4 = 14.5$ percent.

Representativeness of the Sample

The percentage of fire departments participating in NFIRS varies state to state, and some states are not participating at all. To the best that USFA can determine, the distribution of participants is at least reasonably representative of the entire nation, even though the sample is not random. The sample is so large—over 40 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. Most of the NFIRS data

exhibit stability from one year to another, without radical changes, as will be observed from the 10-year trend lines presented throughout this report. Also, 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 participating departments should have the same reporting requirements—the "big picture" is a reasonably accurate description of the fire problem in the United States. It is the best one we have ever had.

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, in Figure 8, "Trends in Fires and Fire Losses," the percent change from 1986 of 26,825 injuries to 1995 of 25,775 injuries would be a decrease of 4 percent. Yet, if we were to choose 1987 as the beginning data point (28,215 injuries), this change would show a 9 percent decrease. As we are interested in *trends* in the U.S. fire problem, this edition of *Fire in the United States* reports the overall change in a data series as a trend. We have computed the best-fit trend line (which accounts for the fluctuation in the year-to-year data) and have presented the change over time based on this trend line. In this example, the overall 10-year trend is a decrease in injuries of 3 percent—not the 4 percent decrease calculated from only beginning and ending years.

Cause Categories

The causes of fires are often 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 U.S. Fire Administration 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 more detailed analysis, as needed.

The cause categories used in this project are listed in the same order on each graph to make comparisons easier from one to another. The order here also is the same as used in previous *Fire in the United States* reports. The particular order chosen was a combination of the order used in the cause sorting hierarchy and a desire to put the more important causes in the top half of the charts.

A 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 40 percent of the fatal 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 was reported. However, there is no information 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 3.[2] A fire is included in the highest category into which it fits on the list. If it does not fit the top category, then the second one is considered, and if not that one, the third, and so on. For example, a fire caused by an arsonist using a match to ignite a fuse is included in the "incendiary or suspicious" category and not in the "open flame" category. If the arsonist used a cigarette to ignite the fuse, the fire still is grouped with incendiary and suspicious fires and not with "careless smoking" fires.

The 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.

Ratio of NFIRS to NFPA Data

There is an inconsistency between the NFIRS sample and the NFPA annual survey data: In every year, the deaths reported to NFIRS are a larger fraction of the NFPA estimate of deaths than the NFIRS fires are of the NFPA estimate of fires. NFIRS injuries and dollar loss are even larger fractions of the NFPA totals than are deaths or fires. This issue is discussed further in Appendix A.

Unreported Fires

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

NFIRS does not include fires from 11 states and 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 accurate national estimates for any but the smallest subcategories of data.

[2] The exact hierarchy and specific definition in terms of the NFIRS code may be found on pages 2–201 to 2–203 of the 1990 NFIRS System Documentation Manual, Version 4.1. The actual hierarchy involves a large number of subcategories that are later grouped into the 13 major categories.

Table 3. 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 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

* 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 electrical distribution.

An enormous number of fires are not reported to the fire service at all. Most are small fires in the home or in industry which go out by themselves or are extinguished by the occupant. These unreported fires collectively cause a great deal of property loss and a large number of injuries requiring medical attention, based on a study done in the early 1970s. CPSC commissioned a study in 1984 on unreported fires. We do not have a current study that can be used to estimate the magnitude of the problem.

Perhaps the most disturbing type of unreported fires are those 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 all submitted. The information that is received is assumed to be the total for the department and is extrapolated as if it were. While there was measure of the extent of this problem in the past, the new NFIRS 5.0 provides fire departments with the capability to report this information in an easy, straightforward manner.

ORGANIZATION OF REPORT

This report is organized similarly to the Ninth Edition of *Fire in the United States*. Chapter 2 presents an overview of the national fire problem in terms of the total number of fires, deaths, injuries, and dollar loss—the four principal measures used to describe the fire problem.

Chapter 3 is a state-by-state presentation of fire deaths, principally in residences. Chapter 4 addresses firefighter casualties. Chapter 5 focuses on two special topics bearing on the fire problem: an examination of socio-economic factors that may affect fire incidents and a close look at the many uses of NFIRS data. At the end of each chapter, a section describes available USFA resources that provide in-depth information on specific topics.

The Ninth Edition of *Fire in the United States* included a detailed examination of residential and non-residential fires and losses over the 10-year period 1985–94. These data will be updated in the Eleventh Edition.

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 an index to the topics of this report.

1

THE NATIONAL FIRE PROBLEM

OVERVIEW

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 dollar loss—which make the U.S. fire problem one of great national importance.

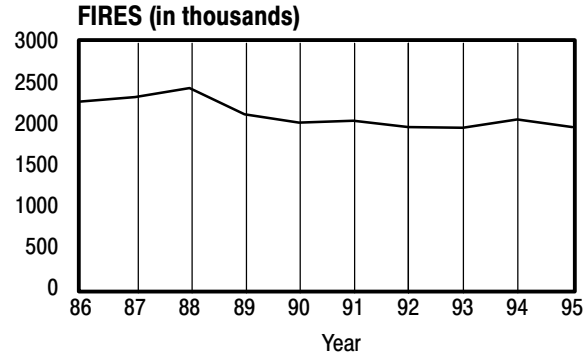
Although we have made much progress in the last decade, the United States continues to have one of the highest per capita fire death rates in the world. The United States had an average of 5,117 fire deaths a year from 1986 to 1995 (Figure 8). The number of deaths has been steadily trending down—30 percent over the past 10 years. In 1995, the number of deaths was 4,585.

We are less certain of the injury statistics in Figure 8 because of ambiguity about the completeness of defining and reporting minor injuries and the fact that many injured people go directly to a medical care facility themselves without going through a fire department screening. There was an average of 28,400 reported civilian injuries per year from reported fires over the past 10 years and an average of 56,260 injuries to firefighters from those fires, as shown in Chapter NO TAG, Figure NO TAG. The actual totals for reported fires may be even higher. Furthermore, 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 NO TAG. Fire-caused injuries to civilians trended down by 3 percent over the 10-year period. Injuries in 1995 were at their lowest level since 1986.

In terms of dollar loss, the estimated direct value of property destroyed in fires was $8.9 billion for 1995. 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 much higher. The direct dollar loss increased 21 percent from 1986 to 1995, with the increase due to inflation. Using constant 1995 dollars, the loss was down by 13 percent over this period. Still, the direct dollar loss was enormously high at an average of $9.6 billion a year in adjusted 1995 dollars.

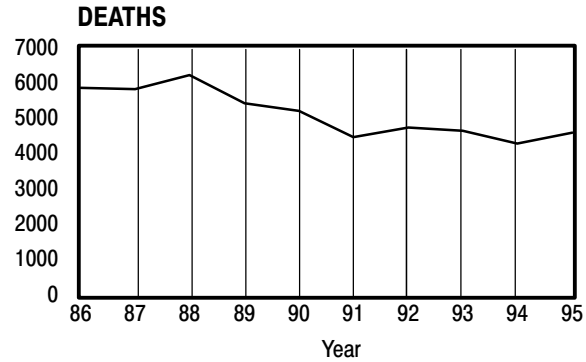
These casualties and losses come from an average of nearly 2.1 million fires a year. Fire incidents have declined 18 percent since 1986, with the sharpest decline in 1989 but remaining steady since then.

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



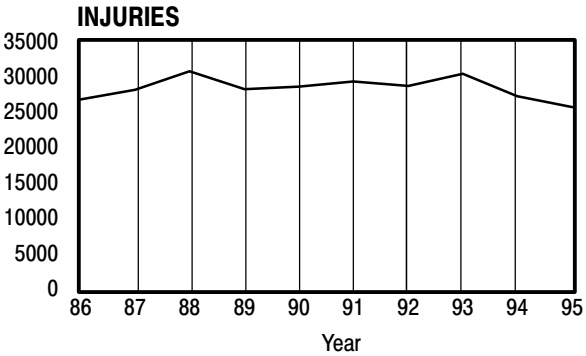
1986	2,272	1991	2,042
1987	2,330	1992	1,965
1988	2,437	1993	1,953
1989	2,115	1994	2,055
1990	2,019	1995	1,966

10-Year Trend = –17.7%



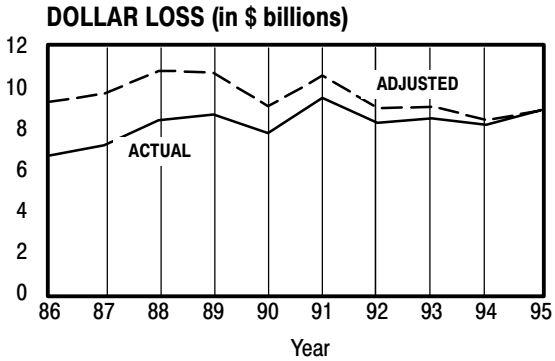
1986	5,850	1991	4,465
1987	5,810	1992	4,730
1988	6,215	1993	4,635
1989	5,410	1994	4,275
1990	5,195	1995	4,585

10-Year Trend = –29.8%



1986	26,825	1991	29,375
1987	28,215	1992	28,700
1988	30,800	1993	30,475
1989	28,250	1994	27,250
1990	28,600	1995	25,775

10-Year Trend = – 3.0%



	Actual	Adjusted to 1995 Dollars
1986	6.7	9.3
1987	7.2	9.7
1988	8.4	10.8
1989	8.7	10.7
1990	7.8	9.1
1991	9.5	10.6
1992	8.3	9.0
1993	8.5	9.1
1994	8.2	8.4
1995	8.9	8.9

10-Year Actual Trend = +20.7%
10-Year Adjusted Trend = –13.0%

Sources: NFPA Annual Surveys and Consumer Price Index

Figure 8. Trends in Fires and Fire Losses

of reported fires and fire casualties. Over this 10-year period, reported fires averaged 8.4 per thousand population (Figure 9).

The fire death rate per million population has declined a significant 36 percent. In terms of injuries, the per capita rate was down 11 percent over 10 years largely because of the drop between 1994 and 1995. Although dollar loss per capita was $34, up 10 percent unadjusted, it trended down 21 percent over the 10 years when adjusted for inflation.

THE BROADER CONTEXT

Fires constitute a much larger problem than is generally known. Losses from all natural disasters combined—floods, hurricanes, tornadoes, earthquakes, etc.—average a fraction of the annual direct dollar losses from fire. Deaths from disasters have tended to be vastly fewer than from fires—on the order of 200 per year for disasters versus more than 4,000 for fires.

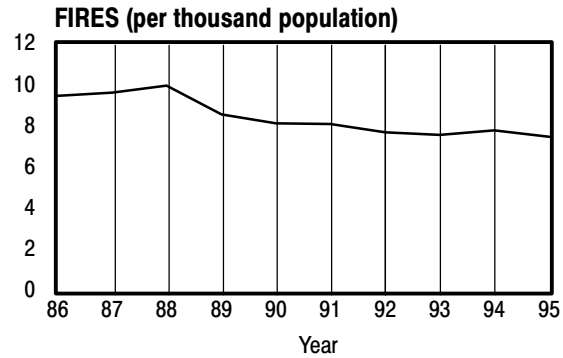
Most fires are relatively small, and their cumulative impact is not easily recognized. There are only a few fires that have the huge dollar losses that are associated with hurricanes or floods. The southern California wildland fires in the fall of 1993 resulted in over $800 million in losses. The Oakland East Bay Hills fire of October 1991 was estimated to have caused over $1 billion in losses. The Phillips petrochemical plant fire in the Houston ship channel in October 1989 caused several hundred million dollars in losses. But because most of the losses from fire are spread over the more than 2 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. The National Safety Council ranks fires as the fifth leading cause of accidental deaths, behind only vehicle accidents, falls, poisonings, and drownings.

Fire-related injuries to civilians and firefighters are reported with too much uncertainty to properly rank them with confidence, but it is clear 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 family, friends, and fellow workers.

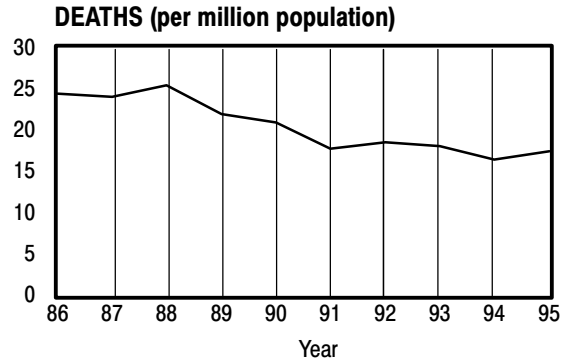
U.S. Fire Deaths Versus Other Nations

The United States has one of the most severe fire problems in the industrialized nations. Although our per capita death rate is nearly half what it was in the late 1970s, and down 36 percent since 1986, current international data (1994) suggest that the United States has a fire death rate two to three times that of several European nations and at least 20 percent higher than most. In 1994,



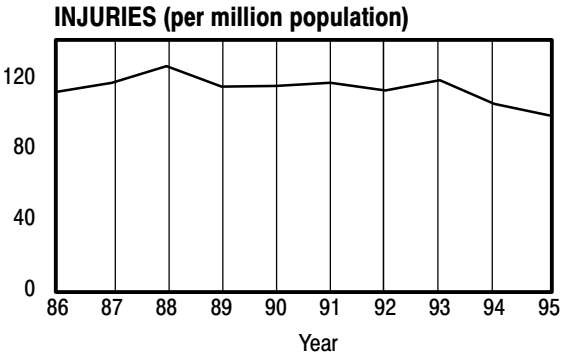
1986	9.46	1991	8.10
1987	9.62	1992	7.70
1988	9.97	1993	7.57
1989	8.57	1994	7.89
1990	8.12	1995	7.48

10-Year Trend = –25.1%



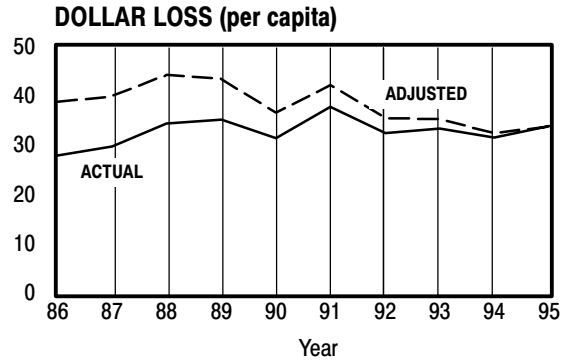
1986	24.4	1991	17.7
1987	24.0	1992	18.5
1988	25.4	1993	18.0
1989	21.9	1994	16.4
1990	20.9	1995	17.4

10-Year Trend = –36.2%



1986	111.7	1991	116.5
1987	116.5	1992	112.5
1988	126.0	1993	118.2
1989	114.5	1994	104.7
1990	115.0	1995	98.1

10-Year Trend = –11.3%



	Actual	Adjusted to 1995 Dollars
1986	27.9	38.8
1987	29.7	39.9
1988	34.4	44.3
1989	35.2	43.3
1990	31.4	36.6
1991	37.7	42.2
1992	32.5	35.4
1993	33.4	35.2
1994	31.5	32.4
1995	33.9	33.9

10-Year Actual Trend = +10.0%
10-Year Adjusted Trend = –20.7%

Sources: NFPA Annual Surveys, Consumer Price Index, and Bureau of the Census

Figure 9. Trends in Severity of Fires and Fire Losses

our fire death rate was reported at 19.1 deaths per million population.[1] Switzerland's rate was 5.5 per million population; Canada's was 15.2. In fact, of the 17 industrial nations that are examined by the World Fire Statistics Centre, the U.S. rate was higher than all but two—Finland and Hungary.

The declining U.S. trend in fire death rate over the past 10 years was not a singular event; all countries except Hungry and Finland also trended downward. Furthermore, although statistical data are not available, the United States is widely believed to have many more residential fires on a per capita basis than any of the countries studied.

The United States has placed greater emphasis on improving the technology in fire suppression and fire service delivery mechanisms 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.

Total Cost of Fire

The total cost of fire to society is staggering—over $100 billion per year.[2] This includes the cost of adding fire protection to buildings, the cost of paid fire departments, the equivalent cost of volunteer fire departments ($20 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 costs of fire would range from $50 to $100 billion, still enormous, and on the order of 1 to 2 percent of the gross domestic product, which was $7.27 trillion in 1995.[3] Thus from a monetary viewpoint, fire ranks among the significant national problems.

FIRE CASUALTIES BY POPULATION GROUP

The fire problem is more severe for certain groups than others. People in the Southeast, males, the old, and the very young all are at much higher risk from fires than the rest of the population.

Regional Differences

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 10 shows the states with the highest fire death rates for 1995. Although improvements have been seen in the death rates of the southeastern states, nearly

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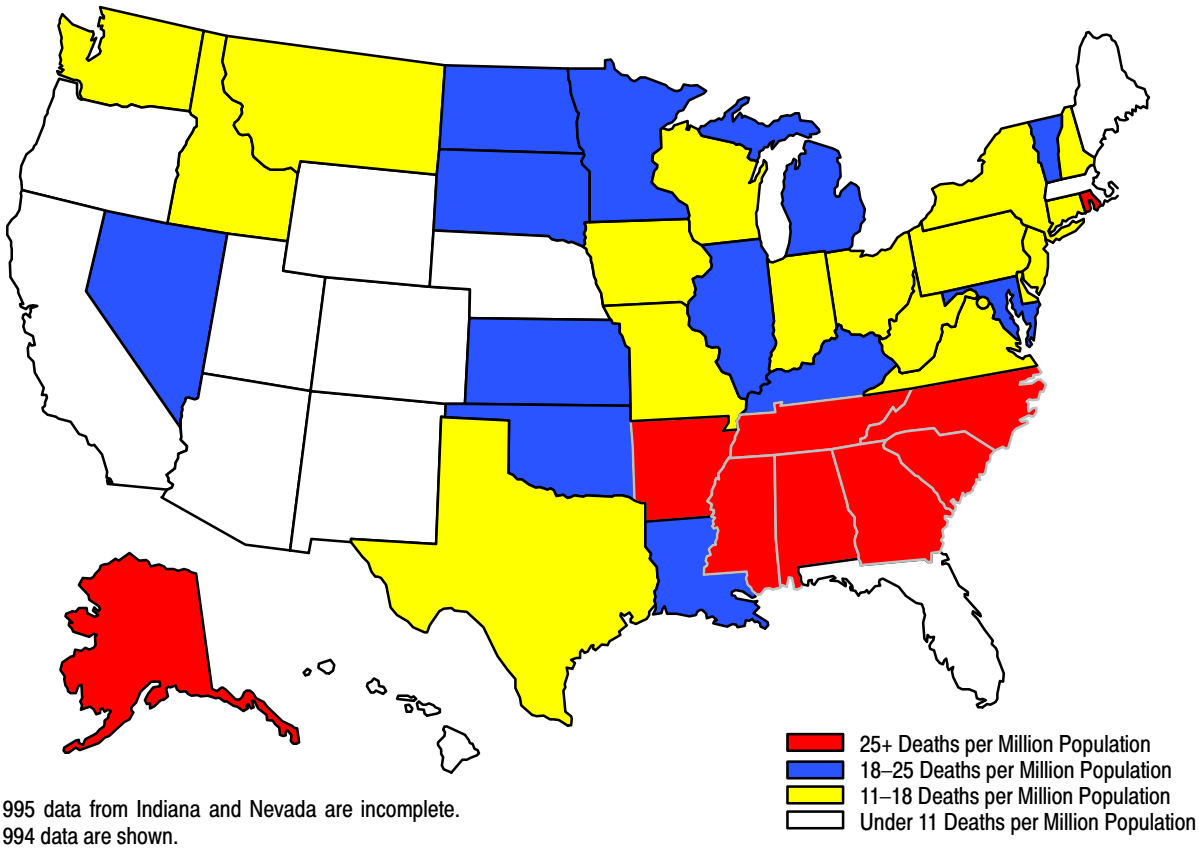
[1] World Fire Statistics Center. Using NFPA estimates and Bureau of the Census data, however, the 1994 U.S. fire death rate is computed at 16.4 per million population. The 1995 death rate is computed at 17.4 per million population.

[2] Meade, William P., *A First Pass at Computing the Cost of Fire in a Modern Society*, The Herndon Group, Inc., February 1991.

[3] U.S. Department of Commerce's Bureau of Economic Analysis.



Note: 1995 data from Indiana and Nevada are incomplete. 1994 data are shown.

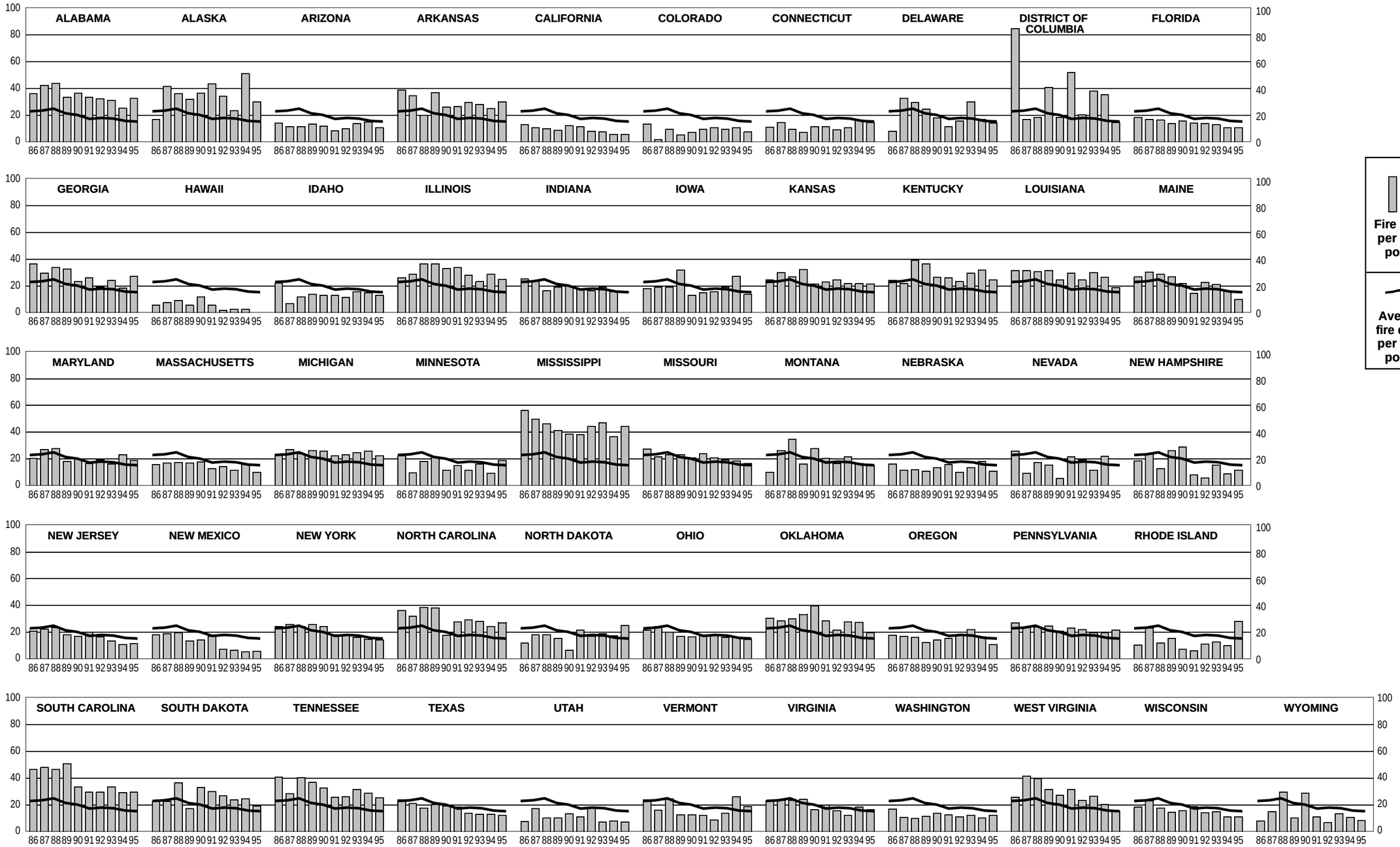
Sources: State Fire Marshals and the United States Fire Administration

Figure 10. Fire Death Rate by State in 1995

half of these still have death rates in the highest category, here at 25 or more deaths per million population. In addition to the Southeast, Alaska and Rhode Island were in the highest fire death rate category in 1995. The Southeast and Alaska have been consistently among the highest fire death rate areas for many years; however, their rates have been dropping along with those of the whole nation. Rhode Island joins this group for the first time.

The next two categories of states in Figure 10 (shaded) still have fire death rates higher than many of the developed nations in Europe and the Far East. At the other extreme are the states with no shading. These "best" states are in the general range of the nations of Europe and the Far East. They tend to be states in the Southwest and West, but there are some noteworthy others: Florida, Nebraska, Massachusetts, and Maine all had a low year in 1995. California and Florida continue to have the lowest death rates among the high population states.

Fire death rates for each state and the District of Columbia for the past 10 years are shown in Figure 11 . An overlay on each state chart represents the national fire death rates. Nine states are consistently above the national average and 11 states are consistently below it.



Source: State Fire Marshals

Figure 11. 10-Year Fire Death Rate by State Compared to National Average

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Figure 11.

The rank order of state fire death rates per million population is shown in Figure 12. 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 should be considered averaged over time. For example, both the District of Columbia and Iowa changed from one of the highest death rates from fires in 1994 to among the lowest in 1995; Rhode Island is the only state to go from best to worst. The highest states were Mississippi, Alabama, Alaska, and Arkansas. The lowest were Utah, New Mexico, California, and Hawaii.

Figure 13 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.

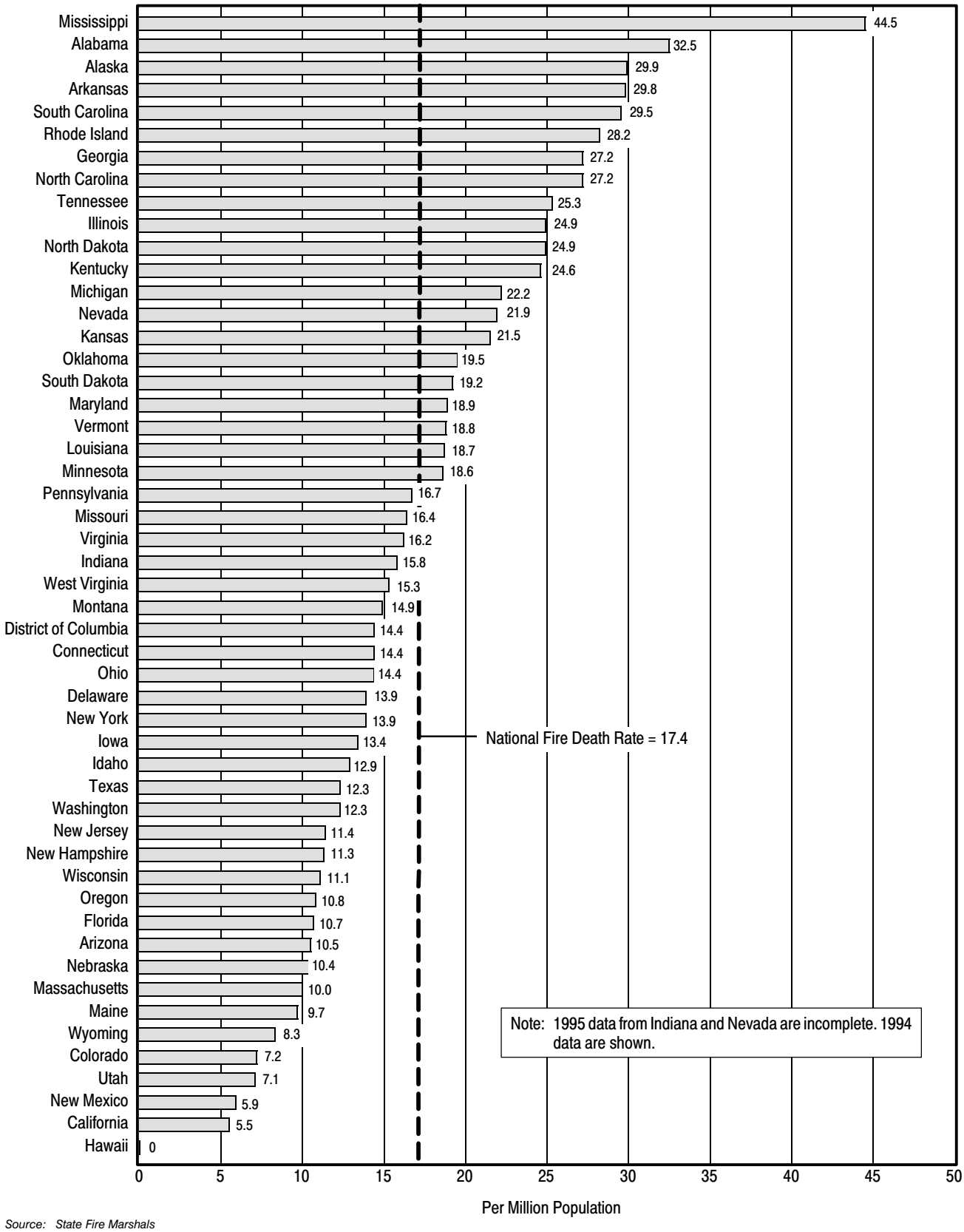
The sum of the state death estimates in Figure 13 is over 400 deaths below the estimate of 4,585 from the NFPA survey for 1995. This difference may be due to some states underreporting their fire deaths or an overestimate from the extrapolation of the NFPA sample of fire departments, or a combination of both. Nevertheless, the correspondence between the two sources should be considered quite good.

Gender

Men continue to have almost twice as many fire deaths as women. Figure 14 shows that the high proportion of male fire deaths has been remarkably steady over the past 10 years. The slight trend toward narrowing the gap between male and female fire deaths appears to have stopped in 1990. Males also have a higher fire death rate per capita than females for essentially all age groups. From the age of 20 on, males have twice the fire death rate as women (Figure 15).

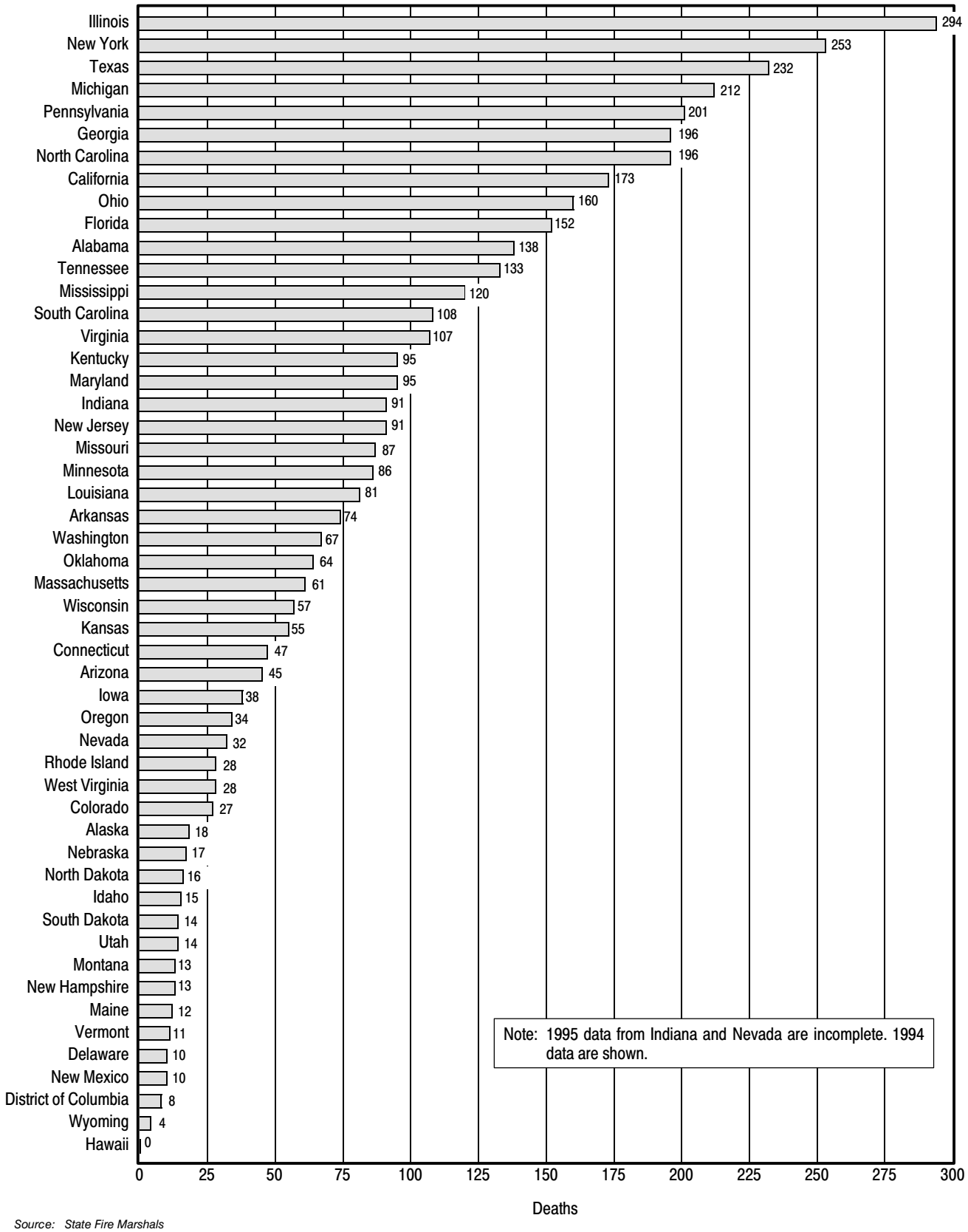
Figure 14 also shows that the male/female ratio for fire injuries is similar to that for fire deaths except that the gender gap is narrowing. Injuries per capita for males are one and one-half to two times the female rate until age 70 (Figure 15), which can be expected because of the longer lifespan of women. For the very old, however, the male injuries per capita are nearly three times that of females.

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, the more dangerous occupations of men (most industrial fire fatalities are males), and the greater use of gasoline and other flammable liquids by men. We do know that men have more injuries trying to react to the fire than do women.



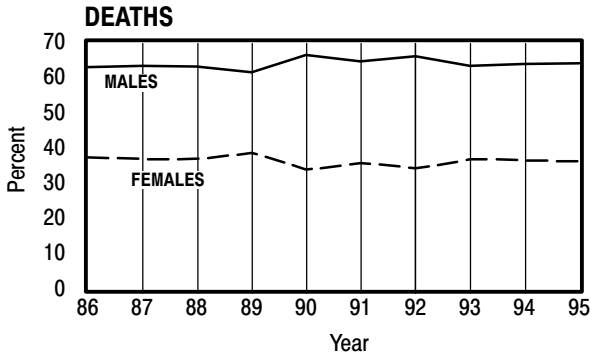
Source: State Fire Marshals

Figure 12. Rank Order of States by Fire Death Rate



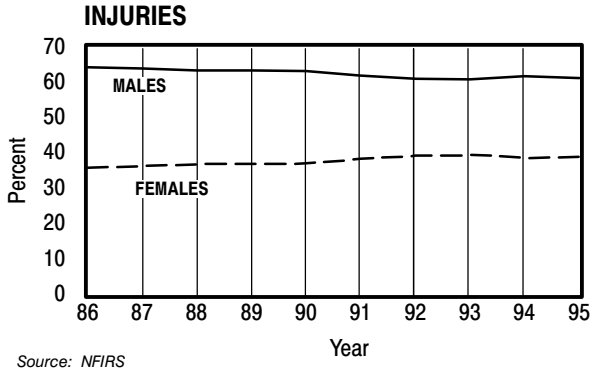
Source: State Fire Marshals

Figure 13. Rank Order of States by 1995 Civilian Deaths



	Males	Females		Males	Females
1986	62.8%	37.2%	1991	64.4	35.6
1987	63.2	36.8	1992	65.9	34.1
1988	63.1	36.9	1993	63.2	36.8
1989	61.4	38.6	1994	63.7	36.3
1990	66.2	33.8	1995	64.0	36.0

10-Year Male Trend = +1.7%
10-Year Female Trend = –2.9%



	Males	Females		Males	Females
1986	64.2%	35.8%	1991	61.8	38.2
1987	63.8	36.2	1992	60.8	39.2
1988	63.2	36.8	1993	60.6	39.4
1989	63.2	36.8	1994	61.6	38.4
1990	63.0	37.0	1995	61.1	38.9

10-Year Male Trend = –4.7%
10-Year Female Trend = +11.3%

Source: NFIRS

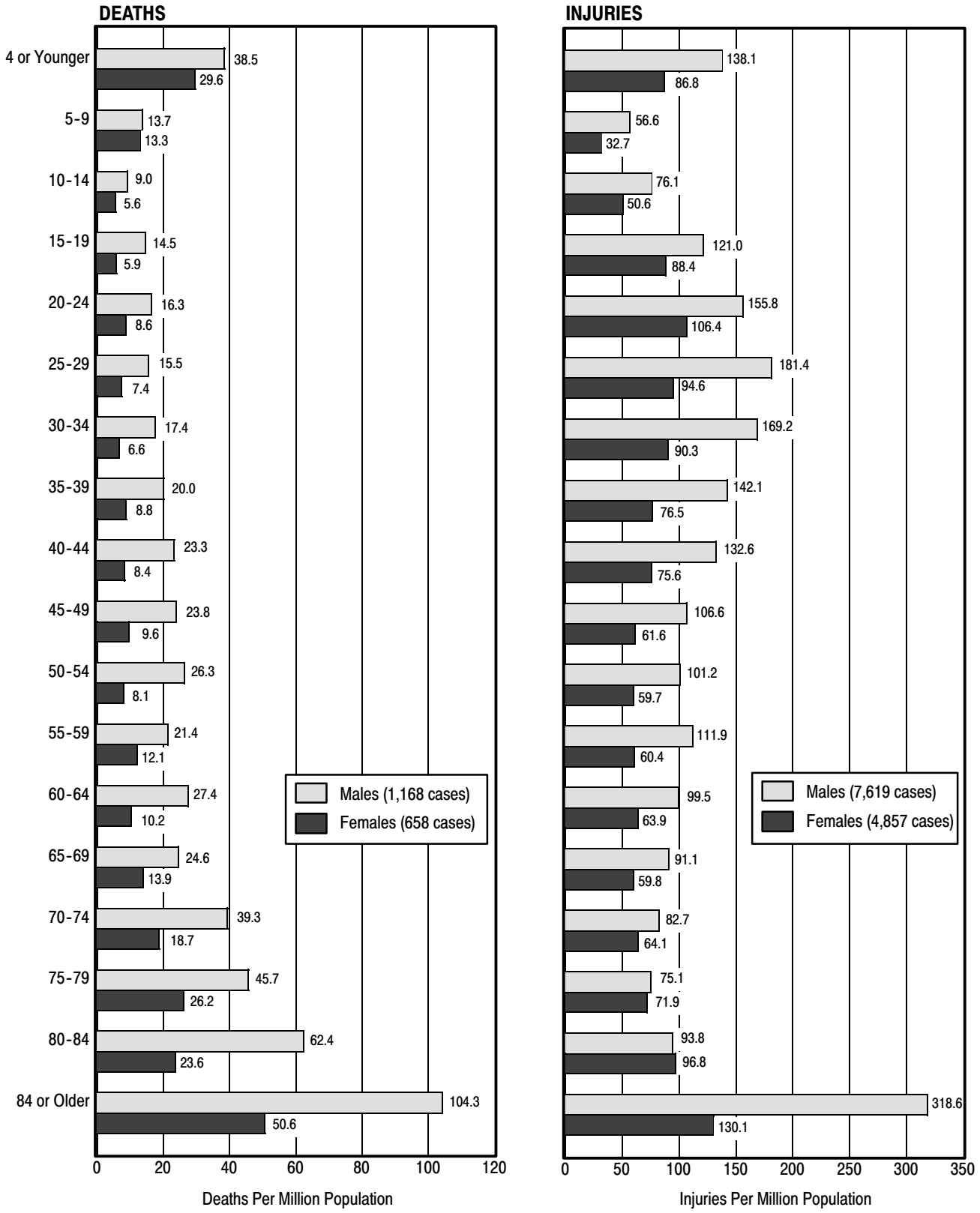
Figure 14. Trends in Male vs. Female Casualties

Age

People over 60 have a much higher fire death rate than the average population (17.4 deaths per million population), as shown in Figure 16. At the other end of the age spectrum, the very young (under 5) have a much higher than average problem too. The relative risk of dying and being injured in a fire for various age groups is shown in Figure 17. (The population as a whole has a relative risk of 1.) Children under 5 have nearly double the risk of death, children over 5 have less than average risk.[4] Risk of fire death drops off sharply between 5 and 19, then experiences inconsistent changes until age 55. At age 55, the risk begins to consistently increase. By age 70, there is a jump in risk; and above age 84, the risk is even higher than for the very young. These profiles remain relatively constant from year to year.

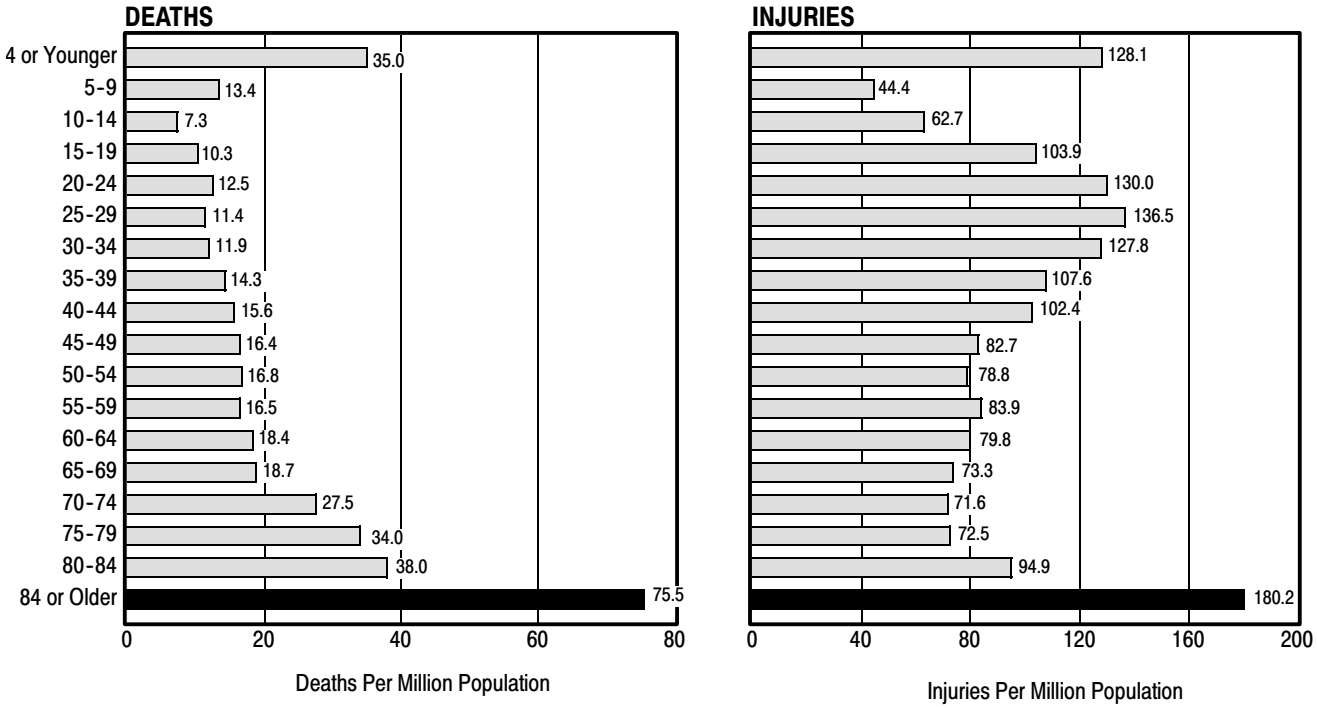
Contrary to what might be expected, the age profile of risk from injuries is very different from that for deaths. The risk of injury in a fire is highest for infants and children under 4, young adults aged 20–34, and the elderly over 85. The risk of injury is below average (98 injuries per million population) for children and those aged 45–79.

[4] For those interested in data reliability issues, there is some concern over the coding of the ages of infants less than 1 year old. Some code them as 1, some as 0, and some to the nearest integer of 0 or 1. Also, some fire departments or states fill in blank fields with zeros. Thus, the number of casualties with age 0 has been suspect. By dropping age profiles with 0's, the difference was small; the category 0–4 still had a relative risk of nearly 2 for fire deaths.



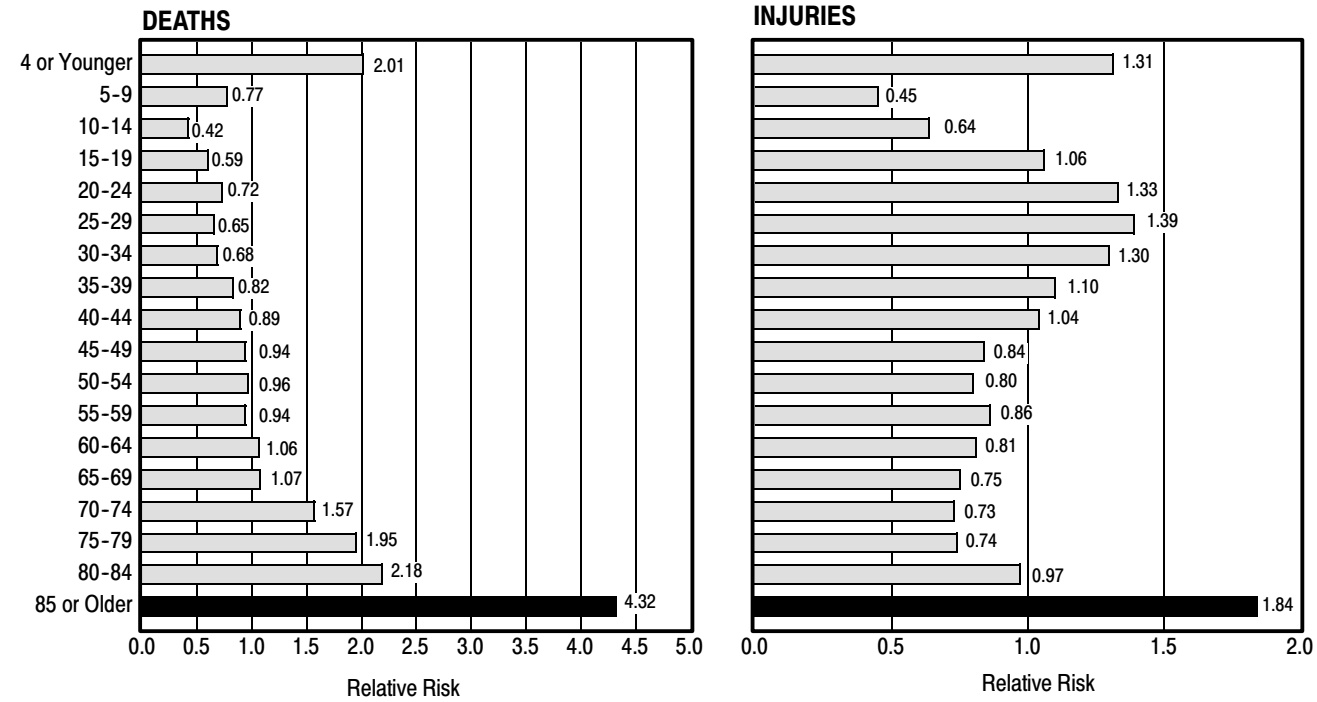
Sources: NFIRS, NFPA Annual Surveys, and Bureau of the Census

Figure 15. Severity of 1995 Fire Casualties by Age and Gender



Sources: NFIRS, NFPA Annual Surveys, and Bureau of the Census

Figure 16. Severity of 1995 Fire Casualties by Age



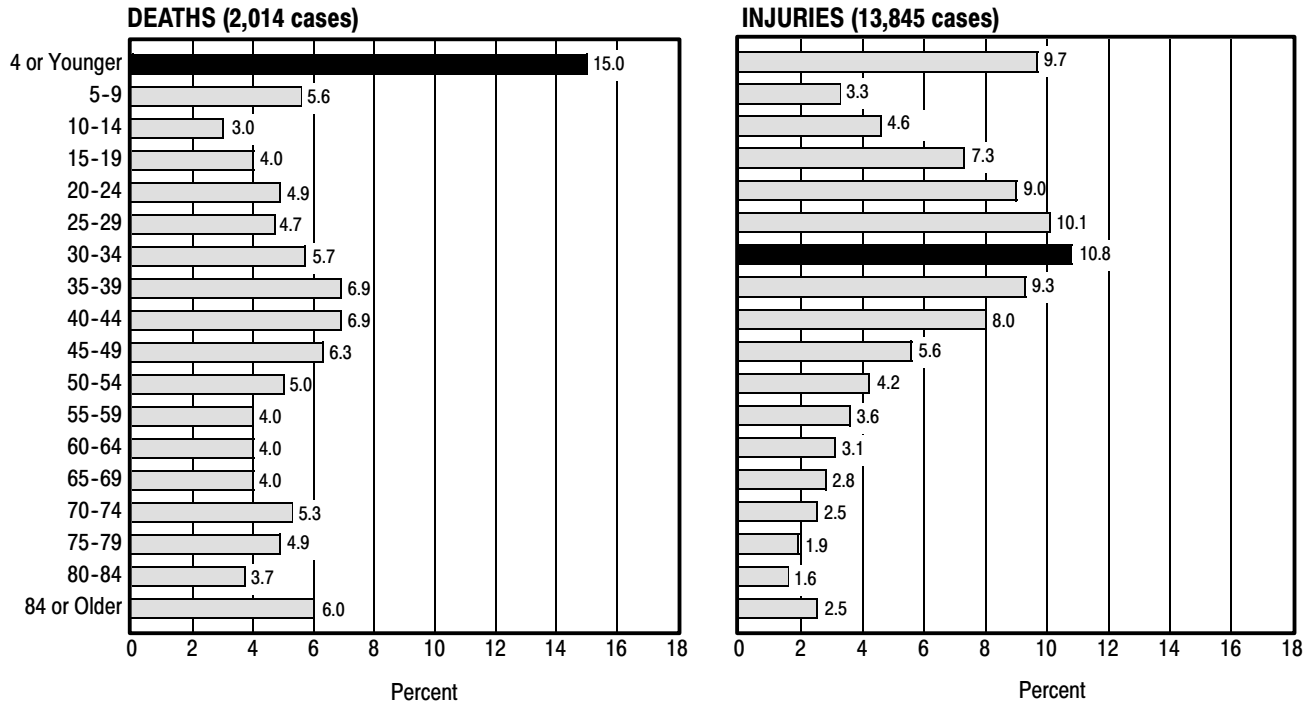
Sources: NFIRS, NFPA Annual Surveys, and Bureau of the Census

Figure 17. Relative Risk of 1995 Fire Casualties by Age

Figure 18 shows the percent of 1995 fire deaths and injuries falling into each age group. (This is not the same as risk.) Those under age 5 account for 15 percent of the deaths with age reported—by far the highest proportion for any age group. Those 70 and above comprise 20 percent of the fire deaths. These two peak risk groups comprise more than one-third of fire deaths and represent about equal numbers of fatalities. On the other hand, 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 victims.

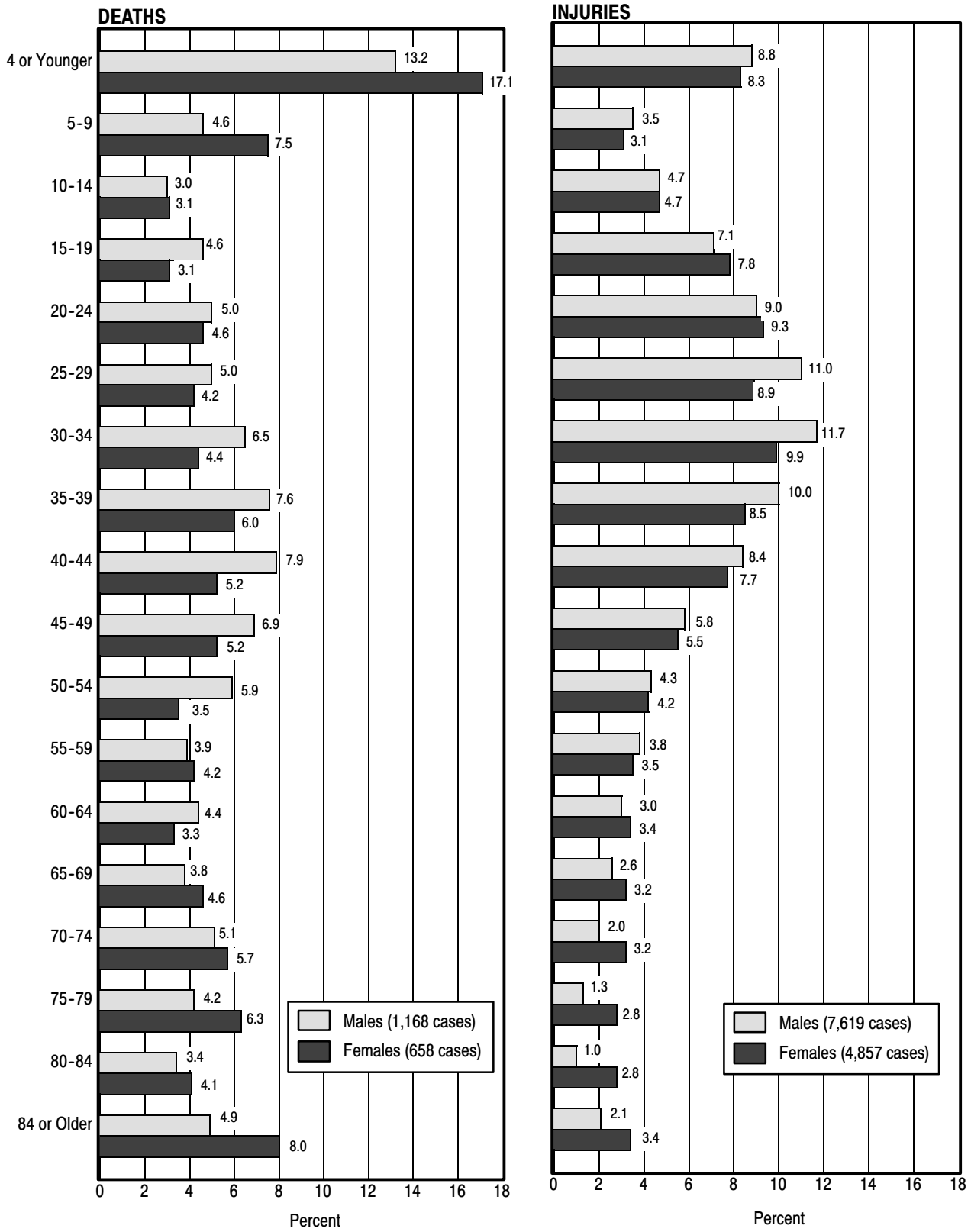
The injury distribution tracks closely the relative risk profile by age, except for the elderly (Figure 18). Ages 20–39 account for 39 percent of fire injuries in 1995. The very young account for 10 percent; the elderly over age 70 account for 9 percent. Although the elderly are at high risk, there are 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 young adults 20–39. It is believed that males in this age group are greater risk takers during fires, resulting in a higher proportion of injuries.

The distribution of fire deaths by age is somewhat different for males versus females. A slightly larger proportion of female deaths in 1995 occurred in the young (through age 14) and again in the elderly (Figure 19). Male fire deaths, by contrast, are higher in the mid-life years, ages 15 to 55. Elderly females have a significantly larger proportion of injuries than males.



Sources: NFIRS, NFPA Annual Surveys, and Bureau of the Census

Figure 18. 1995 Fire Casualties by Age



Source: NFIRS

Figure 19. 1995 Fire Casualties by Age and Gender

Ethnic Groups

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" or ethnic group of victims are somewhat ambiguous in a society where many people are of mixed heritages. And many citizens, including firefighters, find it distasteful to report on race. On the other hand, there does seem to be a higher fire problem for some groups, and it can be helpful to identify their problems for use within their own communities.

KINDS OF PROPERTIES WHERE FIRES OCCUR

This section describes the proportions of the fire problem across major types of properties: residential structures, non-residential structures, vehicles, outside properties, and other or unknown properties.[5]

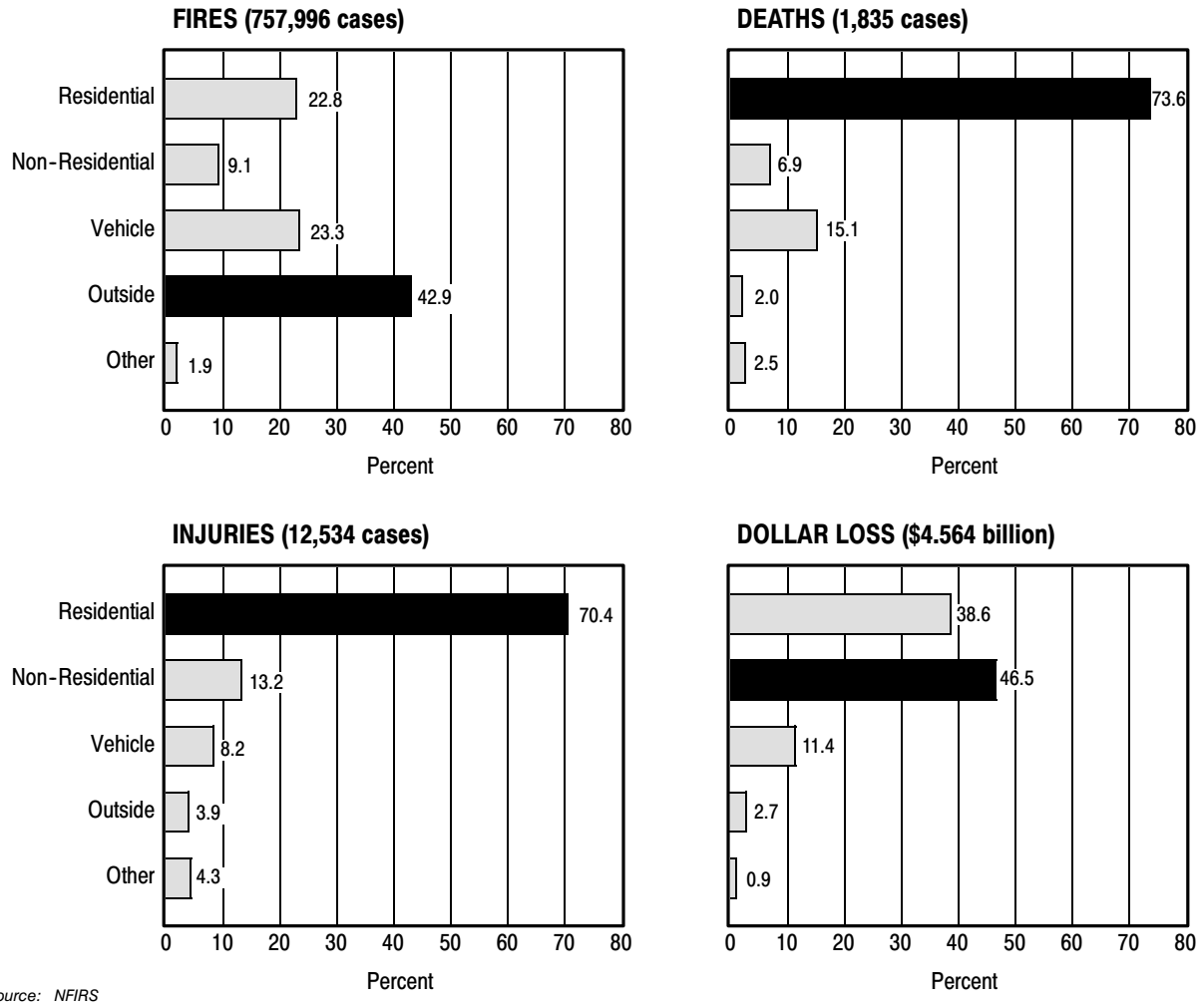
Property Categories

In terms of numbers of fires, the largest category in 1995 (as in all years) is outside fires (43 percent)—in fields, vacant lots, trash, etc. (Figure 20). Many of these fires are intentionally set but do not cause much damage. Residential and non-residential structure fires together comprise only about one-third of all fires. Residential fires outnumber non-residential structure fires by two and a half to one. What may surprise some is the large number of vehicle fires. In fact, one out of every four fires that fire departments attend involves vehicles. The number of vehicle fires does not include the many vehicle accidents that the fire department responds to but where there is no fire.

By far the largest percentage of deaths, 74 percent, occurs in residences, with the majority of these in one- and two-family dwellings. It may surprise some that such a large share of our fire deaths result from fires that occur in houses and apartments. Great attention is given to large, multiple death fires in public places such as hotels, nightclubs, and office buildings. But in fact, the major attention-getting fires that kill 10 or more people are few in number and while tragic constitute only a small portion of fire deaths. Firefighters generally are doing a good job in protecting public properties in this country. The area with the largest problem is where it is least suspected—in people's homes. Fire prevention efforts should be increasingly focused on this part of the overall fire problem.

Vehicles accounted for the second largest percentage of fire deaths, 15 percent. As most vehicle fires deaths are the result of collisions, there are virtually no fire prevention programs designed to address this problem other than as part of vehicle design and as a byproduct of accident prevention in general.

[5] The percentage of fire deaths in the major property types differs somewhat between NFIRS and the NFPA survey. These differences are discussed in Appendix NO TAG.



Source: NFIRS

Figure 20. 1995 Fires and Fire Losses by General Property Type

Only 7 percent of the 1995 fire deaths occurred in commercial and public properties. Outside and other (unknown) fires, including wildfires, were a very small factor in fire deaths (4 percent).

As Figure 20 shows, the picture is somewhat similar for fire injuries, with more than two-thirds of all injuries occurring in residences. Non-residential structures are the location of 13 percent of all fire injuries. Vehicles account for another 8 percent. Outside and other fires account for just 8 percent of the fire injuries.

The picture changes sharply for dollar loss. Non-residential structure fires, while they accounted for less than 10 percent of fires, accounted for nearly half of the nation's fire loss. Moreover, when the two structure categories—residential and non-residential—are combined, they accounted for 85 percent of all dollar loss. The proportion of dollar loss from outside fires may be understated because the destruction of trees, grass, etc., is given zero value in fire reports if it is not commercial cropland or timber.

All relative percentages for property type fires were the same in 1995 as they were in 1994.

Trends

The proportions of the fire problem by property type have remained quite steady over time. This is another consistency check for NFIRS. In terms of numbers of fires, the proportion of the problem due to outside property has increased slightly from 41 percent to 43 percent over the 10-year period, the proportion in vehicles and non-residential structures has remained constant, the proportion in residential and other structures has declined slightly and the proportion of other fires has increased (Figure 21). It has been suggested that the outside property increases might be due to an increasing number of rural departments reporting to NFIRS, increased automation, or more complete reporting.

Over the 10-year period, residential property fires have ranged from 69 to 75 percent of total fire deaths, with an overall downward trend. Non-residential structures and outside fires have remained steady and represent a small, but increasing, proportion of deaths. The trend in vehicle fires has been steadily decreasing while the trend associated with fire deaths has been increasing.

Except for residential properties, the trends in property types for injuries have been slowly decreasing over the 10-year period. Injuries in residential properties have increased slightly over this period.

Dollar loss has greater trend fluctuations because this measure is highly sensitive to a few very large fires and whether they are included or omitted in the sample of fires on which estimates are based. The classic example is the 1986 pineapple fire in Hawaii ("outside" property type), which destroyed an enormous pineapple crop and caused a peak in outside fire losses that forced the other percentages downward. Similarly, in 1994 there was a huge increase in the "other" fire category.

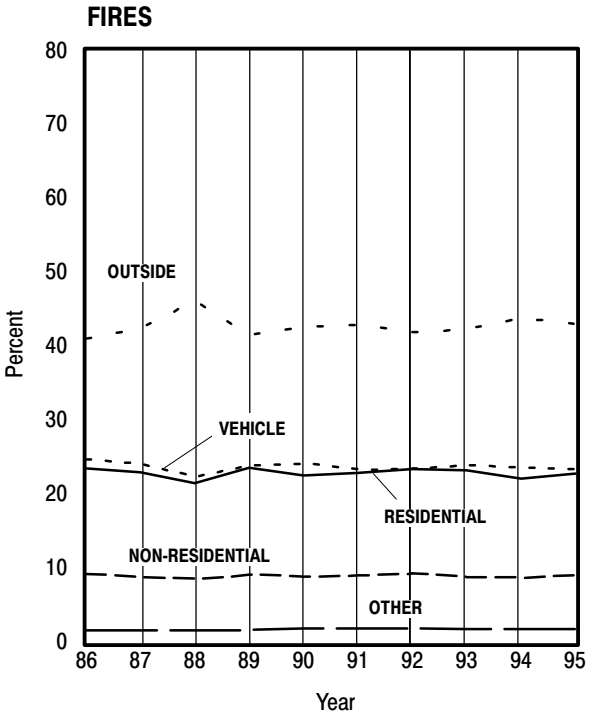
SEVERITY OF FIRES

Figure 22 shows the severity of fires in 1995 as measured by deaths and injuries per thousand fires and by dollar loss per fire. These indicators can increase if there are more casualties or more damage per fire (the numerator) or if fewer minor fires are reported (the denominator).

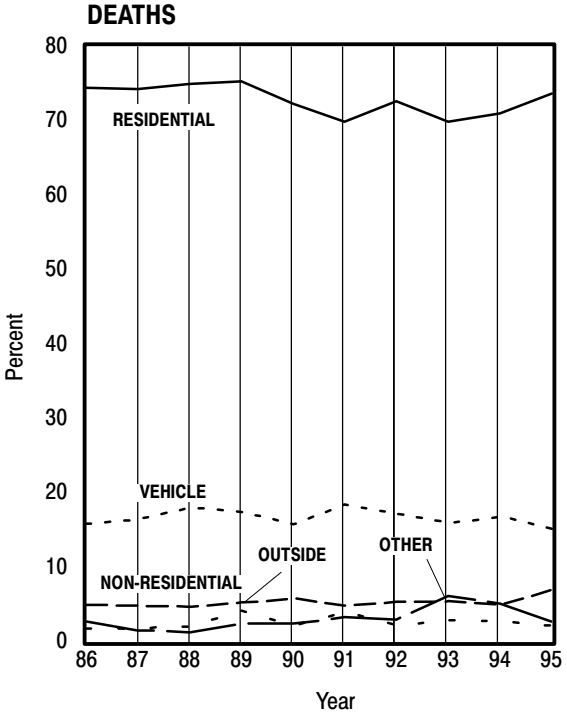
As shown, residential fires have the highest death and injury rates—another important reason for prevention programs to focus on home fire safety. Non-residential structure fires have by far the highest dollar loss per fire.

The trends in severity over the 10-year period are shown in Figure 23. Residential fire severity decreased 9 percent over the 10-year period in terms of deaths per fire and increased by 17 percent in terms of injuries per fire.

Non-residential severity increased in both deaths and injuries per fire. Other fire (including unspecified property types) has relatively high injuries per fire but represents only small numbers of fires, fire deaths, and injuries; it is a miscellaneous category.



	Residential	Non-Residential	Vehicle	Outside	Other
1986	23.5%	9.2%	24.7%	41.0%	1.6%
1987	23.0	8.8	24.1	42.4	1.6
1988	21.5	8.5	22.4	46.1	1.6
1989	23.6	9.1	23.9	41.6	1.7
1990	22.5	8.9	24.2	42.6	1.9
1991	22.9	9.0	23.3	42.9	1.9
1992	23.4	9.3	23.5	41.9	1.9
1993	23.2	8.8	23.9	42.3	1.8
1994	22.1	8.7	23.6	43.8	1.8
1995	22.8	9.1	23.3	42.9	1.9



	Residential	Non-Residential	Vehicle	Outside	Other
1986	74.4%	4.9%	15.8%	1.7%	2.6%
1987	74.2	4.7	16.4	1.8	1.4
1988	74.9	4.6	17.9	2.0	1.2
1989	75.2	5.2	17.3	4.1	2.4
1990	72.2	5.7	15.7	2.1	2.4
1991	69.8	4.8	18.4	3.9	3.2
1992	72.6	5.3	17.1	2.1	2.9
1993	69.8	5.4	15.9	2.8	6.1
1994	70.9	4.9	16.7	2.6	5.0
1995	73.6	6.9	15.1	2.0	2.5

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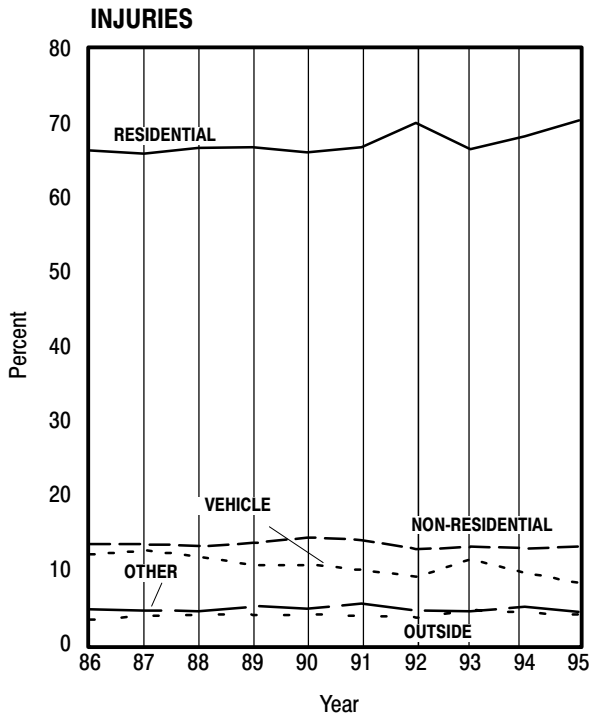
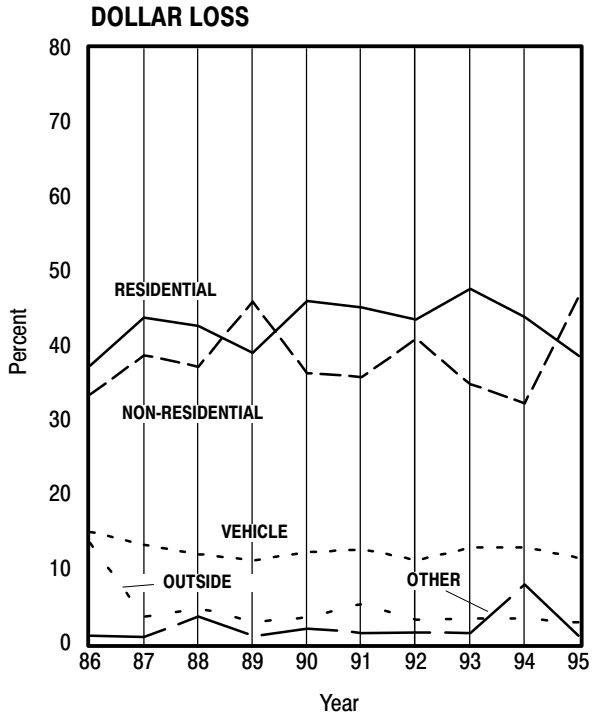
Figure 21. Trends in Fires and Fire Losses by General Property Type



	Residential	Non-Residential	Vehicle	Outside	Other
1986	66.4%	13.5%	12.1%	3.3%	4.7%
1987	65.9	13.4	12.6	3.8	4.5
1988	66.7	13.2	11.7	4.0	4.4
1989	66.8	13.6	10.6	3.9	5.1
1990	66.1	14.3	10.7	4.0	4.8
1991	66.8	14.0	9.9	3.7	5.5
1992	70.1	12.8	9.1	3.6	4.5
1993	66.5	13.1	11.4	4.6	4.4
1994	68.3	12.9	9.6	4.2	5.0
1995	70.4	13.2	8.2	3.9	4.3



	Residential	Non-Residential	Vehicle	Outside	Other
1986	37.3%	33.4%	14.9%	13.5%	1.0%
1987	43.7	38.7	13.2	3.6	0.8
1988	42.6	37.1	11.9	4.7	3.6
1989	39.0	45.9	11.1	2.9	1.0
1990	46.0	36.3	12.3	3.5	1.9
1991	45.1	35.7	12.6	5.3	1.3
1992	43.5	40.9	11.1	3.1	1.4
1993	47.6	34.8	12.9	3.3	1.3
1994	43.8	32.2	12.9	3.2	7.9
1995	38.6	46.5	11.4	2.7	0.9

Source: NFIRS

Figure 21. Trends in Fires and Fire Losses by General Property Type (cont'd)

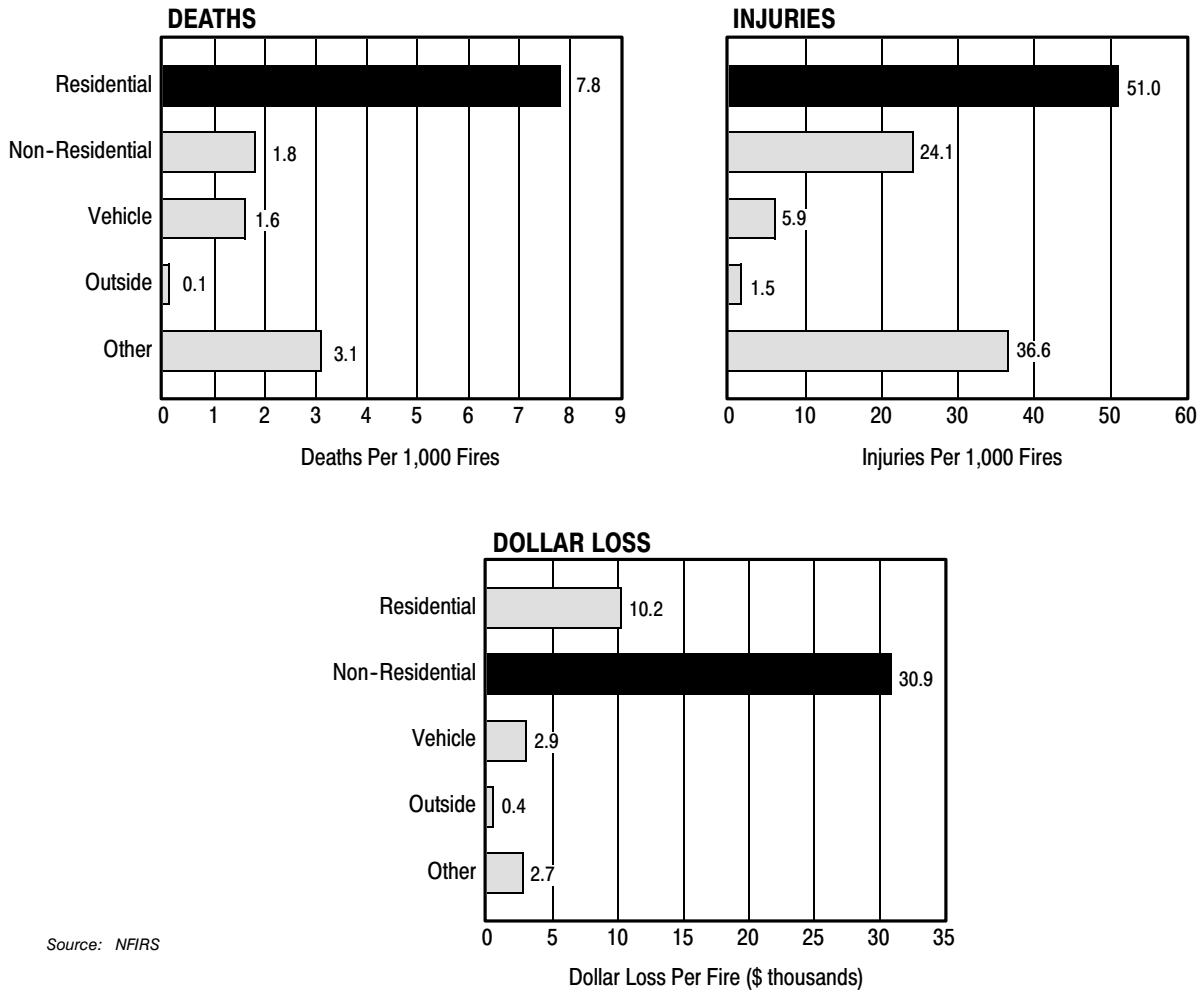
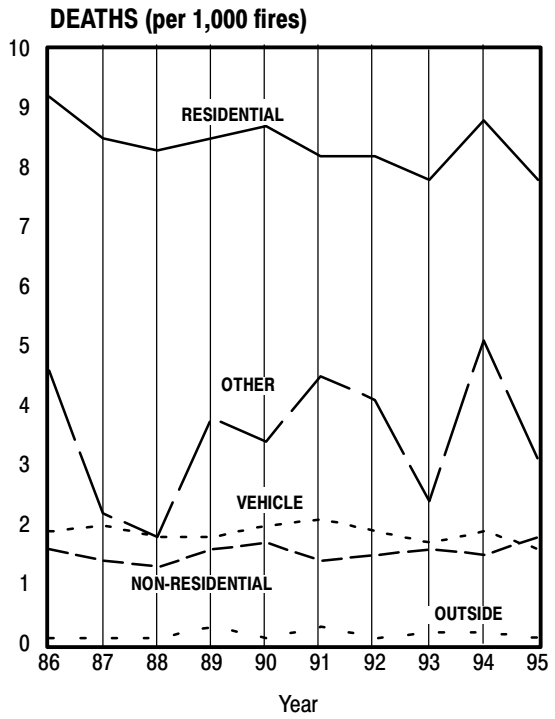


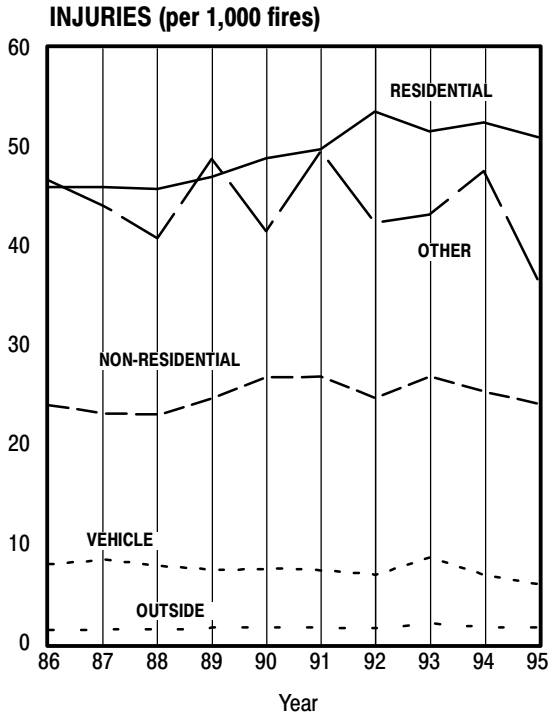
Figure 22. Severity of Fire Losses in 1995 by General Property Type

Adjusted dollar loss per fire changed significantly. Non-residential fires averaged $23,900 over 10 years per fire with wide fluctuations: from a low of $19,300 per fire in 1994 to a high of $30,900 per fire in 1995. Fire loss decreased for most categories. Residential losses increased a significant 13 percent, and from 1993 to 1994 there was an uncharacteristic increase (sixfold) in "other" fires due to one large ($300 million) explosion.

There are many reasons for increases in loss per fire in residential occupancies. It could reflect a more affluent society in part, but affluence has not increased as sharply as the losses per fire adjusted for inflation. More damage per fire also may be due to faster spreading fires. One clue as to the underlying cause for the increase is that the number and percent of residential fires that spread to the whole structure (that is, were not confined to the floor of origin) increased sharply from 1986 to 1995. This is an area needing further study.



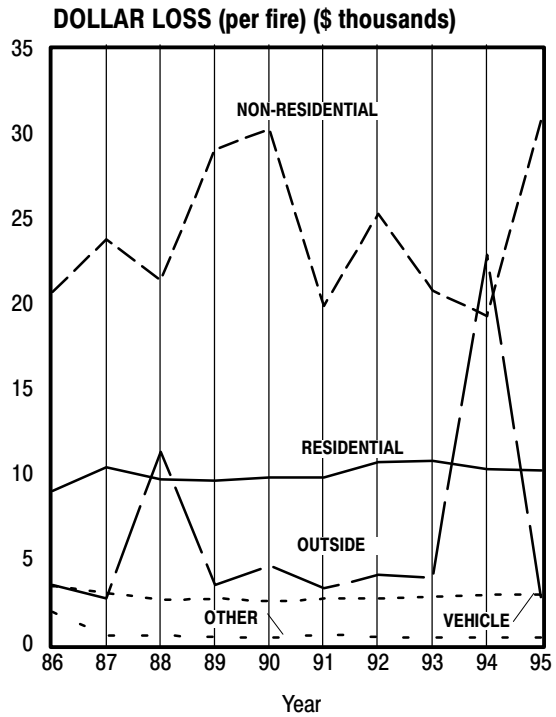
	Residential	Non-Residential	Vehicle	Outside	Other
1986	9.2	1.6	1.9	0.1	4.6
1987	8.5	1.4	2.0	0.1	2.2
1988	8.3	1.3	1.8	0.1	1.8
1989	8.5	1.6	1.8	0.3	3.8
1990	8.7	1.7	2.0	0.1	3.4
1991	8.2	1.4	2.1	0.3	4.5
1992	8.2	1.5	1.9	0.1	4.1
1993	7.8	1.6	1.7	0.2	2.4
1994	8.8	1.5	1.9	0.2	5.1
1995	7.8	1.8	1.6	0.1	3.1
10-Year Trend	**-8.9%**	**+13.7%**	**-9.8%**	**+32.5%**	**+19.8%**



	Residential	Non-Residential	Vehicle	Outside	Other
1986	46.0	24.0	8.0	1.3	46.6
1987	46.0	23.1	8.4	1.4	44.1
1988	45.8	23.0	7.8	1.3	40.8
1989	47.0	24.7	7.4	1.6	48.8
1990	48.9	26.8	7.5	1.6	41.5
1991	49.8	26.9	7.3	1.5	49.6
1992	53.6	24.7	6.9	1.5	42.4
1993	51.6	26.9	8.6	2.0	43.2
1994	52.5	25.3	6.9	1.6	47.6
1995	51.0	24.1	5.9	1.5	36.6
10-Year Trend	**+16.9%**	**+8.1%**	**-18.2%**	**+24.7%**	**-7.7%**

Continued on next page

Figure 23. Trends in Severity of Fire Losses by General Property Type



Source: NFIRS

	(in $ thousands) Residential	Non-Residential	Vehicle	Outside	Other
1986	$9.0	$20.7	$3.4	$1.9	$3.5
1987	10.4	23.8	3.0	0.5	2.7
1988	9.7	21.4	2.6	0.5	11.3
1989	9.6	29.1	2.7	0.4	3.5
1990	9.8	30.3	2.5	0.4	4.6
1991	9.8	19.9	2.7	0.6	3.3
1992	10.7	25.3	2.7	0.4	4.1
1993	10.8	20.8	2.8	0.4	3.9
1994	10.3	19.3	2.9	0.4	22.9
1995	10.2	30.9	2.9	0.4	2.7
	10-Year Trend				
	+10.7%	+8.4%	-6.8%	-80.6%	+150.0%

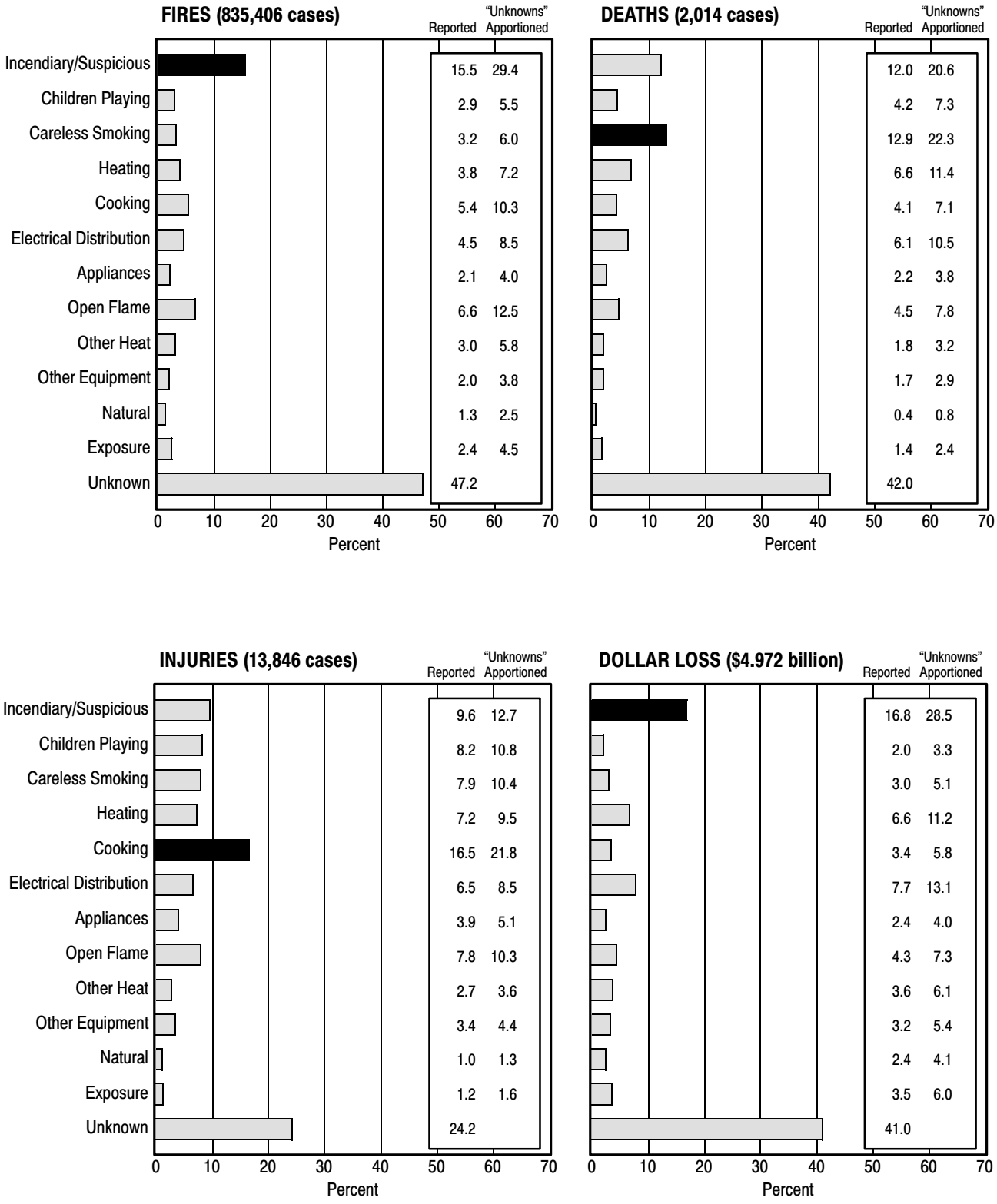
Figure 23. Trends in Severity of Fire Losses by General Property Type (cont'd)

CAUSES OF FIRES AND FIRE LOSSES

Figure 24 shows the profile of the major causes of fires, fire deaths and injuries, and direct dollar loss in 1995. Here, fire deaths occurring in all the different occupancies are grouped together. The top three causes are careless smoking (22 percent), incendiary and suspicious (or arson) (21 percent), and heating (11 percent). These percentages are adjusted, which proportionally spreads the unknowns over the other 12 causes. The leading cause of injuries is cooking (22 percent), followed by arson (13 percent) and children playing (11 percent).

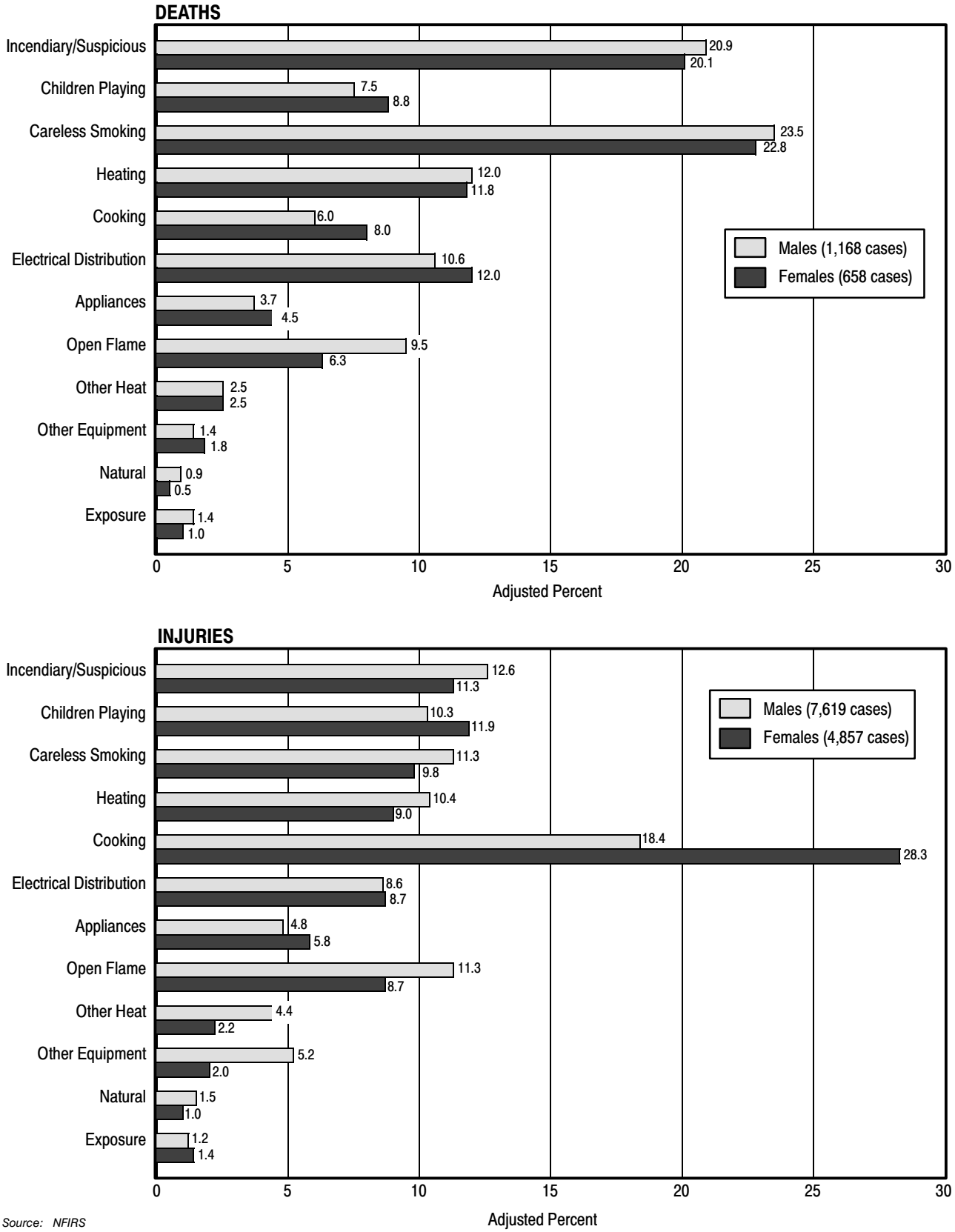
The three leading causes of fire deaths are similar for both sexes (Figure 25). The proportions of each of the remaining causes are surprisingly similar too. Males had fifty percent more fire deaths from open flame and other heat and females slightly more from cooking, electrical, and children playing fires.

Unlike fire deaths, there are sharp differences between the sexes in their injury cause profiles. The leading cause, cooking, is the same, but the relative role that the remaining causes play in fire injuries between men and women differs greatly in 1995. Moreover, while the leading cause for both sexes is cooking, nearly twice as many women are injured in cooking fires as men (28 vs. 18 percent). For women, children playing and arson are the second and third leading causes, although combined they account for fewer injuries than cooking. For men, arson is the second leading cause of fire



Source: NFIRS

Figure 24. Causes of 1995 Fires and Fire Losses



Source: NFIRS

Figure 25. Causes of 1995 Fire Casualties by Gender

injuries, followed by careless smoking and open flame. Arson is by far the leading cause of all fires and direct dollar loss.

USFA RESOURCES ON THE NATIONAL FIRE PROBLEM

The following National Fire Data Center reports provide additional insight to the magnitude of the fire problem in the United States:

- *A Profile of Fire in the United States: 1985–1994*
- *Fire in the United States: 1985–1994* (Ninth Edition)
- *Arson in the United States*
- *Socioeconomic Factors and the Incidence of Fire*
- *Children and Fire: The Experiences of Children and Fire in the United States*

Two available U.S. Fire Administration reports have attracted nationwide attention. *America Burning* is probably the most widely quoted fire protection publication. This report set the stage for national consciousness-raising about the need for as much focus on fire prevention as on fire suppression. *Fire Death Rate Trends: An International Perspective* explores the magnitude and the nature of the fire death problem in the United States. It provides a statistical portrait of fire death rates for 14 industrialized nations, and presents observations about key institutional and attitudinal differences between the U.S. and industrialized countries with significantly lower fire death rates. Another resource that is useful to the fire world is the *Fire Data Analysis Handbook*. The handbook describes statistical techniques for analyzing data typically collected in fire departments.

These publications are available by writing to:

U.S. Fire Administration
Federal Emergency Management Agency
Publications Center, Room N310
16825 S. Seton Avenue
Emmitsburg, MD 21727

Documents may also be ordered via the World Wide Web: http://www.usfa.fema.gov/usfapubs. USFA publications are free.

3

STATE PROFILES

There is considerable variation in the fire problem from state to state and from one area of the country to another. The state rankings, in terms of death rates, in Chapter 2 showed that the death rates per capita ranged from 44.5 to 0, a wide range from the highest state to the lowest. The variations in the data from state to state and from year to year result from a combination of real-world fire experience, completeness of the data, and accuracy of reporting.

This section examines the numbers of deaths, death rate trends, causes of fires and fire deaths, and other available fire-related data on a state-by-state basis. Where data from the National Fire Incidence Reporting System are available, the causes of fires and fire deaths in residential structures—where the preponderance of deaths occur—are presented as the average over a 3-year period from 1993 to 1995. These data may differ slightly from the state data. The average is shown because one year's data in isolation can present a skewed picture of the overall problem. A single large fire, a particularly cold winter, or a very hot, dry year for example can affect the data one way this year and another way the next. Taken out of context of the overall fire picture, one year's data can sometimes present a profile very different from the norm or "average" profile. Fire death data and other fire-related information were obtained from the state agency that oversees the fire and public safety arena. Where possible, the information is directly from this agency or from its annual report.

The data regarding the number of deaths each year that were supplied by the state are plotted in terms of deaths per million population and the 10-year trend. For comparison, the 10-year national average is also juxtaposed on this chart. Using death rate as a measure is a reasonable approach from the available data for assessing the fire situation across all states.

WHAT CAUSES VARIATIONS

A significant part of the real-world variations is associated with socioeconomic characteristics of the states' populations along with their climates. Alaska has a severe heating problem, a high alcoholism rate, and extreme rural conditions in much of the state. The Southeast has considerable rural poverty. The older cities of the Northeast have different fire experiences than the younger cities of the Southeast. Hawaii obviously does not have much of a heating problem, which is the leading cause of fires and fire deaths in many states. The weather results of El Nino will certainly have an effect on the current 1997 and 1998 fire data. Large cities have a higher incidence of arson than rural areas. These factors and many others influence the magnitude and the characteristics of each state's fire problem.

A second factor in variations is the completeness and representation of the departments that report data, whether it be to NFIRS or to the local or state reporting agency. Completeness means both that the data reported is itself complete and that the data reported represents the full range of the state's fire experience. The latter can be achieved either by reporting all fires or by having a judicious sampling of fires to paint a reasonably accurate picture of the fire problem. Table 3 in Chapter 1 shows the number of departments that reported to each NFIRS state in 1995. This table gives some feel for the completeness of department reporting, although it is not as accurate as the percent of population represented by the reporting departments. Some of the largest cities in the country are not yet participating in NFIRS.

This lack of data can, and does, skew the profile of their states. Nonetheless, the states that participate in NFIRS collect data from approximately half of the nation's fire departments, a large proportion of fires are reported to NFIRS, and the stability and completeness of the data are considered generally good. So good, in fact, that the NFIRS data are routinely used by other countries as it is the largest, most comprehensive fire incident data set available.

The third major factor in the variations from state to state and locale to locale is the accuracy of reporting. Along with completeness, the accuracy of the data affects the manner in which the cause of the fire is determined. Largely the result of not coding the fire data according to the NFPA 901 code and the NFIRS handbook, perhaps the most harmful effect of inaccurate reporting is that the cause of the fire is determined incorrectly or, potentially, cannot be determined at all. Nearly 47 percent of fires in 1995 have unknown cause. It is generally assumed that the "unknown" cause fires are distributed among the causes somewhat like the fires with known cause. If this is not the case, the NFIRS cause profiles could vary from those shown in the following state graphs. Data from states with large percentages of fires of unknown cause should be considered with caution.

NFIRS PARTICIPATION

Participation in the National Fire Incident Reporting System declined in 1995. Two states, Montana and New Mexico, had participated in 1994 but dropped out in 1995, and one state, Delaware, was new to the system in 1995. The number of fire departments in the United States that participated declined by nearly 5 percent. However, 19 states had more participating fire departments in 1995 than in 1994, and 17 states had less. Of the 39 states plus the District of Columbia that did participate, 21 had greater than 50 percent of its departments reporting. Four states had less than 10 percent reporting—Alabama, Arizona, Colorado, and Washington—while five had 90 percent or better—District of Columbia, Massachusetts, Michigan, Oregon, and West Virginia.

10-YEAR TRENDS

It is encouraging that the trend in both the number of deaths and the deaths per million population have declined over 10 years in the United States. This decline is broad across nearly every state. In fact, only six states have shown an increasing death rate trend: North Dakota (55 percent), Connecticut (30 percent), Rhode Island (29 percent), Alaska (27 percent), Colorado (14 percent), and Nebraska (1 percent). For the most part, however, these are very low population states with relatively few deaths per year. An increase of even one or two deaths a year significantly affects the death rate.

CAUSES

Over the 3-year period 1993–1995, 40 states reported meaningful data to NFIRS on the causes of residential fires; 33 states reported meaningful data on the causes of residential fire deaths. Cooking fires were the leading cause of fire in 22 of these states, heating fires in 15 states, and arson in 3 states. Even though cooking was the leading cause of fires in most states, it was never the leading cause of deaths. Instead, careless smoking was overwhelmingly the leading cause of deaths, followed by heating. Arson, children playing, electrical distribution, and appliances were also shown to be leading causes in eight states. Table 4 presents the leading causes—by number and percentage of states—of residential fires and deaths over the 3-year period.

Table 4. Leading Cause of Residential Fires and Deaths (1993–95) by Number/Percentage of States

Fires			Deaths*		
Leading Cause	No. of States	Percent	Leading Cause	No. of States	Percent
Cooking	22	55.9	Careless Smoking	17	50.0
Heating	15	37.5	Heating	9	27.8
Arson	3	7.5	Arson	4	11.1
			Children Playing	2	5.6
			Electrical Distribution	1	2.8
			Appliances	1	2.8

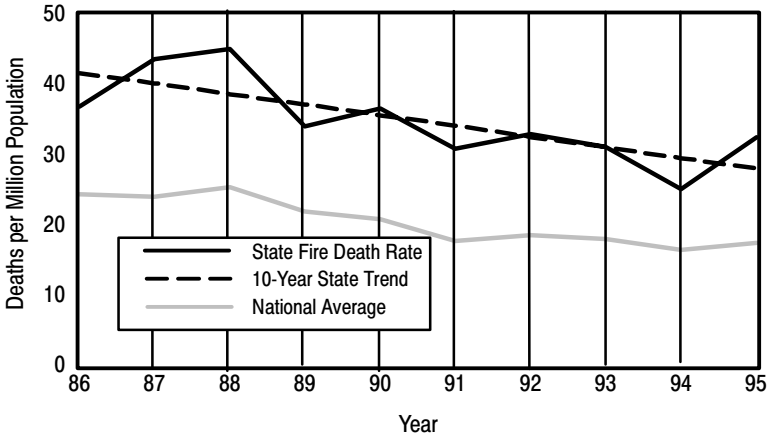
*Alaska had a two-way tie for the leading cause of fire deaths.

ALABAMA

Only one fire department, Birmingham, participates in NFIRS. This represents just 0.1 percent of the estimated 1,038 fire departments in the state. A total of 3,827 fires were reported to NFIRS in 1995. Of these, 1,266 were structure fires, 85 percent of which were in residential structures. Alabama's State Fire Marshal data cited 138 civilian deaths in 1995.

STATE FIRE DEATHS AND DEATH RATE

With a fire death rate of 32.5 deaths per million population, Alabama went from the 13th highest death rate in the nation in 1994 to the 2nd highest (behind Mississippi) in 1995. Alabama's death rate is considerably higher than the national average of 17.4 deaths per million. Over the 10-year period, however, Alabama's overall trend has been downward: 28% for civilian deaths and 32% for deaths per million.



Year	Fire Deaths	Deaths/ Million
1986	147	36.8
1987	175	43.6
1988	181	45.0
1989	137	34.0
1990	148	36.6
1991	126	30.8
1992	136	32.9
1993	130	31.1
1994	106	25.1
1995	138	32.5

Alabama State Fire Marshal's Office; Alabama Center for Health Statistics, Department of Public Health; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

The causes of fires in the Birmingham area have been consistent in each of the 3 years, with cooking, arson, and exposure as the leading three causes in each year. Together, these causes accounted for 63 percent of all residential fires. Only 27 deaths were reported to NFIRS over the 3-year period: 14 deaths were of unknown cause and 7 attributed to arson.

Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	165	131	156	5	1	1
Children Playing	47	51	46	1	0	1
Careless Smoking	38	32	35	0	0	0
Heating	81	68	72	0	0	0
Cooking	264	268	287	1	0	0
Electrical Distribution	42	51	62	0	0	0
Appliances	50	41	45	0	0	2
Open Flame	49	34	48	0	0	1
Other Heat	9	17	14	0	0	0
Other Equipment	1	7	4	0	0	0
Natural	9	5	4	0	0	0
Exposure	109	111	114	0	0	0
Unknown	149	178	183	4	4	6
Total	1,013	994	1,070	11	5	11

Source: NFIRS

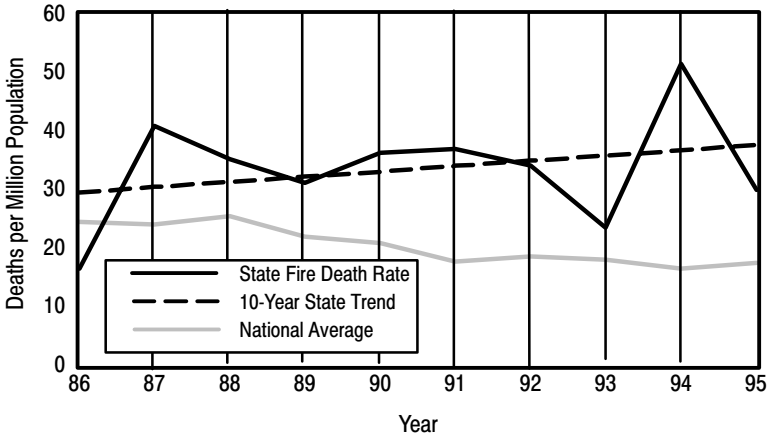
ALASKA

In 1995, 37 percent of Alaska's fire departments (93 of 253) participated in NFIRS, a 19 percent increase over 1994 reporting departments. The number of fires in Alaska reported to NFIRS in 1995 was 2,615, of which 1,075 were structure fires. Nearly 75 percent of the structure fires occurred in residences.

More fire-related information for Alaska can be found at Web site http://www.dps.state.ak.us/fire.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths in Alaska have shown a 10-year upward trend of 45%. This is in marked contrast to the national average, which has trended downward 30%. Deaths per million population, however, were less severe, with an increase of 27%. In 1995, Alaska's fire death rate was 29.9 deaths per million population, the third highest in the nation, and considerably higher than the national rate of 17.4. However, the 1995 rate in Alaska represented a significant drop from 1994 which was a 51.4 deaths per million, the highest in the nation.

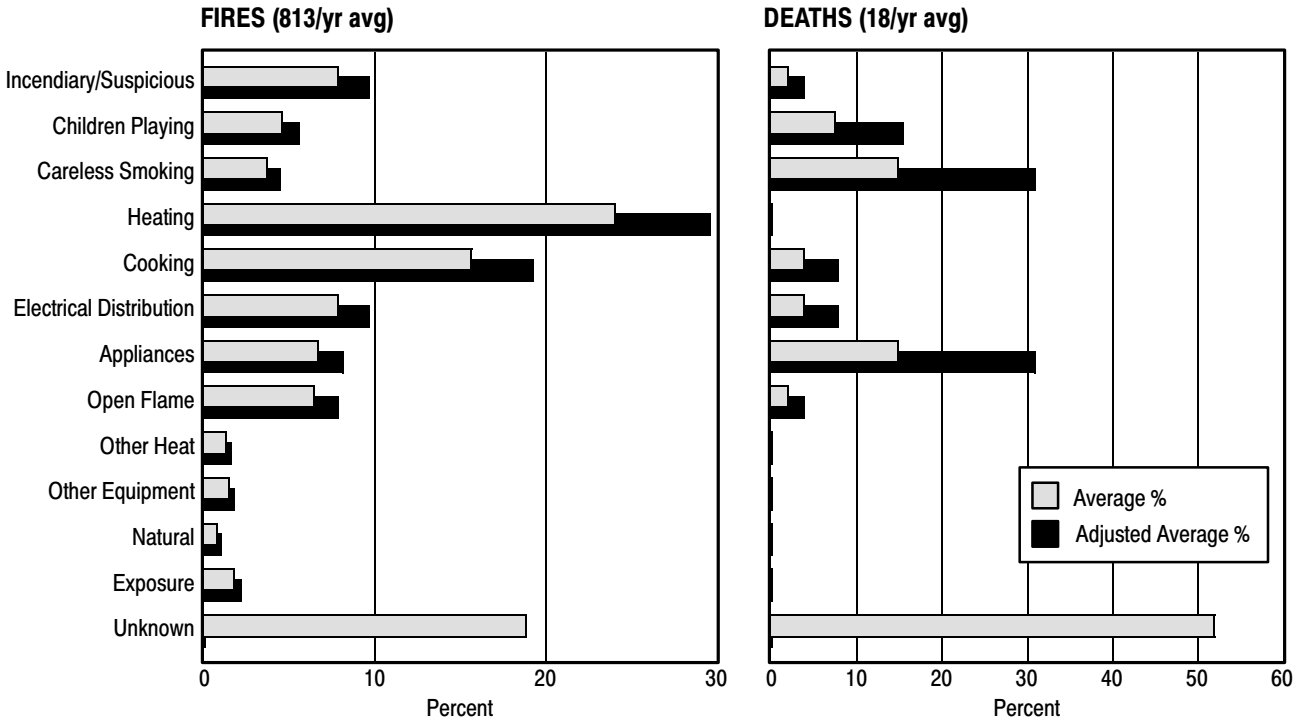


Year	Fire Deaths	Deaths/ Million
1986	9	16.5
1987	22	40.8
1988	19	35.1
1989	17	31.1
1990	20	36.2
1991	21	36.9
1992	20	34.0
1993	14	23.4
1994	31	51.4
1995	18	29.9

Alaska State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

In each of the past 3 years, heating has been the leading cause of residential fires in Alaska, yet no deaths were attributed to heating-related fires. Cooking was the second leading cause of fires. Careless smoking was the leading cause of fire deaths. In 1994, eight deaths were attributed to appliance fires (the same number as the 3-year total for smoking), but this appears to be an anomaly. The cause of fire for over half of the fire deaths was unknown; these unknowns are quite high.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	72	59	59	0	0	1
Children Playing	36	39	34	0	2	2
Careless Smoking	25	30	32	3	1	4
Heating	190	188	208	0	0	0
Cooking	123	134	124	0	2	0
Electrical Distribution	56	68	67	0	0	2
Appliances	38	71	52	0	8	0
Open Flame	47	51	57	0	1	0
Other Heat	4	11	15	0	0	0
Other Equipment	7	16	11	0	0	0
Natural	7	5	5	0	0	0
Exposure	21	9	11	0	0	0
Unknown	175	155	128	10	10	8
Total	801	836	803	13	24	17

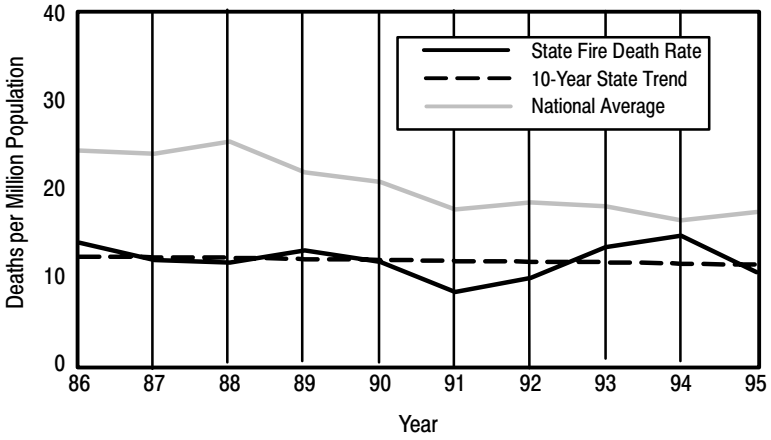
Source: NFIRS

ARIZONA

Only 3 of Arizona's 258 fire departments participated in NFIRS in 1995. Of the 184 fires reported, 19 occurred in structures, 14 of which were residences. No residential fire deaths were reported in 1994 or 1995. Arson is the leading cause of fires over the 1993–95 period, and careless smoking the leading cause of deaths. The limited NFIRS data preclude the presentation of meaningful cause charts.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths in Arizona have remained in 1995 relatively constant over 10 years with an average of 45 fire deaths. Arizona's fire death rate in 1995 is considerably less than the national average of 17.4, and ranks 10th lowest in the nation.



Year	Fire Deaths	Deaths/ Million
1986	46	13.9
1987	41	11.9
1988	41	11.6
1989	47	13.0
1990	43	11.7
1991	31	8.3
1992	38	9.9
1993	53	13.4
1994	60	14.7
1995	45	10.5

Arizona State Fire Marshal's Office; Arizona Vital Records Section, Department of Health Services; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	224	12	0	1	0	0
Children Playing	86	8	1	0	0	0
Careless Smoking	66	8	1	2	0	0
Heating	49	8	4	0	0	0
Cooking	143	8	2	0	0	0
Electrical Distribution	100	2	3	0	0	0
Appliances	45	7	0	0	0	0
Open Flame	60	6	0	1	0	0
Other Heat	24	2	0	1	0	0
Other Equipment	6	0	1	0	0	0
Natural	10	0	0	0	0	0
Exposure	9	8	2	0	0	0
Unknown	128	11	0	0	0	0
Total	950	80	14	5	0	0

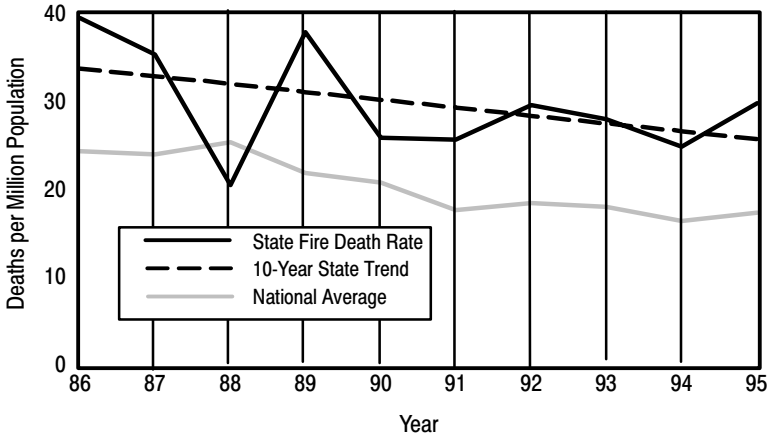
Source: NFIRS

ARKANSAS

Half of Arkansas' fire departments (410 of 824) reported to NFIRS in 1995. Of the 15,998 fires reported that year, 4,956 were in structures. Of these, 76 percent occurred in residences. More fire-related information for Arkansas can be found at Web site http://www.state.ar.us/asp/asp.html.

STATE FIRE DEATHS AND DEATH RATE

Arkansas' fire deaths have trended downward 19% and the death rate downward by 24% over 10 years. At 29.8 deaths per million population in 1995, Arkansas' death rate was considerably higher than the national rate of 17.4 and has the fourth highest death rate in the nation.

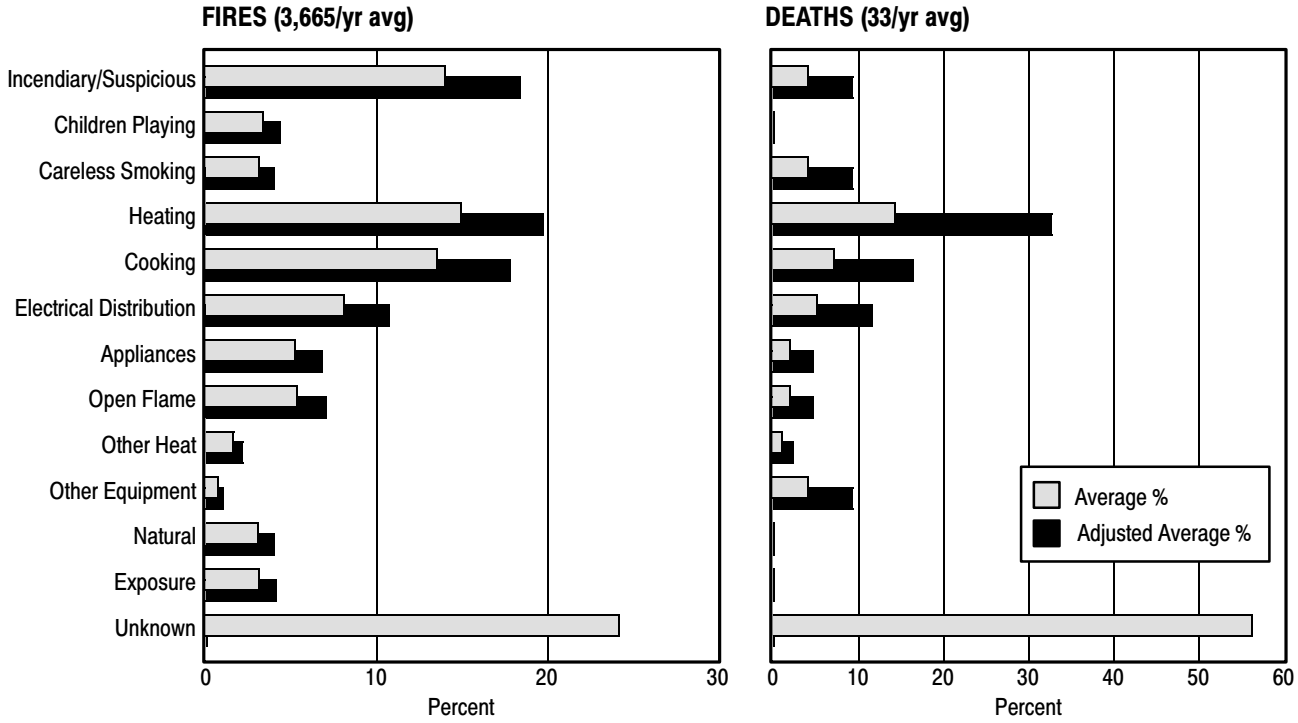


Year	Fire Deaths	Deaths/ Million
1986	92	39.5
1987	83	35.4
1988	48	20.5
1989	89	37.9
1990	61	25.9
1991	61	25.7
1992	71	29.6
1993	68	28.0
1994	61	24.9
1995	74	29.8

Arkansas State Fire Marshal's Office; Arkansas Division of Vital Records, Department of Health; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Arson, heating, and cooking were closely grouped as the three leading causes of fires in 1995 and for the 3-year average. Heating and cooking fires, however, were higher than arson fires in 1993 and 1994. Although heating has been the leading cause of reported fatalities in Arkansas, this may not represent the true picture due to the large number of unknown causes (56%).



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	501	483	550	0	2	2
Children Playing	143	124	93	0	0	0
Careless Smoking	113	103	121	1	1	2
Heating	615	505	518	6	2	6
Cooking	509	516	458	2	3	2
Electrical Distribution	255	315	323	1	1	3
Appliances	172	179	219	1	0	1
Open Flame	166	215	204	1	1	0
Other Heat	41	63	68	0	1	0
Other Equipment	27	26	28	4	0	0
Natural	99	126	110	0	0	0
Exposure	96	96	151	0	0	0
Unknown	918	825	921	15	12	28
Total	3,655	3,576	3,764	31	23	44

Source: NFIRS

CALIFORNIA

In 1995, 345 of 930 California fire departments reported 72,702 fires to NFIRS. These fires resulted in an estimated $551 million in direct dollar loss. Structure fires accounted for 17,409 fires, with 69 percent of these in residential buildings. The number of reporting fire departments decreased from 32 percent in 1994 to 30 percent in 1995.

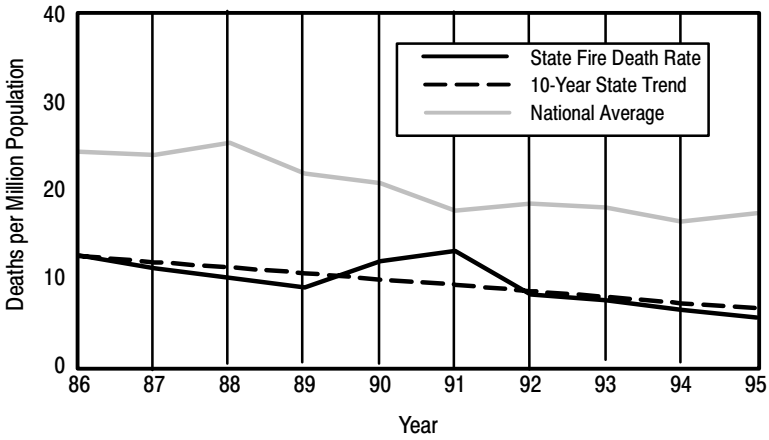
To assist in providing statewide leadership in addressing the fire and burn problem through public awareness education, the California State Fire Marshal's Office established the Public Education Advisory Committee in 1986. This committee, made up of fire service representatives, burn prevention specialists, public educators, service organizations, community volunteers, private industry, and local, regional, and state government representatives, advises the State Fire Marshal on matters pertaining to the reduction of fires and burns in California through public fire and burn safety education. Its goal is to raise public fire and burn safety awareness by coordinating statewide programs and assisting local agencies in their fire/burn safety efforts. With the assistance of this committee, the State Fire Marshal's Office developed the Public Education Resource Catalog, which contains over 400 programs, visual aids, and printed materials available from fire departments, service organizations, and commercial and government sources. Another joint venture of this committee and the State Fire Marshal's Office was the development of a comprehensive Media Guide that can be updated with camera-ready art and scripts for use by public educators throughout the state.

The California State Fire Marshal Film Industry Program is a unique program sponsored by the State Fire Marshal's Office. The program was created for the mutual benefit of the fire service and the film industry to provide consistency of regulation and enforcement of fire prevention requirements in the motion picture and television industry.

More fire-related information for California can be found at Web site http://www.saic.com/firesafe/csfm.dir.html.

STATE FIRE DEATHS AND DEATH RATE

Civilian fire deaths in California have declined by 44% over 10 years, better than the 30% national trend. The fire death rate showed a similar decline of 39%. In 1995, the number of reported deaths was 173, the lowest over the period. California's fire death rate of 5.5 per million population, the second lowest in the nation in 1995, was significantly lower than the 1995 national death rate of 17.4.

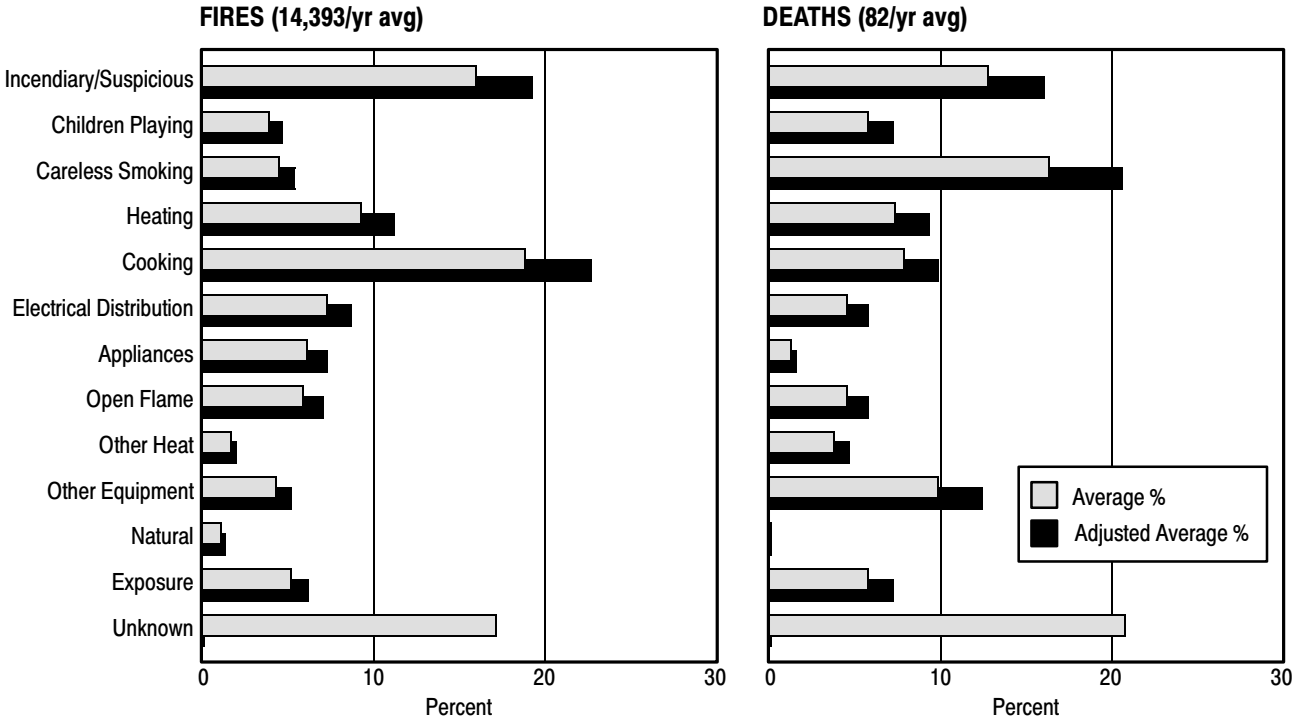


Year	Fire Deaths	Deaths/ Million
1986	342	12.6
1987	307	11.1
1988	284	10.0
1989	259	8.9
1990	357	11.9
1991	398	13.1
1992	250	8.1
1993	234	7.5
1994	200	6.4
1995	173	5.5

California State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Cooking and arson have been the leading causes of fires, with cooking leading in 1993 and 1994 and arson leading in 1995. Together, these two causes accounted for 35% of all residential fires. In 1995, there were 99 fire deaths reported (a 52% increase over the previous year); careless smoking and arson were the leading causes of residential fire deaths over the 3 years.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	2,598	2,131	2,150	14	8	9
Children Playing	645	573	422	6	7	1
Careless Smoking	973	511	397	15	12	13
Heating	1,753	1,222	985	9	1	8
Cooking	3,827	2,194	2,095	5	2	12
Electrical Distribution	1,354	859	883	6	0	5
Appliances	1,003	850	741	0	2	1
Open Flame	927	807	760	1	6	4
Other Heat	259	234	197	3	1	5
Other Equipment	430	760	643	0	13	11
Natural	174	130	108	0	0	0
Exposure	1,111	611	477	6	1	7
Unknown	2,617	2,575	2,193	16	12	23
Total	17,671	13,457	12,051	81	65	99

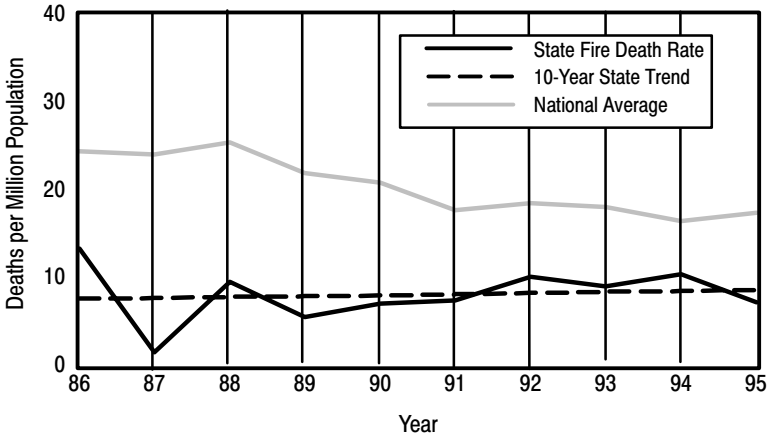
Source: NFIRS

COLORADO

Only 21 of Colorado's 400 fire departments (5 percent) report to NFIRS. These 21 reported 4,708 fires in 1995, 1,139 of which were in structures. Residential fires accounted for 67 percent of total structure fires. More fire-related information for Colorado can be found at Web site http://www.state.co.us/gov_dir/cdps/dfs.htm.

STATE FIRE DEATHS AND DEATH RATE

Civilian fire deaths reported by the Colorado Fire Marshal reports totaled 27 in 1995. The 10-year trend in deaths has shown a 33% increase. The death rate per million population increased 14% over this period, but at 7.2 deaths per million in 1995, Colorado has the fifth lowest rate in the nation, considerably lower than the 17.4 deaths per million nationally.

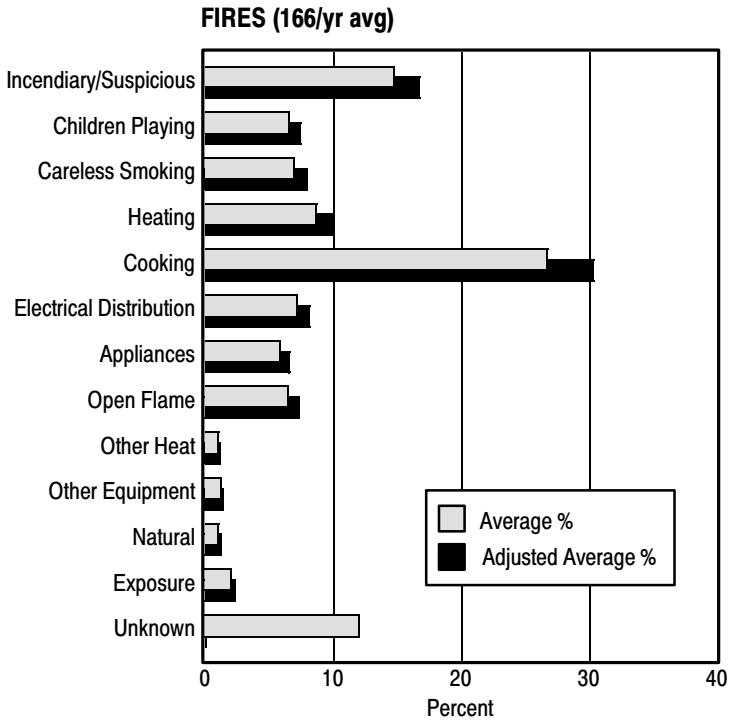


Year	Fire Deaths	Deaths/ Million
1986	43	13.3
1987	5	1.5
1988	31	9.5
1989	18	5.5
1990	23	7.0
1991	25	7.4
1992	35	10.1
1993	32	9.0
1994	38	10.4
1995	27	7.2

Colorado Division of Fire Safety, Department of Public Safety; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Cooking is the leading cause of residential fires in Colorado by a wide margin (averaging 30% over the 3-year period). Arson accounts for 17% of fires. Only 19 deaths were reported to NFIRS over 3 years, 8 of which were of unknown cause. It appears, however, the careless smoking accounts for more deaths, by a factor of three, than the next leading cause, children playing.



Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	154	150	124	0	0	0
Children Playing	72	67	50	0	2	0
Careless Smoking	75	67	60	1	5	0
Heating	90	115	49	0	0	0
Cooking	300	271	208	0	0	0
Electrical Distribution	64	96	47	0	1	0
Appliances	50	76	43	0	0	0
Open Flame	55	76	56	0	1	0
Other Heat	10	11	7	0	0	0
Other Equipment	15	12	8	1	0	0
Natural	7	16	7	0	0	0
Exposure	21	24	14	0	0	0
Unknown	104	152	93	1	3	4
Total	1,017	1,133	766	3	12	4

Source: NFIRS

CONNECTICUT

A high proportion of Connecticut's fire departments participate in NFIRS—81 percent (221 of 274). In 1995, 17,825 fires were reported to NFIRS; 5,572 were structure fires, of which 71 percent occurred in residential structures.

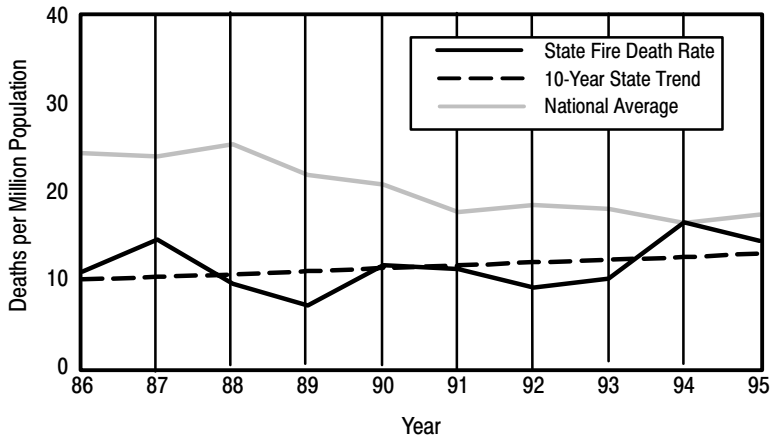
The Annual Report from the Commission on Fire Prevention and Control indicated a 17.3 percent increase in arson in 1995. Approximately 61 percent of all arsons were juvenile firesetter related. In response to this increase and to combat this growing problem, the Public Education and Information Division sponsored a Juvenile Firesetter Conference.

As part of community education and outreach, the Training Division maintains an "escape trailer." The escape trailer is a mobile unit designed to teach third grade students to plan for and practice a home exit escape plan. The trailer was used by 22 Connecticut municipalities and reached 6,675 third grade students.

More fire-related information for Connecticut can be found at Web site http://www.state.ct.us/cfpc/sfa.html.

STATE FIRE DEATHS AND DEATH RATE

Civilian fire deaths have ranged from a high of 54 in 1994 to a low of 23 in 1989. Over the 10-year period, fire deaths have trended upward 32% and deaths per million population 30%, primarily because of the higher number of deaths in 1994 and 1995. Nevertheless, Connecticut's 1995 fire death rate of 14.4 per million is below the national average of 17.4, and the state is ranked in the lowest half of all states.

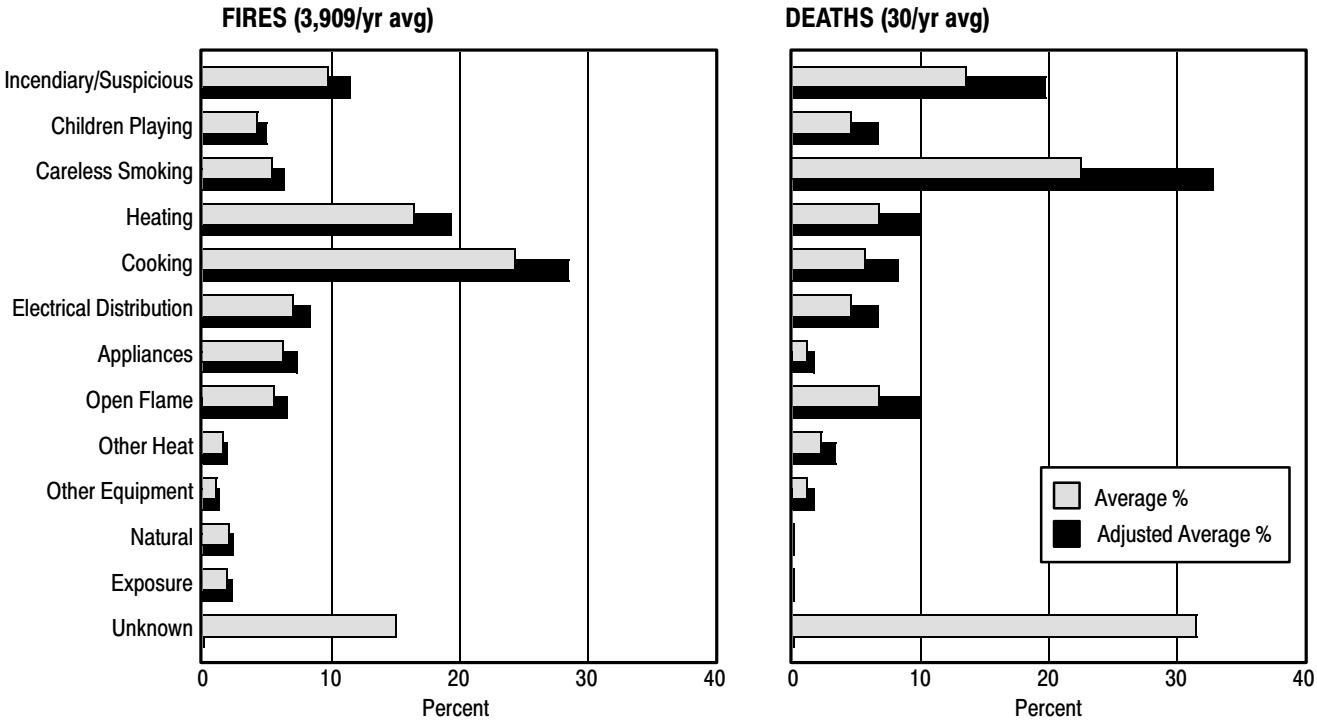


Year	Fire Deaths	Deaths/ Million
1986	35	10.9
1987	47	14.5
1988	31	9.5
1989	23	7.0
1990	38	11.6
1991	37	11.2
1992	30	9.1
1993	33	10.1
1994	54	16.5
1995	47	14.4

Connecticut Bureau of State Fire Marshal and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Despite a tie with heating in 1994, careless smoking has been the leading cause of fatalities in Connecticut in each of the past 3 years. It accounted for 43% of the total residential deaths in 1995. A large number of fire deaths (32%) occurred in fires of unknown cause. Cooking, heating, and arson were the top causes of fires that, combined, accounted for 59% of all fires over the 3-year period.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	443	357	341	7	1	4
Children Playing	168	140	179	2	0	2
Careless Smoking	207	191	229	4	6	10
Heating	675	645	600	0	6	0
Cooking	955	889	1,000	2	2	1
Electrical Distribution	252	287	284	2	1	1
Appliances	229	262	236	0	1	0
Open Flame	198	219	230	0	3	3
Other Heat	54	60	67	1	0	1
Other Equipment	41	41	38	0	0	1
Natural	78	85	71	0	0	0
Exposure	60	58	97	0	0	0
Unknown	549	627	584	3	14	11
Total	3,909	3,861	3,956	21	34	34

Source: NFIRS

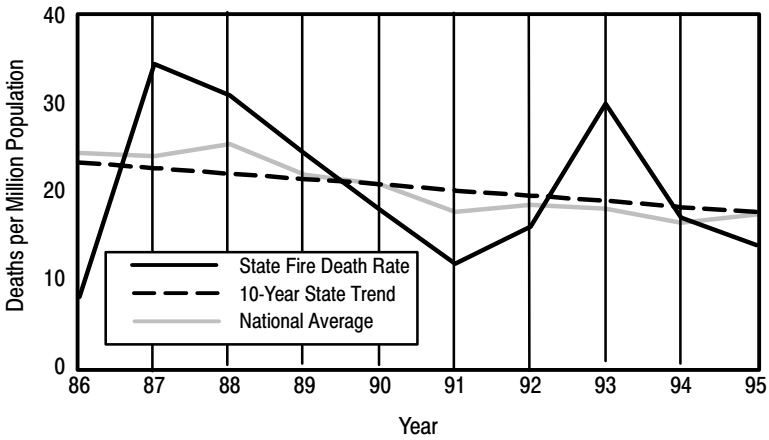
DELAWARE

Delaware did not submit data to NFIRS from 1991 to 1994. In 1995, 80 percent of the fire departments (49 of 61) reported 2,029 fires. Of these, 1,215 were structure fires, with 76 percent in residences. No deaths were reported to NFIRS in 1995.

In 1993, the Delaware State Fire Marshal's office spearheaded a smoke detector bill that was passed by the General Assembly. This bill requires a smoke detection device to be present in every residential home. In addition to the bill, an aggressive public education campaign was launched to inform citizens about the importance of smoke detectors and how to comply with the law. With this new law, the State Fire Marshal's Office hopes to reduce the number of fire deaths in homes with working smoke detectors to zero.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths in Delaware have ranged from 5 in 1986 to 22 in 1987. The 10-year trend in deaths has decreased 25%. The death rate was 13.9 per million population in 1995—below the national death rate of 17.4—and it has trended downward over 10 years by 25%. Delaware's death rate places it in the lower half of states.

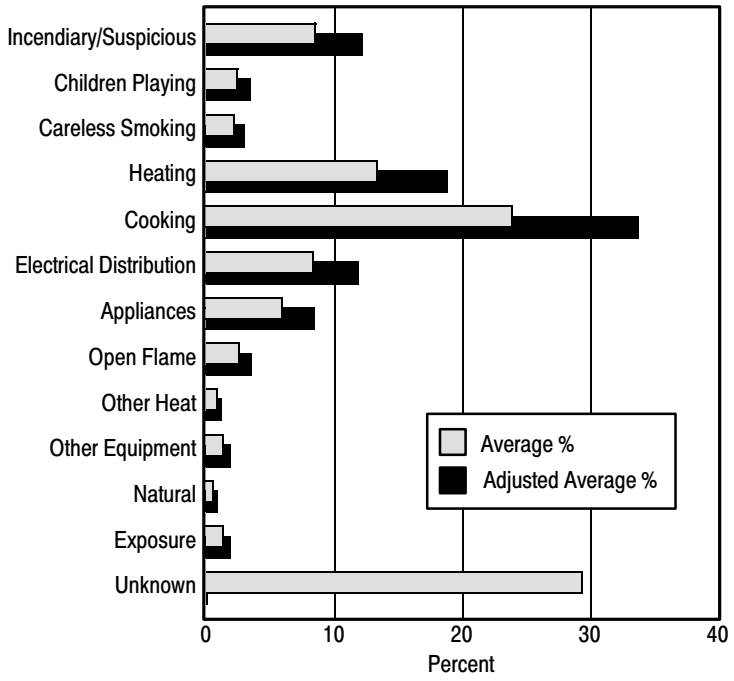


Year	Fire Deaths	Deaths/ Million
1986	5	8.0
1987	22	34.5
1988	20	30.9
1989	16	24.3
1990	12	17.9
1991	8	11.8
1992	11	16.0
1993	21	30.0
1994	12	17.0
1995	10	13.9

Delaware State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES BASED ON NFIRS REPORT (1995)

One-third of fires in residences were attributed to cooking, and heating accounted for 19% in 1995, the only year since 1990 that Delaware participated in NFIRS. A high proportion of fires (29%) had no cause attributed. No deaths were reported to NFIRS for 1995.



Cause of Fires	1995
Arson	79
Children Playing	22
Careless Smoking	19
Heating	123
Cooking	221
Electrical Distribution	77
Appliances	55
Open Flame	23
Other Heat	7
Other Equipment	12
Natural	5
Exposure	12
Unknown	271
Total	926

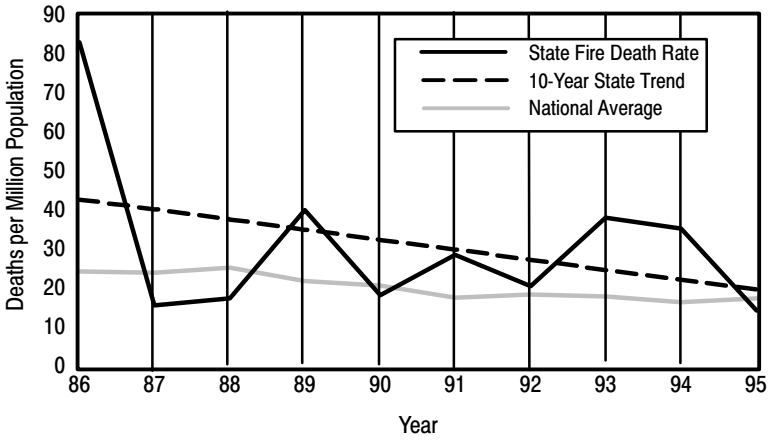
Source: NFIRS

DISTRICT OF COLUMBIA

The District of Columbia reported 5,746 fires to NFIRS in 1995. This total should represent all fires since the District fully participates in reporting to NFIRS; however, the Fire Marshal's data differ from the NFIRS data. The number of structure fires reported in NFIRS was 988, 71 percent occurring in residential structures.

STATE FIRE DEATHS AND DEATH RATE

In 1995, only eight deaths were reported by the District, the lowest in 10 years. (Note that 12 deaths were reported in NFIRS.) This is in marked contrast to the 53 deaths in 1986. The trend in deaths has significantly decreased over 10 years, by 62%. Deaths per million population in 1995 were 14.4, below the national average of 17.4. The city's death rate places it at about the halfway point among the 50 states. The death rate trend has decreased 54% over 10 years, a very favorable trend.

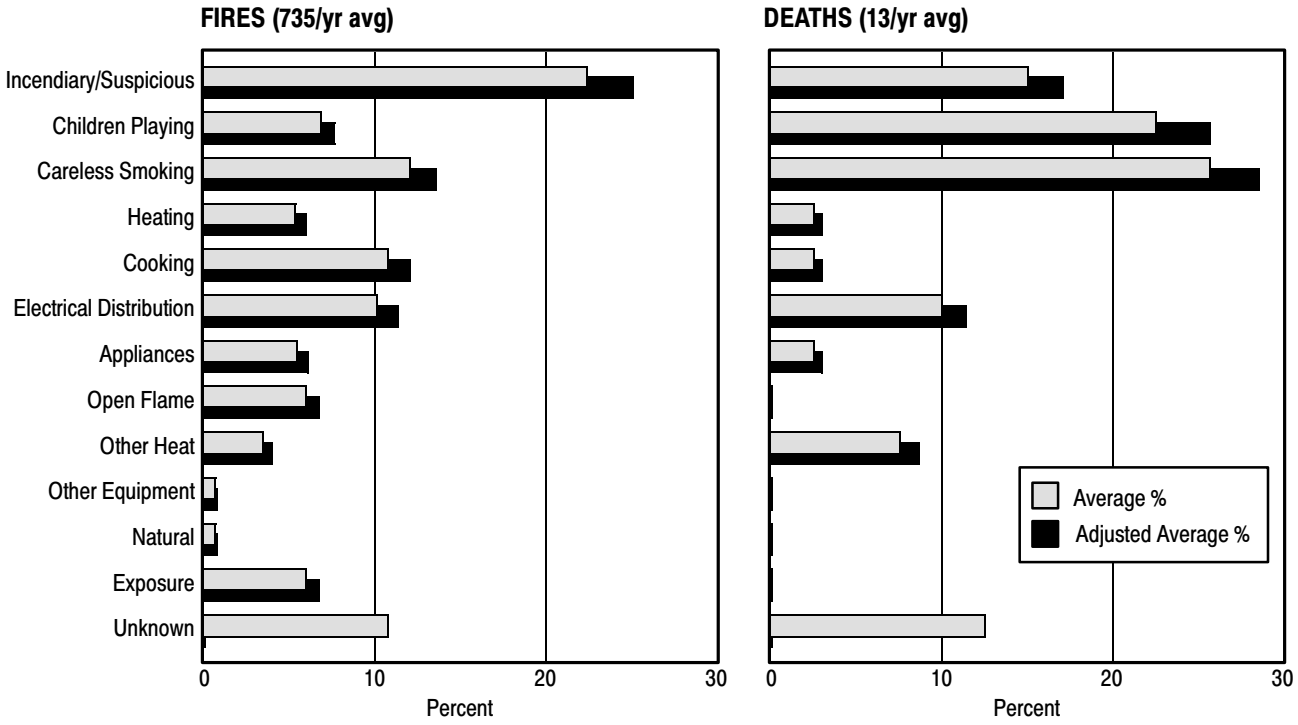


Year	Fire Deaths	Deaths/ Million
1986	53	83.0
1987	10	15.7
1988	11	17.4
1989	25	40.1
1990	11	18.2
1991	17	28.6
1992	12	20.5
1993	22	38.1
1994	20	35.3
1995	8	14.4

District of Columbia Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

In each of the 3 years, arson was the leading cause of fires in the District of Columbia. This is consistent with most large urban centers which experience a higher incidence of arson than non-urban areas. Careless smoking, cooking, and electrical distribution fires are roughly equal causes. Of the 12 deaths reported to NFIRS in 1995, careless smoking was the cause of 5 and children playing with 4. For the past 2 years, all deaths have had cause determined in NFIRS reports.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	160	164	169	1	1	4
Children Playing	55	60	35	6	2	1
Careless Smoking	86	105	74	4	1	5
Heating	40	33	44	1	0	0
Cooking	91	81	65	0	1	0
Electrical Distribution	79	76	68	1	2	1
Appliances	46	41	31	1	0	0
Open Flame	40	42	49	0	0	0
Other Heat	18	30	28	0	2	1
Other Equipment	5	5	3	0	0	0
Natural	2	4	8	0	0	0
Exposure	36	42	53	0	0	0
Unknown	70	90	77	5	0	0
Total	728	773	704	19	9	12

Source: NFIRS

FLORIDA

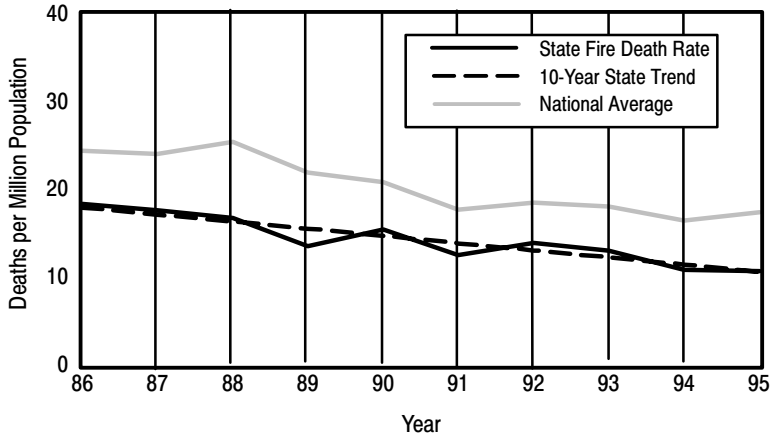
Florida's annual report cited 81,646 fires in 1995. This included 26,057 fires in structures, of which 20,514 (79 percent) were in residences. Nearly half of all fire departments (324 of 674) report to NFIRS, which accounted for 46,978 fires. Of these, 13,460 were in residential structures, 78 percent of which were in residences. The correlation of state data and NFIRS data is very close.

As shown on the following page, the leading cause of residential fires in Florida is from cooking. According to the 1995 Florida Fire Report, the causes of kitchen fires were cooking left unattended, improper operation of appliances, and ignition of an item left too close to a heat source. The bedroom is the area when most deaths occur (41 percent), caused by misuse of smoking materials, alcohol impairment, portable heaters placed too close to bedding, juvenile firesetting, and faulty cords and lamps.

More fire-related information for Florida can be found at Web site http://www.doi.state.fl.us/sfm.htm.

STATE FIRE DEATHS AND DEATH RATE

Of the 152 civilian fire deaths in 1995, the State Fire Marshal's Office reported 125 (82%) died in residences. Over the past 10 years, the trend in number of deaths has decreased 28%. Florida had the 11th lowest death rate in 1995 and the 10-year trend has declined 41%. At 10.7 deaths per million population in 1995, the state is considerably below the national death rate of 17.4.

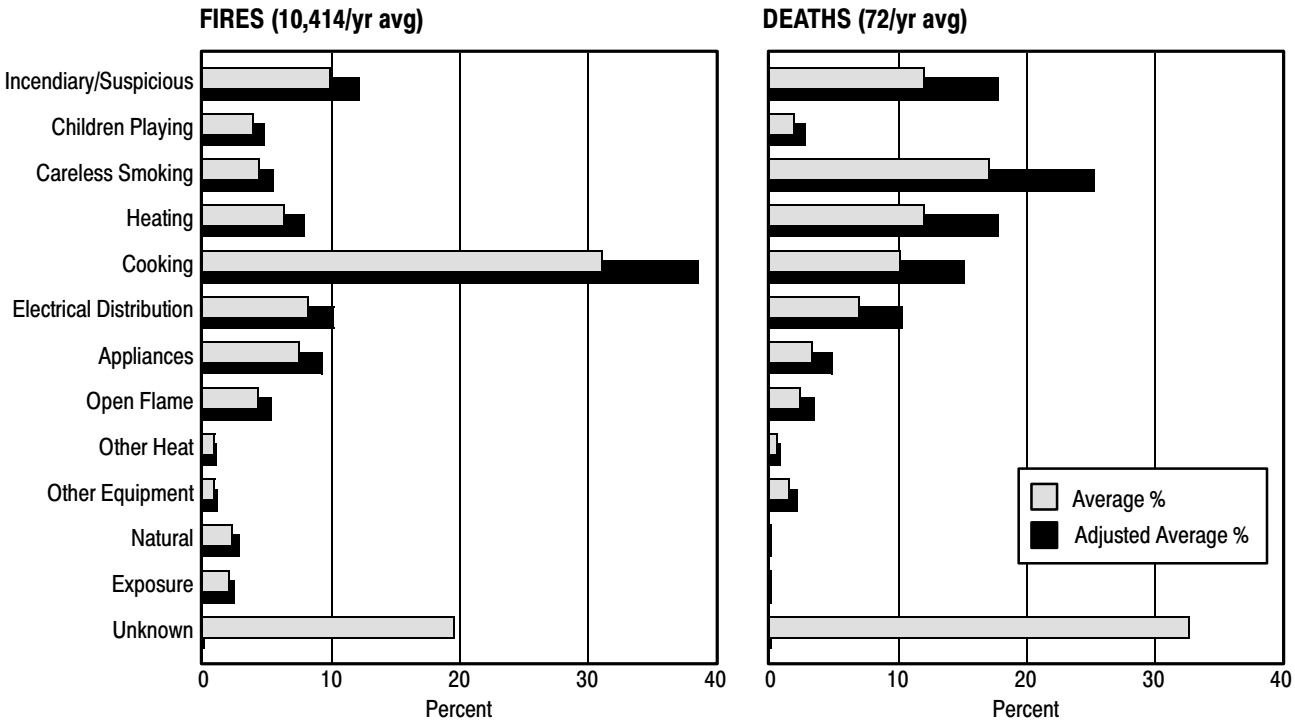


Year	Fire Deaths	Deaths/ Million
1986	213	18.3
1987	211	17.6
1988	206	16.7
1989	171	13.5
1990	200	15.4
1991	166	12.5
1992	188	13.9
1993	178	13.0
1994	151	10.8
1995	152	10.7

Florida State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Cooking is the leading cause of fires in Florida in all 3 years by a factor of 3 over the next leading cause, arson. In 1995, residential arson was the leading cause of death (31 percent), followed closely by careless smoking at 26 percent. Careless smoking was the leading cause of death in Florida over the 3-year period. The unknowns for fire deaths are high at 33%.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	954	1,026	1,067	10	5	11
Children Playing	392	419	361	2	1	1
Careless Smoking	486	409	460	17	11	9
Heating	731	542	678	11	13	2
Cooking	3,383	3,209	3,119	13	5	4
Electrical Distribution	835	780	914	6	5	4
Appliances	781	759	764	4	0	3
Open Flame	412	447	450	2	2	1
Other Heat	79	73	86	1	0	0
Other Equipment	78	83	97	1	2	0
Natural	243	277	180	0	0	0
Exposure	217	187	184	0	0	0
Unknown	2,073	1,870	2,137	25	20	26
Total	10,664	10,081	10,497	92	64	61

Source: NFIRS

GEORGIA

The Georgia annual report cited 21,512 fires in 1995; 5,932 of these fires (28 percent)were in structures. Residential structures accounted for 78 percent of all structure fires. The annual report estimates that the Georgia fire data are drawn from approximately 62 percent of the state's population. As a result, the fire totals reported in the annual report are understated. In 1995, Georgia reports that there were 181 fire departments participating in the Georgia Fire Incident Reporting System; the NFIRS data reflects 171 fire departments (24 percent of the state's 718).

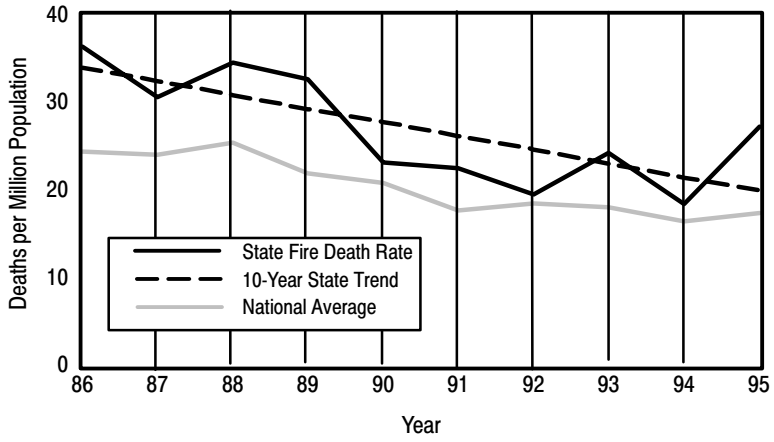
The significant increase in the number of fire deaths from 1994 to 1995 (66 more deaths, or a 51 percent increase)led the Insurance and Fire Safety Commissioner to appoint a task force to identify ways to address the fire problem in the state.

In incidents where smoke detector data were available in 1995, Georgia fire departments reported no smoke detectors in 53 percent of residential fires. As of 1994, all commercial and residential buildings are required by state law to have some type of smoke detector system. The Georgia State Fire Marshal's Office has worked, and continues to work, with local fire departments and community organizations to distribute smoke detectors to Georgians who do not have them. The State Fire Marshal's Office participates in a battery giveaway program in conjunction with distribution of smoke detectors.

Additional fire-related information for Georgia can be found at Web site http://www.State.Ga.US/Ga.Ins.Commission.

STATE FIRE DEATHS AND DEATH RATE

Georgia has the seventh highest fire death rate among the states. At 27.2 fire deaths per million population, Georgia's fire death rate is much higher than the national death rate of 17.4. However, there has been a sharp downward trend in the death rate (42%) over 10 years. Total deaths have also trended downward, by 30%. But in 1995, there were 66 more deaths than in 1994, a 51% increase.

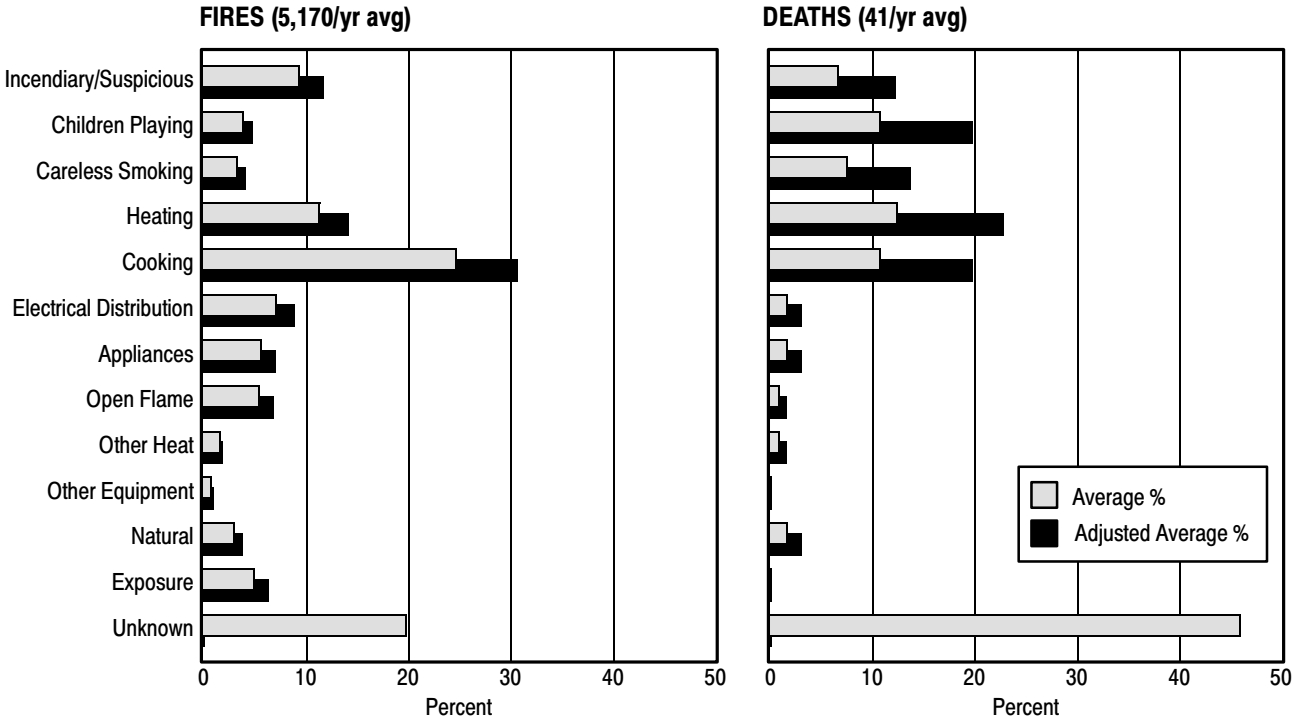


Year	Fire Deaths	Deaths/ Million
1986	221	36.3
1987	190	30.6
1988	218	34.5
1989	209	32.6
1990	150	23.1
1991	149	22.5
1992	132	19.5
1993	167	24.2
1994	130	18.4
1995	196	27.2

Georgia State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

By far, the leading cause of fires in Georgia is cooking, at 31% over 3 years. Heating and arson are the next leading causes. The kitchen and the bedroom are the leading areas of origin of residential fires (26% and 13%, respectively). Over the 3 years, heating, children playing, and cooking were the leading causes of fire deaths in residences. Unknown causes for fire deaths were quite high at 48%.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	455	522	472	5	0	3
Children Playing	199	217	167	4	5	4
Careless Smoking	156	187	155	2	3	4
Heating	644	571	535	8	4	3
Cooking	1,350	1,422	1,039	2	10	1
Electrical Distribution	348	392	352	0	0	2
Appliances	303	292	267	0	0	2
Open Flame	266	348	227	0	0	1
Other Heat	70	102	55	1	0	0
Other Equipment	38	41	37	0	0	0
Natural	140	123	192	0	2	0
Exposure	371	236	159	0	0	0
Unknown	1,099	986	976	9	24	23
Total	5,439	5,439	4,633	31	48	43

Source: NFIRS

HAWAII

Fire operations in Hawaii are run autonomously by four counties rather than under the control of a state fire marshal's office. Since the four counties do not report to a central state fire marshal—nor have they participated in NFIRS since 1992—there is little aggregate information for the state. Fire reports for the 1996 fiscal year (July 1, 1995 to June 30, 1996) from three of the counties (Kauai, Hawaii, and Honolulu) indicate a total of 3,573 fires and no deaths.

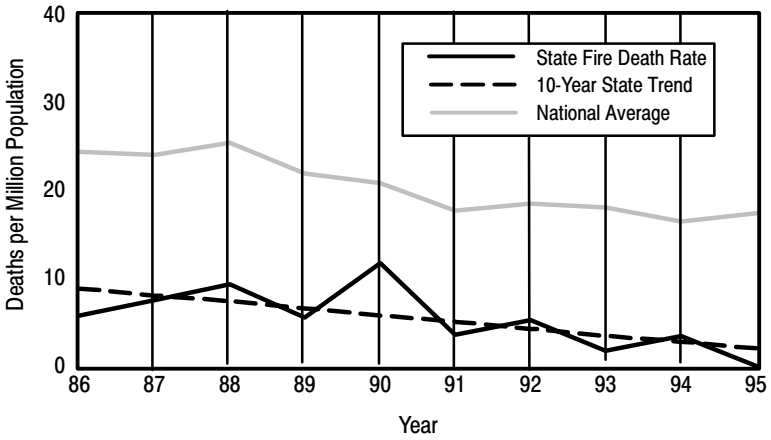
Kauai County reported 194 fires, of which 13 percent were in residential structures. Arson and electrical distribution were the leading causes of fire in structures, while 45 percent of all fires were grass or brush fires.

Hawaii County reported 561 fires. Again, grass and brush was the leading type of fire at 40 percent. Fourteen percent of all fires were in residences.

The City and County of Honolulu reported 2,818 fires in the fiscal year, a considerable decline from the 4,478 fires in FY94 and 3,382 in FY95.

STATE FIRE DEATHS AND DEATH RATE

Hawaii has led the nation with the lowest death rate per million in both 1994 and 1995. The 10-year trend in both deaths and death rate has declined dramatically: 75% and 78%, respectively. With an average fire death rate of 5.3 deaths per million population over 10 years, the state is considerably below the national average.



Year	Fire Deaths	Deaths/ Million
1986	6	5.7
1987	8	7.5
1988	10	9.3
1989	6	5.5
1990	13	11.7
1991	4	3.5
1992	6	5.2
1993	2	1.7
1994	4	3.4
1995	0	0.0

Hawaii State Fire Council and the Bureau of the Census

IDAHO

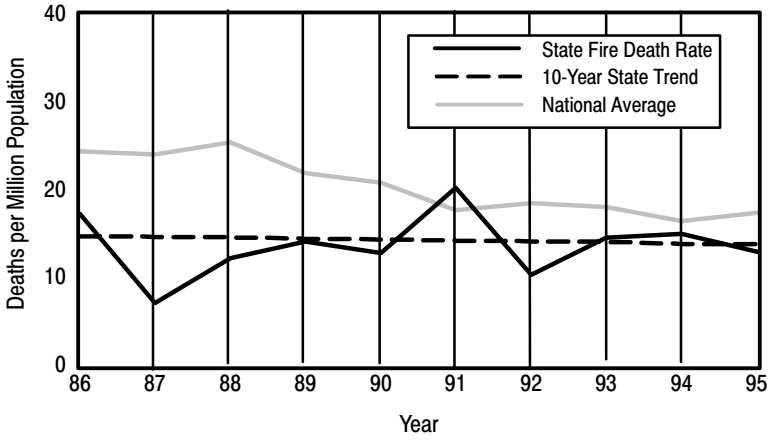
Fifty-four percent of Idaho's fire departments (141 of 263) participate in NFIRS. In 1995, 5,841 fires were reported. Of these 1,798 were in structures, 73 percent of which were in residences.

The last year of data from Idaho annual reports was in 1993, with 4,611 fires, 1,393 occurring in residential structures. In that year, smoke detectors were not present in 46 percent of residential and commercial fires. Detectors were present in 27 percent of reported structure fires, but they did not operate in 13 percent of cases. In total, a working smoke detector was present in only 14 percent of all reported structure fires.

Unlike national trends, chimneys, not kitchens, were the leading area of fire origin in Idaho in 1993, accounting for 33 percent of residential fires. This is consistent with Idaho's leading cause of residential fires—heating—as discussed on the following page. More fire-related information for Idaho can be found at Web site http://www.doi.state.id.us/firemars/firemars.htm.

STATE FIRE DEATHS AND DEATH RATE

The trend in fire deaths in Idaho has increased by 5% over 10 years, with 1987 being the lowest year (7 deaths) and 1986 the highest (22 deaths). At 12.9 fire deaths per million population in 1995, Idaho is below the national average of 17.4. There has been a slight decrease in the fire death rate (7%) over 10 years. The state has the 18th lowest death rate of all states.

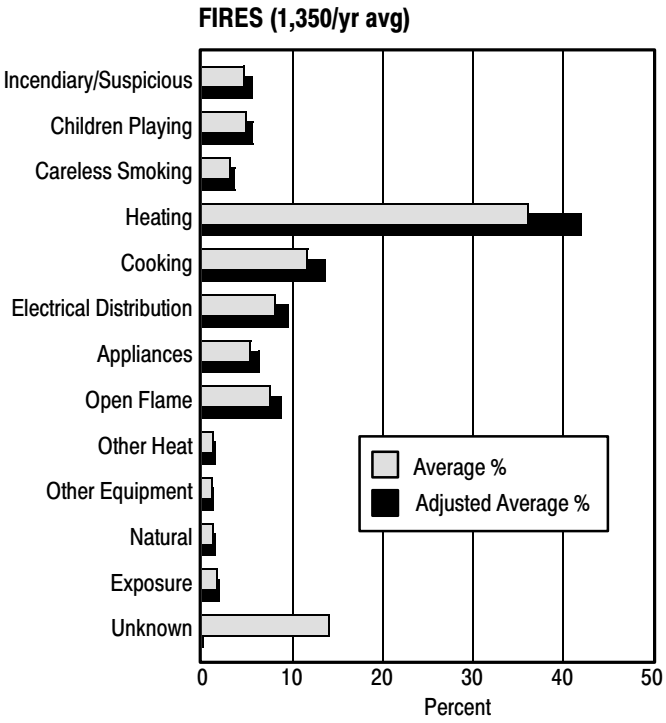


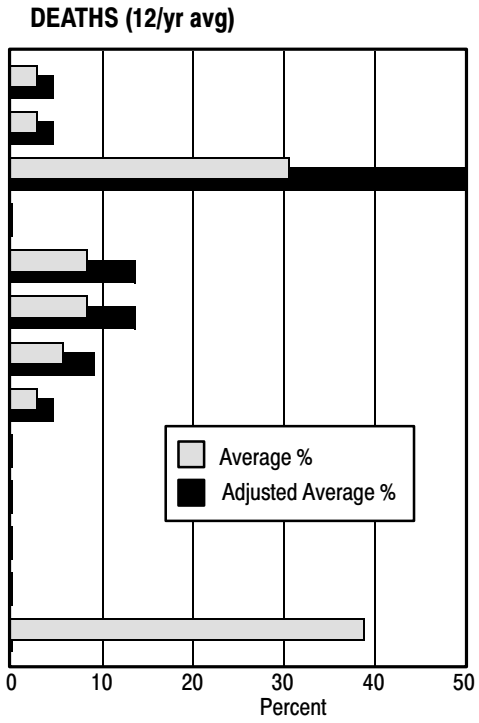
Year	Fire Deaths	Deaths/ Million
1986	22	22.2
1987	7	7.1
1988	12	12.2
1989	14	14.1
1990	13	12.8
1991	21	20.2
1992	12	11.3
1993	16	14.5
1994	17	15.0
1995	15	12.9

Idaho State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

According to NFIRS, heating has been the leading cause of residential fires by a wide margin in each of the past 3 years, by nearly a factor of three over the second leading cause, cooking. Arson is not as severe a problem in Idaho as it is in most states. Only nine deaths were reported in 1995, four of which were of unknown cause. Careless smoking was the cause in three cases. The unknowns for fire deaths were high at 39%.





Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	48	74	65	1	0	0
Children Playing	61	67	65	0	1	0
Careless Smoking	44	34	43	7	1	3
Heating	545	498	420	0	0	0
Cooking	166	145	159	0	2	1
Electrical Distribution	115	109	102	1	2	0
Appliances	57	75	83	0	2	0
Open Flame	95	94	114	0	0	1
Other Heat	16	17	16	0	0	0
Other Equipment	8	17	16	0	0	0
Natural	13	15	21	0	0	0
Exposure	23	19	22	0	0	0
Unknown	202	172	195	6	4	4
Total	1,393	1,336	1,321	15	12	9

Source: NFIRS

ILLINOIS

A total of 853 Illinois fire departments reported to NFIRS in 1995, out of 1,330 statewide (64 percent). There were 71,893 fires in 1995; 19,631 were in structures, of which 65 percent occurred in residences.

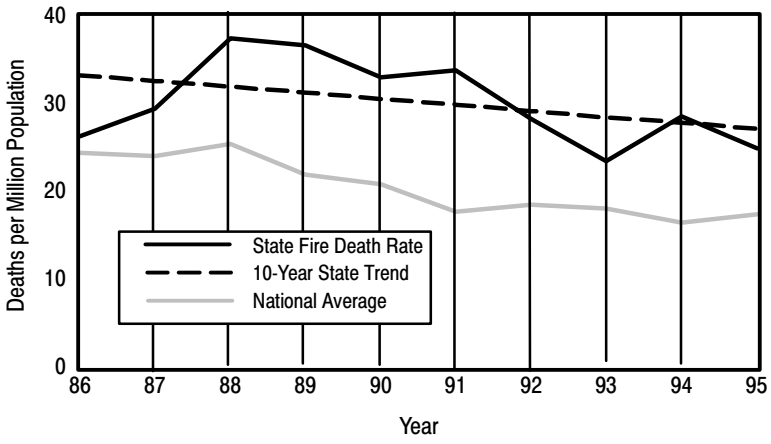
The State Fire Marshal sponsors the FIRE (Fire Instruction Reduces Emergencies) education program. Information available from the State Fire Marshal's Office includes fire safety, charts that describe fire problems and trends, resources available, and other information for use by adults and students. The maps and graphs can be printed and used in various reports. Multimedia computer programs are available to schools and fire departments at no cost. The public can access brochures and other information through this valuable service.

The Office of the Illinois State Fire Marshal also maintains a very comprehensive Kid's Fire Page on its Web site. This site can be directly addressed at http://www.state.il.us/kids/fire.

More fire-related information for Illinois can be found at Web site http://www.state/il.us/osfm.

STATE FIRE DEATHS AND DEATH RATE

In 1995, Illinois had the 10th highest death rate in the nation, an improvement from 7th highest in 1994. Illinois' fire death rate has been consistently higher than the national average during this period; in 1995, the fire death rate was 24.9 versus the national rate of 17.4. Over 10 years, however, the death rate has trended down by 19%. The trend in number of deaths has also declined over the 10 years, by 16%. In 1995, the 294 deaths were the second lowest in the 10-year period.

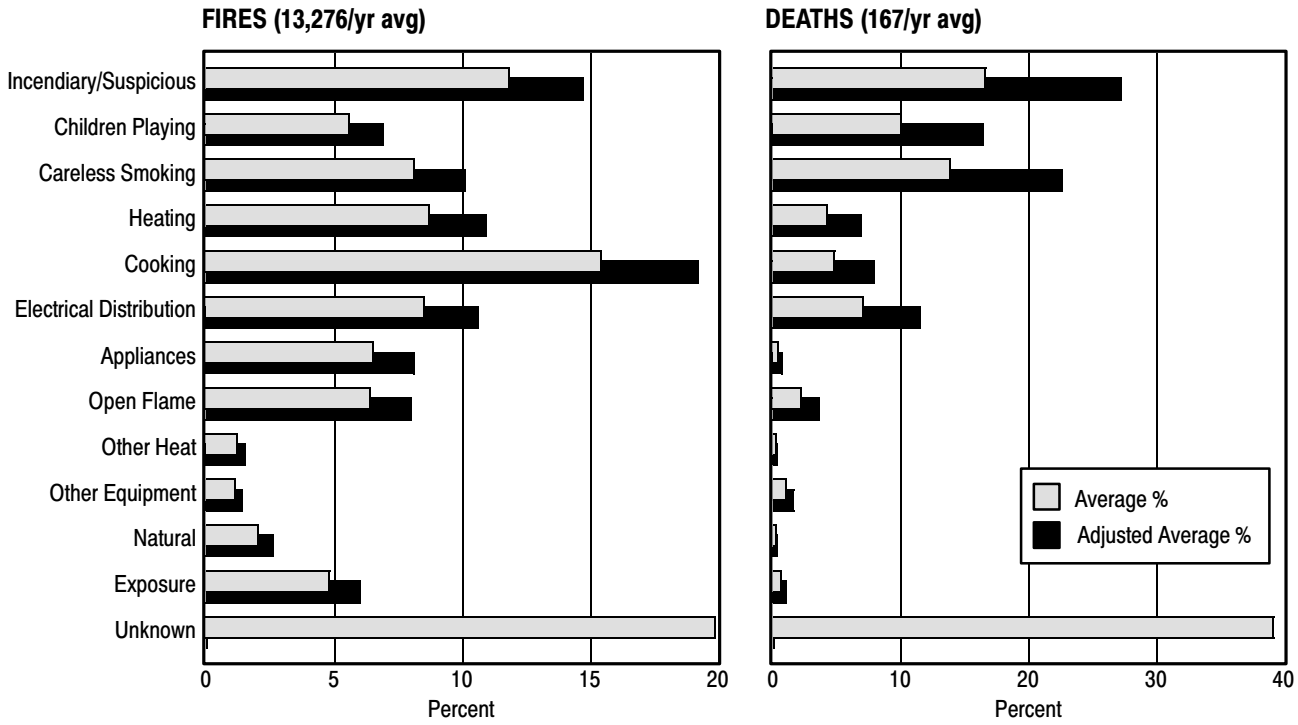


Year	Fire Deaths	Deaths/ Million
1986	300	26.3
1987	335	29.4
1988	426	37.4
1989	418	36.6
1990	378	33.0
1991	390	33.8
1992	328	28.2
1993	273	23.4
1994	335	28.5
1995	294	24.9

Illinois State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking is the leading cause of residential fires each year in Illinois, followed by arson. Half of the known residential fire deaths over the 3-year period were from arson and careless smoking. In 1995, deaths from electrical distribution fires (16) were higher than from careless smoking (15). Causes of fire deaths were unknown for a large number (39%) of the cases.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	1,485	1,720	1,479	20	37	26
Children Playing	754	844	620	18	25	7
Careless Smoking	1,097	1,105	1,029	24	30	15
Heating	1,267	1,177	1,029	4	12	5
Cooking	2,097	2,101	1,936	6	12	6
Electrical Distribution	1,066	1,131	1,193	8	11	16
Appliances	836	863	894	0	2	0
Open Flame	748	963	853	3	4	4
Other Heat	133	153	178	0	0	1
Other Equipment	155	142	149	2	3	0
Natural	363	230	222	1	0	0
Exposure	536	715	657	1	1	1
Unknown	2,527	2,841	2,541	84	70	42
Total	13,064	13,985	12,780	171	207	123

Source: NFIRS

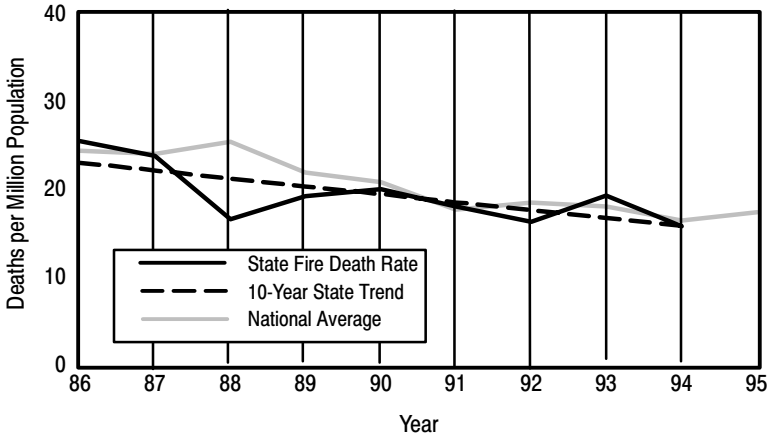
INDIANA

Indiana has not reported to NFIRS since 1993, and 1994 is the last year for which fire death data are available.

The Office of the State Fire Marshal publishes a quarterly newsletter *Fire!* which is devoted to juvenile firesetters and related issues. More fire-related information for Indiana can be found at Web site http://www.ai.org/sema/osfm.html.

STATE FIRE DEATHS AND DEATH RATE

In 1994, the last year in which fire death data are available, Indiana had 91 deaths, tied with 1988 as the lowest number of deaths. Over 9 years, the death trend has been downward 27%. With 15.8 deaths per million population, the state is slightly below the 1994 national rate of 16.4, and the trend in deaths is down 31% over 9 years.



Year	Fire Deaths	Deaths/ Million
1986	139	25.5
1987	130	23.8
1988	91	16.6
1989	106	19.2
1990	111	20.0
1991	101	18.0
1992	92	16.3
1993	110	19.3
1994	91	15.8
1995	-	-

Indiana State Fire Marshal's Office; Indiana Vital Records, State Board of Health; and the Bureau of the Census

IOWA

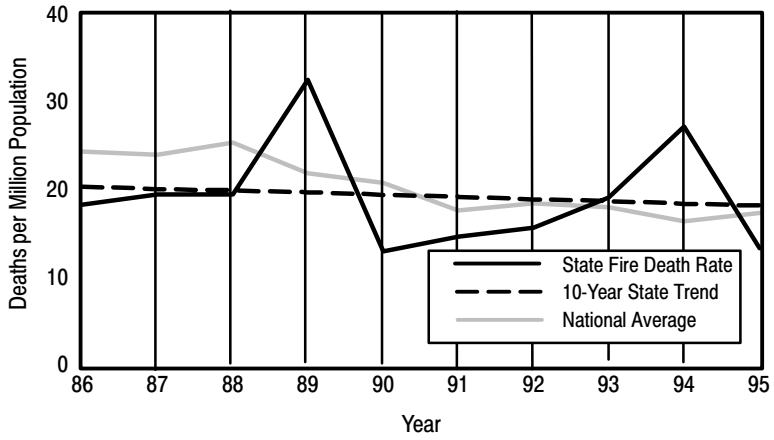
According to the 1995 annual report, there were 14,010 fires in Iowa that year. These fires resulted in more than $94 million in damage, the highest dollar loss in the last 10 years and well over the 10-year average of approximately $60 million per year.

Of the 869 fire departments in the state, 516 (59 percent) report to NFIRS. There were 13,142 fires reported to NFIRS from Iowa in 1995. Structure fires numbered 4,301, with 61 percent of these in residential structures.

Since the 1970s, Iowa has seen significant increases in the numbers of deaths attributed to arson, arson/suicide, electrical equipment, and children playing. According to the state fire report, which uses different causes of fire categories than the 13 used by NFIRS at the national level, electrical equipment was responsible for fewer than 5 percent of fire deaths in the early 1970s, but this proportion rose to almost 20 percent by the early 1990s. Children playing fire deaths rose from approximately 3 percent of all deaths in the early 1970s to 10 percent in the early 1990s. More fire-related information for Iowa can be found at Web site http://www.state.ia.us/government/dps/fm/isfm/html.

STATE FIRE DEATHS AND DEATH RATE

Iowa's death rate per million population was 13.4 in 1995, ranking it 19th lowest in the nation and below the national average of 17.4. This is a significant improvement over 1994, when Iowa had the seventh highest death rate in the nation. The 10-year trend in death rate decreased by 11%. The 38 deaths reported in 1995 were the second lowest in 10 years. Overall, the trend in number of deaths has also been downward, declining 9%. Iowa's annual report cited smoke inhalation as the cause of death for 23 of the 38 victims.

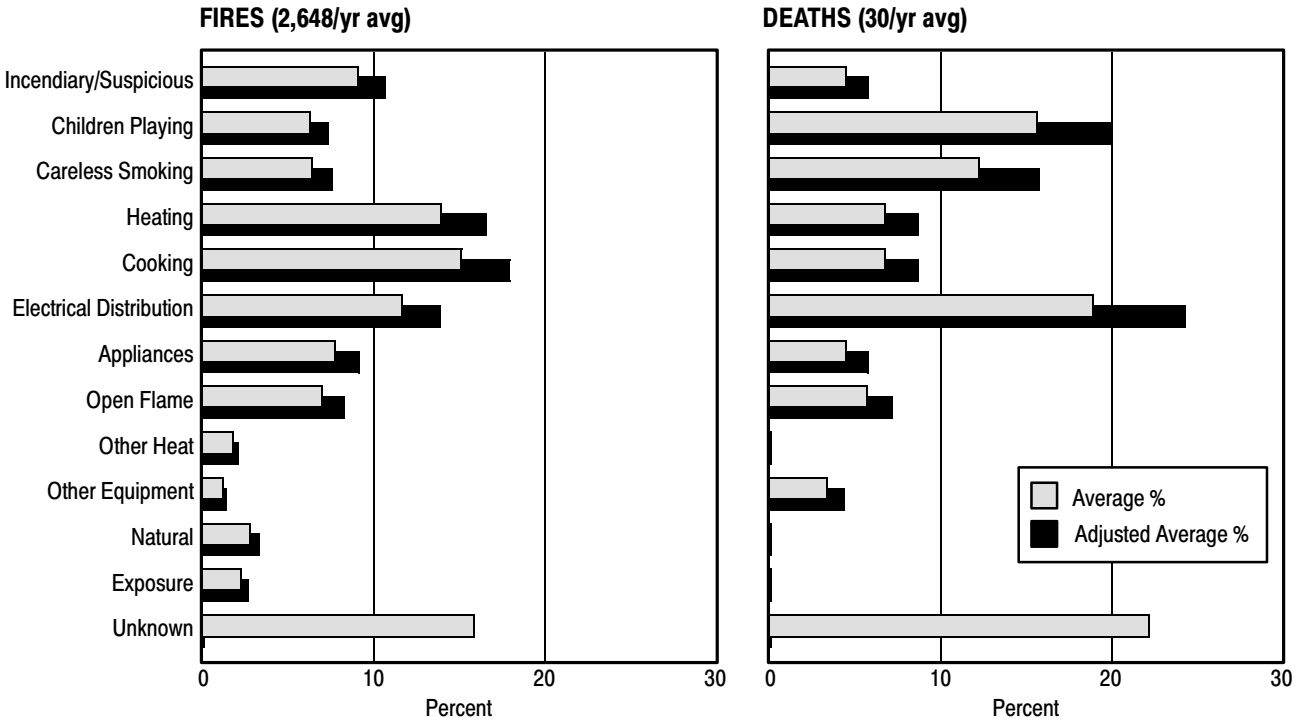


Year	Fire Deaths	Deaths/ Million
1986	51	18.3
1987	54	19.5
1988	54	19.5
1989	90	32.5
1990	36	13.0
1991	41	14.7
1992	44	15.7
1993	54	19.1
1994	77	27.2
1995	38	13.4

Iowa State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

The leading cause of residential fires in Iowa is cooking, followed closely by heating. Over the 3-year period, fires from electrical distribution and appliances have increased each year. Over 3 years, 17 deaths were attributed to electrical distribution, which make it the leading cause of death. However, 13 of those deaths occurred in one year, 1994. Children playing and careless smoking are the next leading causes of residential fire deaths.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	211	274	227	0	3	1
Children Playing	146	174	169	2	9	3
Careless Smoking	171	166	165	2	1	8
Heating	358	410	334	1	2	3
Cooking	356	424	420	5	0	1
Electrical Distribution	284	313	326	3	13	1
Appliances	199	197	216	1	3	0
Open Flame	178	212	157	0	3	2
Other Heat	41	49	47	0	0	0
Other Equipment	25	36	23	1	2	0
Natural	82	71	58	0	0	0
Exposure	47	52	74	0	0	0
Unknown	405	436	412	10	3	7
Total	2,503	2,814	2,628	25	39	26

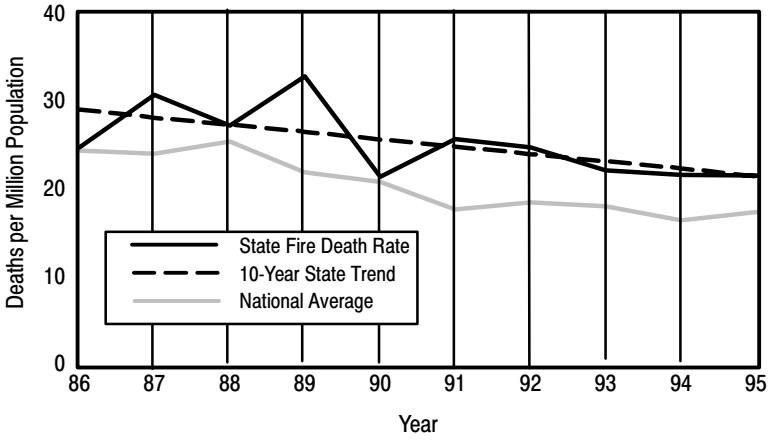
Source: NFIRS

KANSAS

Eighty-four percent of Kansas' fire departments (571 of 680) report to NFIRS. In 1995, 19,448 fires were reported. Structure fires numbered 5,216, with 71 percent of these in residences. Eighteen percent of fires occurred in vehicles. Kansas uses its equivalent of NFIRS in reporting fires in its annual report, so their totals are understated. Similar to the United States as a whole, the kitchen and the living room were the leading areas of fire origin in 1995 according to the state fire report.

STATE FIRE DEATHS AND DEATH RATE

Kansas' 21.5 deaths per million population ranks it in the highest third nationally and above the national average of 17.4. The 10-year death rate, however, has trended downward 26%. The annual number of fire deaths rose in the late 1980s but has since plateaued at a lower level in the 1990s. The overall trend in fire deaths has declined 22%.

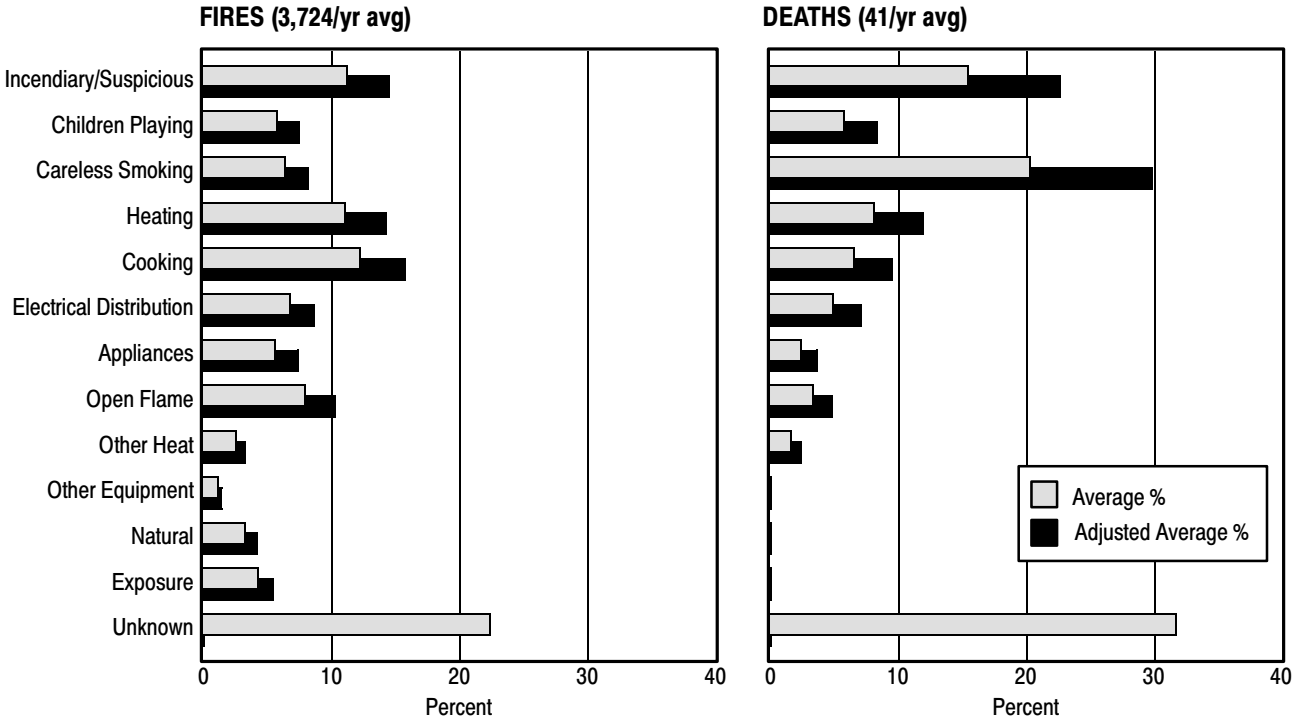


Year	Fire Deaths	Deaths/ Million
1986	60	24.7
1987	75	30.7
1988	67	27.2
1989	81	32.8
1990	53	21.4
1991	64	25.7
1992	62	24.7
1993	56	22.1
1994	55	21.6
1995	55	21.5

Kansas State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Cooking, arson, and heating are the leading causes of residential fires in Kansas accounting for 44% of all fires in the 3-year period. Smoking caused 32% of deaths in residences in 1995, followed by arson at 18%. Again, the unknown causes are high at 32%.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	409	415	422	14	1	4
Children Playing	214	200	228	2	3	2
Careless Smoking	221	255	223	9	9	7
Heating	443	377	412	3	5	2
Cooking	443	470	450	2	4	2
Electrical Distribution	235	228	283	2	2	2
Appliances	222	199	209	0	1	2
Open Flame	266	315	307	3	0	1
Other Heat	76	98	101	0	2	0
Other Equipment	35	34	56	0	0	0
Natural	125	136	98	0	0	0
Exposure	130	181	155	0	0	0
Unknown	881	860	760	8	15	16
Total	3,700	3,768	3,704	43	42	38

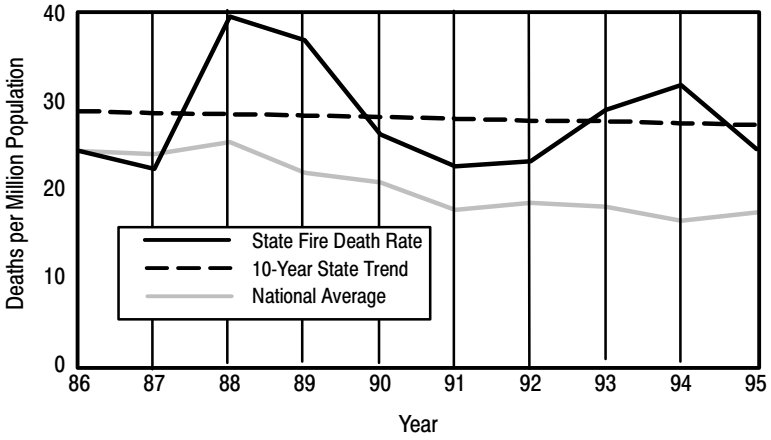
Source: NFIRS

KENTUCKY

In 1995, 569 of 794 Kentucky fire departments (72 percent) reported 20,469 fires to NFIRS. Structure fires totaled 6,906, with 76 percent of these occurring in residential structures. There was a 20 percent increase in NFIRS participation from 1994 to 1995.

STATE FIRE DEATHS AND DEATH RATE

The number of deaths in Kentucky has been erratic over 10 years, with a slight downward trend of 1%. The state had the 12th highest death rate in 1995 at 24.6 deaths per million population, well above the national death rate of 17.4. Nevertheless, this was a considerable improvement over 1994 when Kentucky was 4th highest at 31.9. The death rate has trended downward 5% over 10 years.

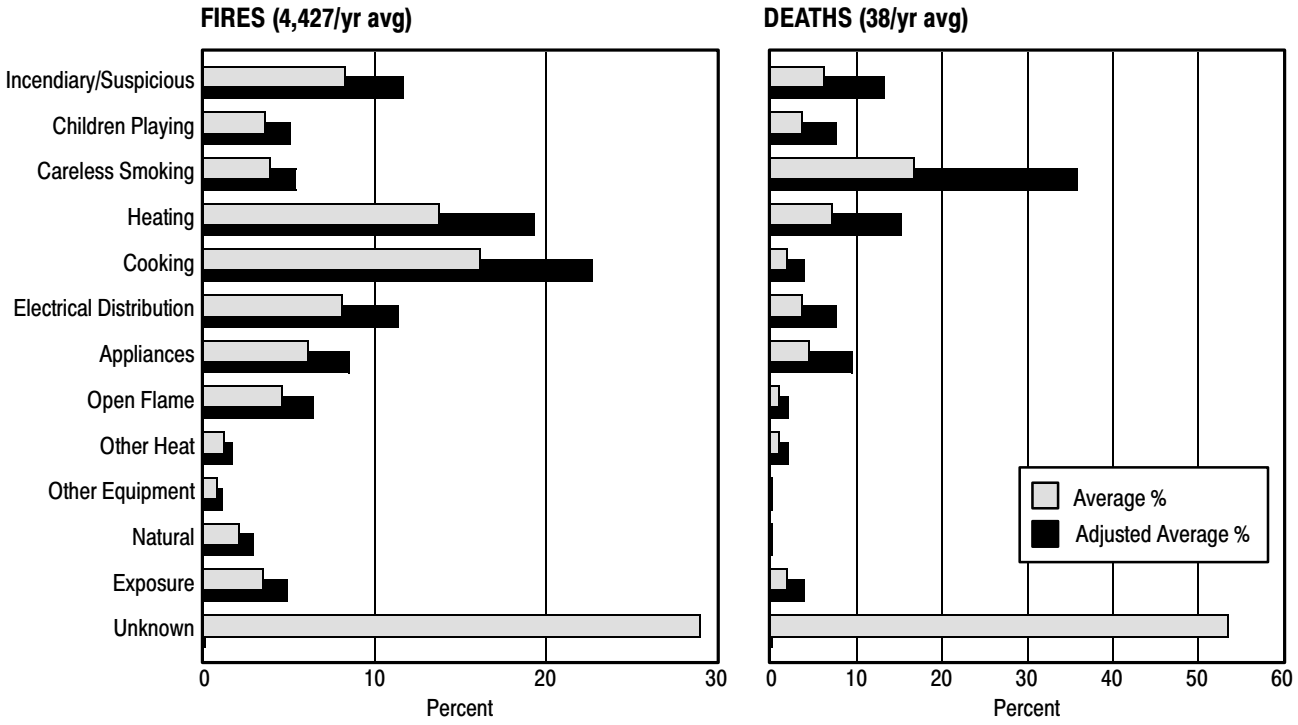


Year	Fire Deaths	Deaths/ Million
1986	90	24.4
1987	82	22.3
1988	146	39.7
1989	136	37.0
1990	97	26.3
1991	84	22.6
1992	87	23.2
1993	110	29.0
1994	122	31.9
1995	95	24.6

Kentucky State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

As in most states, cooking was the leading cause of residential fires in Kentucky in each of the 3 years. Heating fires, the second leading cause, represented 19% of all residential fires. A large proportion (29%) of reported fires were of unknown cause. Careless smoking caused 36% of the known deaths over the 3-year period. An exceptionally large proportion of fire deaths (over half) in each of the 3 years were of unknown cause.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	248	416	428	1	2	4
Children Playing	114	193	163	3	0	1
Careless Smoking	101	213	187	4	12	3
Heating	547	641	631	2	4	2
Cooking	647	685	807	1	0	1
Electrical Distribution	298	371	392	0	1	3
Appliances	224	264	303	0	5	0
Open Flame	150	213	235	0	0	1
Other Heat	28	55	67	0	0	1
Other Equipment	22	26	44	0	0	0
Natural	97	76	94	0	0	0
Exposure	96	147	205	0	2	0
Unknown	992	1,181	1,679	16	26	19
Total	3,564	4,481	5,235	27	52	35

Source: NFIRS

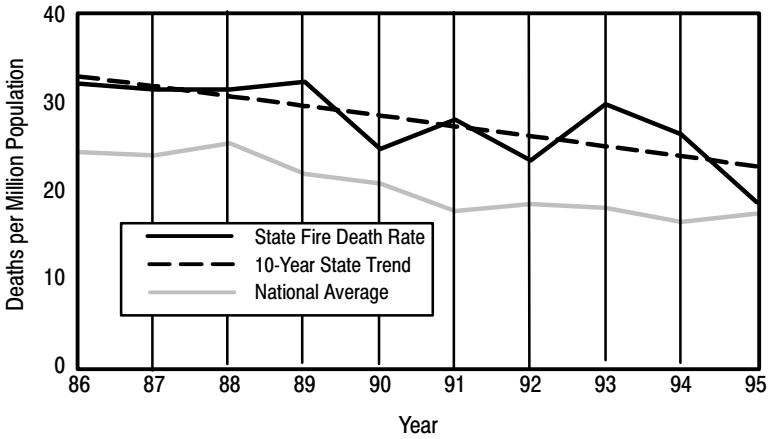
LOUISIANA

There were 15,385 fires reported to NFIRS from Louisiana in 1995. The number of structure fires was 5,227, with 80 percent of these in residences. Forty-five percent of the state's fire departments (314 of 700) report to NFIRS, a 16 percent drop in the number of fire departments that participated in 1994.

More fire-related information for Louisiana can be found at Web site http://www.dps.state.la.us/sfm/index.htm.

STATE FIRE DEATHS AND DEATH RATE

With 81 deaths in 1995, Louisiana improved its death rate considerably, from 26.4 deaths per million in 1994 to 18.7 in 1995—near the national average of 17.4. The 10-year fire death rate trend has decreased 31%. The state, which had the 11th highest death rate in 1994, dropped to 20th in 1995. The 81 deaths in 1995 were the lowest in 10 years, and the trend in number of deaths has decreased 32%.

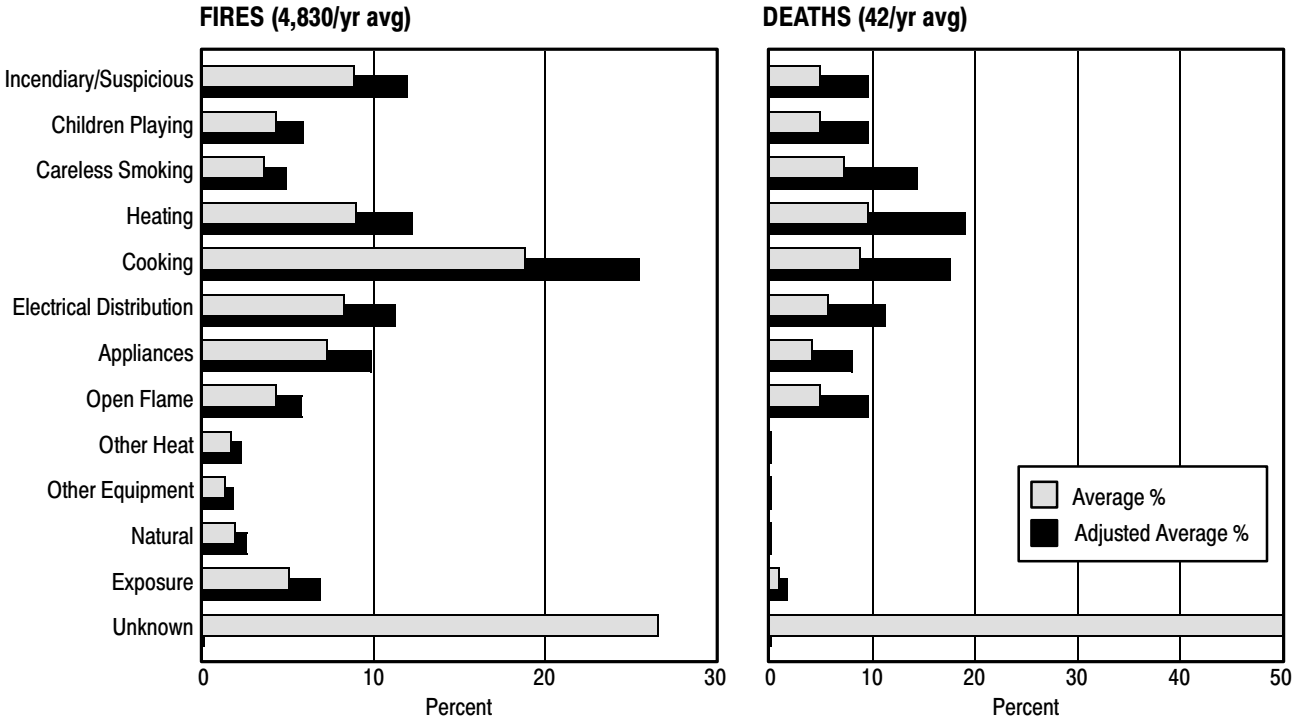


Year	Fire Deaths	Deaths/ Million
1986	142	32.2
1987	137	31.5
1988	135	31.5
1989	138	32.4
1990	104	24.7
1991	119	28.1
1992	100	23.4
1993	128	29.8
1994	114	26.4
1995	81	18.7

Louisiana State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Cooking fires accounted for 26% of all residential fires in Louisiana over the 3-year period. Arson and heating fires were the next leading causes accounting for a combined 24%. The leading cause of residential fire death over 3 years and in 1995 is heating, but children playing led in 1993 and cooking in 1994. More than one-quarter of reported residential fires had unknown cause. Cooking and careless smoking are not far behind heating as the second and third leading causes of residential fire deaths over 3 years. A very large number of the reported fire deaths (50%) were not attributed to cause.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	523	364	381	3	1	2
Children Playing	243	181	188	6	0	0
Careless Smoking	190	149	170	2	2	5
Heating	536	389	371	2	4	6
Cooking	1,087	943	688	3	6	2
Electrical Distribution	424	373	394	2	1	4
Appliances	404	342	294	3	1	1
Open Flame	231	186	185	4	1	1
Other Heat	97	75	64	0	0	0
Other Equipment	65	59	56	0	0	0
Natural	94	89	79	0	0	0
Exposure	286	133	309	1	0	0
Unknown	1,465	1,368	1,016	26	28	9
Total	5,645	4,651	4,195	52	44	30

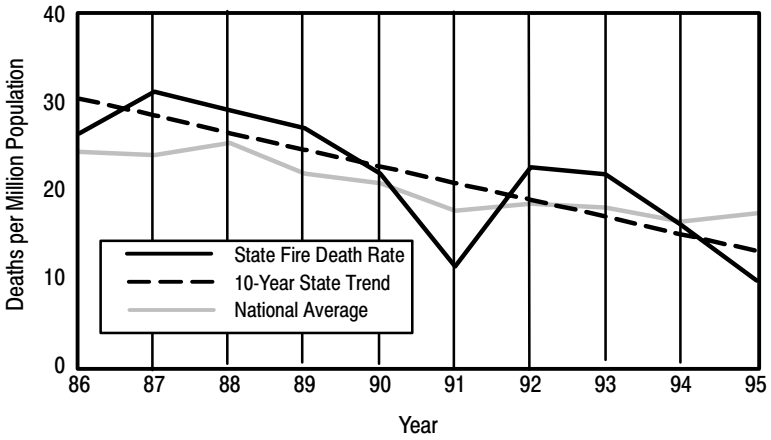
Source: NFIRS

MAINE

No data are available on the number of fires in Maine for 1995. Also, since Maine has not submitted data to NFIRS since 1990, no data on fire causes are available. The State Fire Marshal's Office reported that 7 of the 12 fire fatalities occurred in residential properties. Heating was the cause of four of the residential fire fatalities.

STATE FIRE DEATHS AND DEATH RATE

The 12 deaths reported by the State Fire Marshal's Office was the lowest number in the past 10 years. The 10-year trend has declined sharply, by 54%. This mirrors the 57% decline in deaths per million population, which were 9.7 in 1995, again the lowest over the period and far below the national rate of 17.4. Maine had the 7th lowest death rate in the nation; the state was 19th lowest in 1994.



Year	Fire Deaths	Deaths/ Million
1986	31	26.5
1987	37	31.2
1988	35	29.1
1989	33	27.1
1990	27	21.9
1991	14	11.3
1992	28	22.6
1993	27	21.8
1994	20	16.1
1995	12	9.7

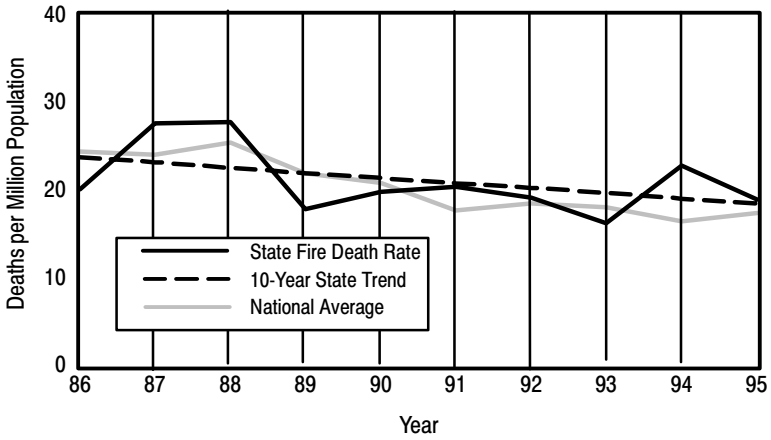
Maine State Fire Marshal's Office and the Bureau of the Census

MARYLAND

Seventy-seven percent of Maryland's fire departments (285 of 370) report to NFIRS. This represents a 20 percent decrease in participation from 1994. In 1995, 16,534 fires were reported to NFIRS. Of these, 4,691 were in structures and 78 percent of those were in residences.

STATE FIRE DEATHS AND DEATH RATE

Maryland had a death rate per million population of 18.9, above the national average of 17.4 but a significant improvement over the 22.9 deaths per million in 1994. Nationally, Maryland is ranked in the top half of states having the highest death rates. The 10-year trends in death rate and in number of deaths have declined by 22% and 13%, respectively. The 95 deaths in 1995 is under the 10-year average of 101 deaths per year.

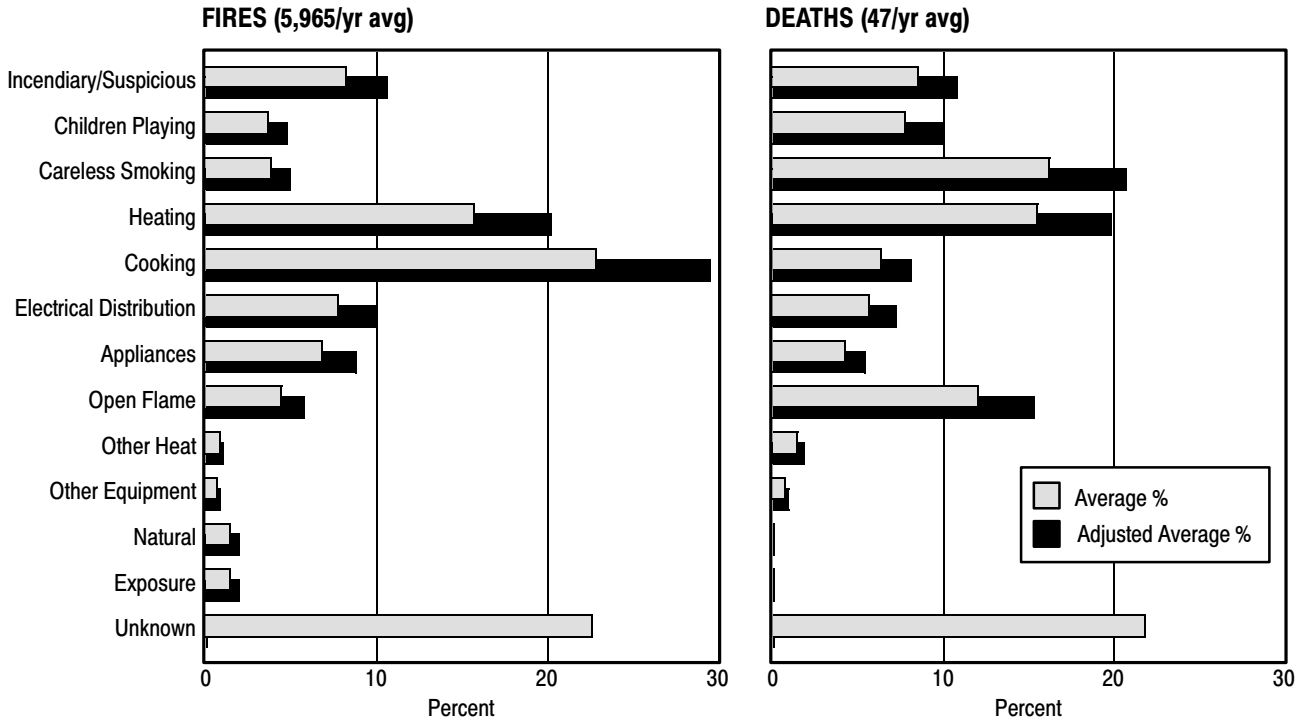


Year	Fire Deaths	Deaths/ Million
1986	90	20.1
1987	126	27.6
1988	129	27.7
1989	84	17.8
1990	95	19.8
1991	99	20.4
1992	94	19.1
1993	80	16.2
1994	114	22.8
1995	95	18.9

Maryland State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Cooking has been the leading cause of fires in Maryland over the 3-year period, but in 1995 there were slightly more heating fires, the second leading cause over the 3 years. Combined, these two causes represented nearly half of all residential fires. The decrease in 1995 fires is due to the decrease in the number of fire departments reporting to NFIRS. Careless smoking and heating were the leading causes in 1995 with five deaths each.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	506	644	323	3	8	1
Children Playing	237	298	114	2	8	1
Careless Smoking	248	290	147	6	12	5
Heating	1,012	1,110	680	4	13	5
Cooking	1,649	1,775	663	3	4	2
Electrical Distribution	526	576	269	1	7	0
Appliances	437	502	285	0	2	4
Open Flame	277	336	175	7	10	0
Other Heat	48	44	46	0	2	0
Other Equipment	36	44	32	0	1	0
Natural	81	140	38	0	0	0
Exposure	58	81	119	0	0	0
Unknown	1,428	1,861	760	11	15	5
Total	6,543	7,701	3,651	37	82	23

Source: NFIRS

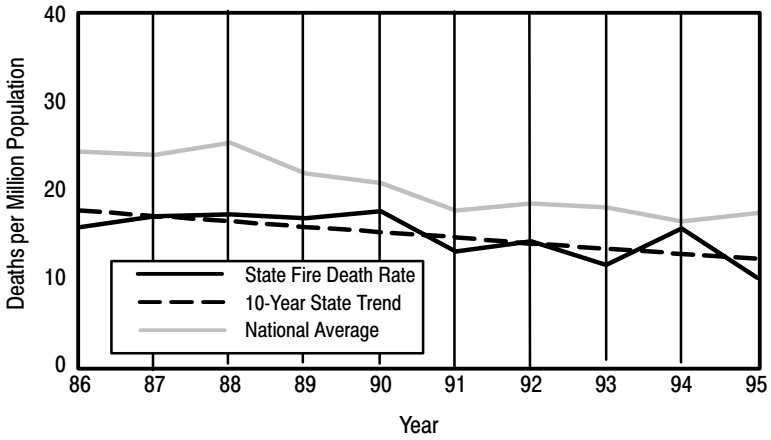
MASSACHUSETTS

Most of Massachusetts' fire departments report to NFIRS, 335 of 364 departments (92 percent). In 1995, 32,149 fires were reported to NFIRS. Structure fires numbered 11,685, with 77 percent of these occurring in residential structures.

Because careless smoking has been a consistent leading cause of fire deaths, the Massachusetts legislature appropriated $1.25 million in 1994 to be used by fire departments to address this problem. The funding to support this program was raised through revenues from cigarette taxes. The state also has a vigorous campaign to reduce the number of deaths caused by children playing with fire materials by encouraging parents to keep lighters and matches out of the reach of children, purchase child-resistant lighters, and teach their children about the safe uses of fire, such as for lighting birthday candles and barbecuing. More fire-related information for Massachusetts can be found at Web site http://www.magnet.state.ma.us/sfmo.

STATE FIRE DEATHS AND DEATH RATE

The 61 deaths reported by the State Fire Marshal's Office for 1995 was the lowest in 10 years, which contributed to the 30% decline in the 10-year trend. Massachusetts, with 10 deaths per million population in 1995—also the lowest in 10 years—ranked as the eighth lowest rate in the nation and was significantly below the national death rate of 17.4. The death rate trend over 10 years has declined 32%.



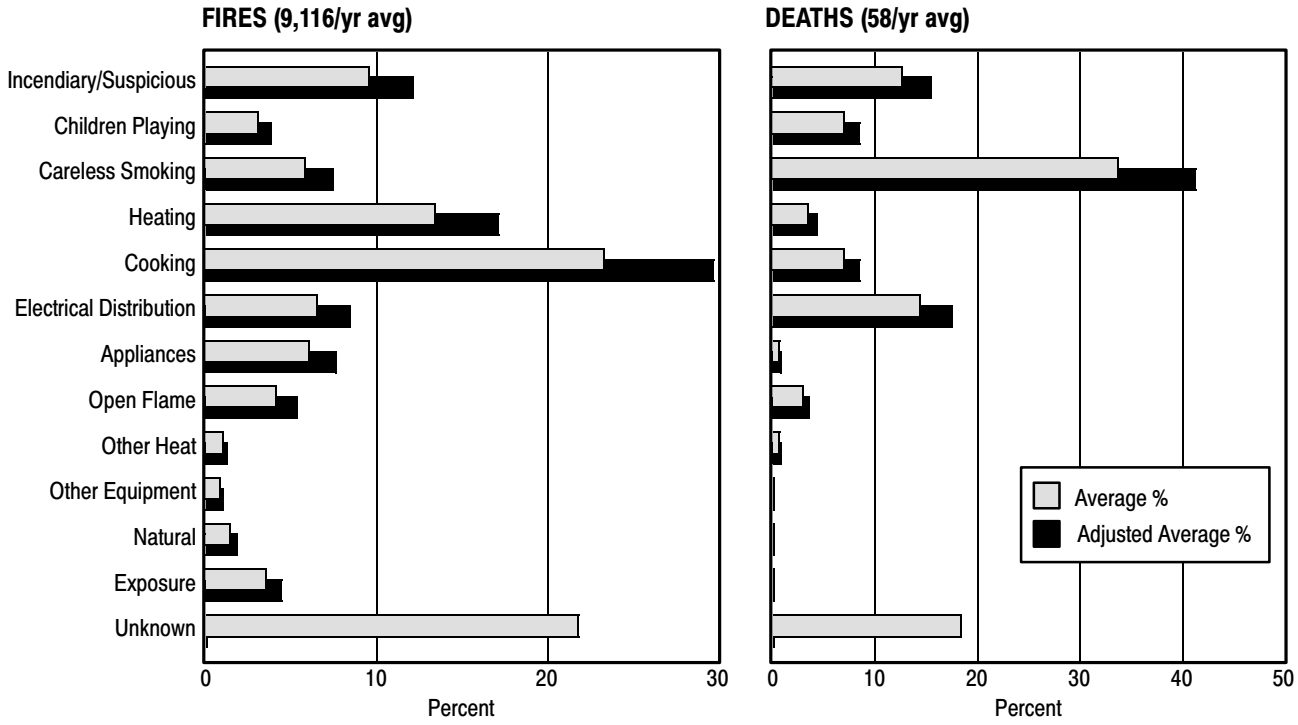
Year	Fire Deaths	Deaths/ Million
1986	93	15.8
1987	101	17.0
1988	103	17.2
1989	101	16.8
1990	106	17.6
1991	78	13.0
1992	85	14.2
1993	69	11.5
1994	94	15.6
1995	61	10.0

Massachusetts State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking has been the leading cause of fires in Massachusetts residences for each of the past 3 years, although the actual numbers have been declining. These fires are nearly twice the number of the next leading cause, heating. Combined, these two causes account for 46% of all residential fires.

Of the known causes of fire deaths in residences in 1995, careless smoking accounted for 44%. Deaths due to electrical distribution fires accounted for an unusually large percentage (25%) in 1995.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	933	892	771	12	7	3
Children Playing	273	295	249	4	6	2
Careless Smoking	540	539	506	20	23	16
Heating	1,290	1,136	1,228	2	3	1
Cooking	2,322	2,111	1,929	3	7	2
Electrical Distribution	555	622	611	5	11	9
Appliances	540	536	558	0	0	1
Open Flame	353	386	391	2	2	1
Other Heat	79	89	94	0	0	1
Other Equipment	71	81	72	0	0	0
Natural	148	155	91	0	0	0
Exposure	205	436	207	0	0	0
Unknown	1,580	2,164	2,211	3	18	11
Total	8,889	9,442	9,018	51	77	47

Source: NFIRS

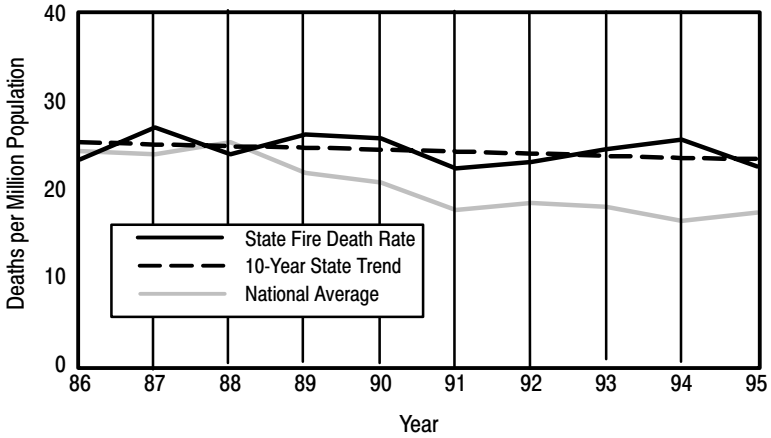
MICHIGAN

Michigan reported 60,076 fires to NFIRS in 1995. Ninety-four percent of fire departments (964 of 1,030) participate in NFIRS, and those data are used in compiling Michigan's annual report. Structure fires totaled 23,121, with 66 percent of these occurring in residences representing $200 million in property damage.

From the 1995 annual report, arson, the leading cause of residential fires, was most frequent between 10 p.m. and 2 a.m. and most commonly were set on Saturdays, Sundays, and Mondays. Civilian fire deaths most frequently occurred (20 percent) between midnight and 4 a.m. Nearly a third of all civilian deaths were children between the ages of one and nine. The kitchen was the area of origin for most fires (21 percent), followed by bedrooms (14 percent). The living room and bedrooms the were the rooms where the most fatalities occurred, at 25 and 20 percent, respectively. More fire-related information for Michigan can be found at Web site http://www.msp.state.mi.us/division/isb.htm#3.

STATE FIRE DEATHS AND DEATH RATE

Over 10 years, fire deaths in Michigan have been remarkably steady, trending downward just 2%. In 1995, deaths per million population were 22, considerably higher than the national average of 17.4 and 13th highest in the nation. The death rate trend has declined nearly 7% over this period.

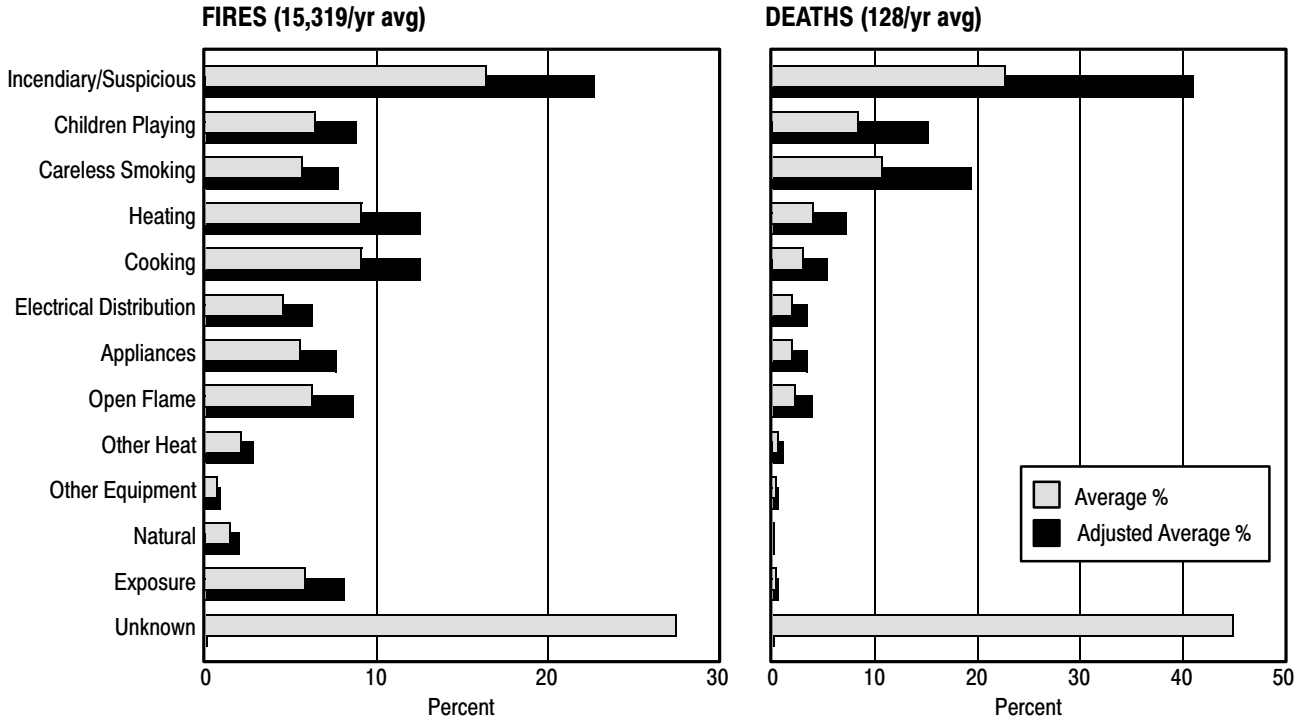


Year	Fire Deaths	Deaths/ Million
1986	214	23.4
1987	249	27.1
1988	221	24.0
1989	243	26.3
1990	240	25.8
1991	210	22.4
1992	218	23.1
1993	233	24.6
1994	244	25.7
1995	212	22.2

Michigan State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Over 3 years, Michigan fire departments did not report the causes of 28% of residential fires and 45% of deaths to NFIRS. Arson is by far the leading cause of both fires (23%) and deaths (41%). Cooking and heating are the next leading causes of fires, virtually tied at 13%; heating fires, however, have decreased in each of the 3 years. A large number of fires (28%) were of unknown cause. After arson, careless smoking (19%) and children playing (15%) were the leading causes of fire deaths over the 3-year period. A high proportion of fire deaths (45%) occurred in fires of unknown cause.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	2,225	2,729	2,600	28	31	28
Children Playing	947	1,092	898	2	16	14
Careless Smoking	872	845	852	12	13	16
Heating	1,506	1,373	1,294	3	4	8
Cooking	1,388	1,386	1,397	3	1	7
Electrical Distribution	655	744	652	0	4	3
Appliances	794	830	899	3	3	1
Open Flame	844	1,023	1,005	2	1	5
Other Heat	288	322	288	1	0	1
Other Equipment	89	107	75	1	0	0
Natural	178	252	214	0	0	0
Exposure	769	958	958	0	0	1
Unknown	4,094	4,435	4,111	55	63	55
Total	14,649	16,096	15,243	110	136	139

Source: NFIRS

MINNESOTA

Minnesota's annual report uses the data it submits to NFIRS. In 1995, 87 percent of the fire departments (694 of 804) reported to the state.[1] There were 19,798 fires reported in 1995, 6,942 in structures and, of these, 65 percent occurred in residences. The annual report showed that 20 percent of fires in buildings were caused by heating systems, 16 percent were arson fires, and 14 percent were cooking-related fires. Seventy-eight percent of 1995 fatalities occurred in residential settings and, not surprisingly, 43 percent of these deaths occurred between midnight and 6 a.m. Alcohol or drugs were determined to be a factor in 44 percent of all Minnesota fire deaths in 1995. To pinpoint causes, Minnesota now requires autopsies for all fire deaths.

In a continuing effort to reduce fire damage and fatalities, Minnesota promotes fire protection technology (smoke detectors, sprinkler systems, etc.), better inspection programs, and fire safety education efforts. The 1995 annual report cites these efforts as significant factors in the reduction in fire death rates over the last 25 years in the state. One such safety program is the Home Safety Checklist developed by the Minnesota Injury Prevention Program, part of the state Department of Health. The purpose of the program is to reduce the number of injuries to children and the elderly by educating families about fire-related burn hazards and installing smoke detectors and other safety devices.[2] Several methods were tested for using the Home Safety Checklist. The most successful method was found to be home inspections conducted by public health professionals.

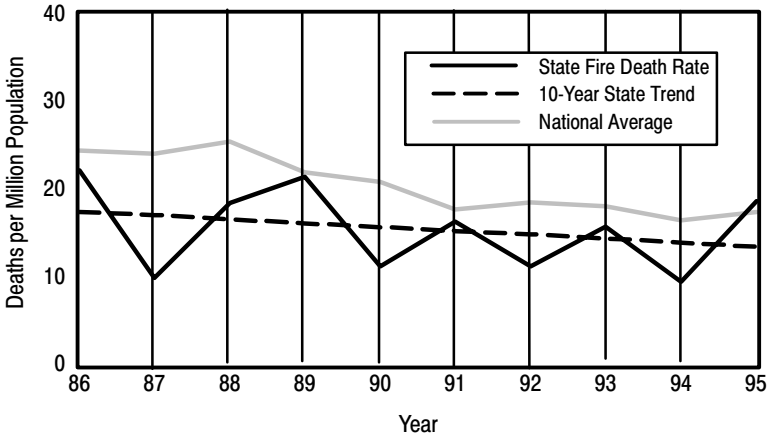
More fire-related information for Minnesota can be found at Web site http://www.dps.state.mn.us/fmarshal/fmarshal.html.

[1] Although 694 fire departments reported to the State of Minnesota, 662 fire department IDs are represented in the national data.

[2] *Effort To Increase Smoke Detector Use in U.S. Households*: *An Inventory of Programs*, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, GA, 1966.

STATE FIRE DEATHS AND DEATH RATE

The number of deaths in Minnesota in 1995 doubled over 1994 deaths. Nevertheless, the 10-year trend in deaths has declined by 15%. In fact, there was a 19% drop in the 1970s, and the drop in number of deaths in the 1990s may reach 20%. The increase in deaths in 1995 catapulted the state into the top half of states having the highest death rate, from fifth lowest in 1994. With 18.6 deaths per million population, Minnesota's fire death rate was above the national rate of 17.4 for the first time in 10 years. Overall, though, the 10-year trend in deaths per million population has declined 23% over the past 10 years.

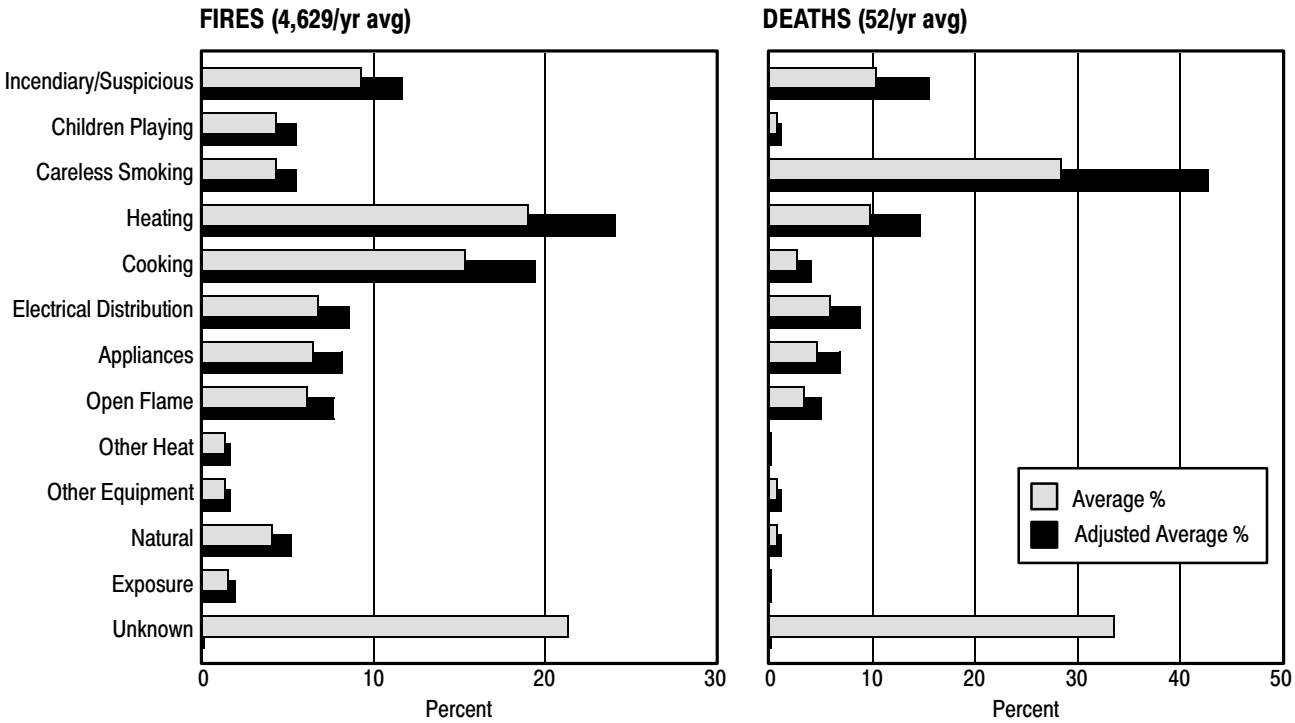


Year	Fire Deaths	Deaths/ Million
1986	93	22.1
1987	42	9.9
1988	79	18.4
1989	93	21.4
1990	49	11.2
1991	72	16.3
1992	50	11.2
1993	71	15.7
1994	43	9.4
1995	86	18.6

Minnesota State Fire Marshal's Office; Minnesota Section of Vital Statistics, Department of Health; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Heating is the leading cause of residential fires in Minnesota, followed by cooking and arson. There were 67 residential fire deaths in 1995, 43% attributed to careless smoking over the 3-year period. In 34% of deaths, the cause was not determined in NFIRS.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	391	454	428	2	8	6
Children Playing	198	218	172	0	1	0
Careless Smoking	182	197	211	14	10	20
Heating	912	847	876	3	3	9
Cooking	779	679	660	0	3	1
Electrical Distribution	279	321	328	2	1	6
Appliances	267	299	320	1	1	5
Open Flame	261	290	285	2	3	0
Other Heat	57	52	52	0	0	0
Other Equipment	58	67	40	1	0	0
Natural	203	185	170	1	0	0
Exposure	64	63	66	0	0	0
Unknown	974	1,069	913	23	9	20
Total	4,625	4,741	4,521	49	39	67

Source: NFIRS

MISSISSIPPI

Mississippi's semiannual run report stated that fire departments reported making 51,103 runs to incidents involving fire in 1995, with 13,988 occurring in structures. Seventy-seven percent of these structural fires were residential. These structural fires accounted for approximately $366 million in property losses. Although Mississippi does not currently participate in NFIRS, it is developing its own system of incident reporting, which will be capable of downloading data elements into the NFIRS database. The Mississippi Fire Incident Reporting System pilot program began in January 1995. When fully implemented, this system will have the capability of gathering fire incident reports from all of its 735 fire departments electronically. Target date for complete implementation has been set for FY 1999.

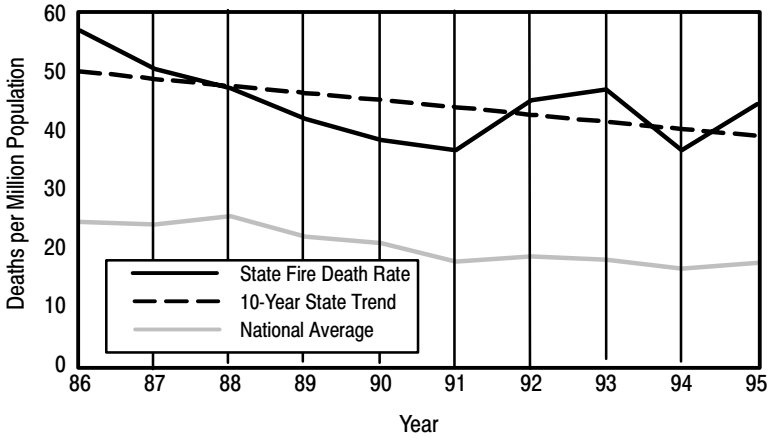
Since the passage of House Bill 693, which increased the amount of state funds provided to fire departments providing fire protection throughout the state, a number of improvements have been made. According to the Mississippi Fire Services Development Division, among these improvements are the following:

- Fire department personnel are saving approximately 50 more lives a year than they did in 1988.
- There are 3,000 less structural fires annually than in 1988, of which 2,000 were residential.
- Three hundred-fifty new fire stations have been established since 1988 accounting for over 6,000 more volunteer fire fighters and 800 additional fire apparatus. Fire services, which centered solely on fire suppression, have expanded to include rescue, hazardous materials, and emergency medical response; fire prevention; and fire safety education.
- Homeowners have experienced a decrease in insurance costs averaging $56 per policy year.

More fire-related information for Mississippi can be found at Web site http://www.doi.state.ms.us.

STATE FIRE DEATHS AND DEATH RATE

Mississippi had the highest death rate in the United States in 1995 at 44.6 per million population, two and one half times the national average of 17.4 deaths per million population. In 1994, Mississippi had the second highest rate. Over 10 years, however, there has been a 22% decline in the trend for death rate and a 19% decline in the trend for number of deaths.



Year	Fire Deaths	Deaths/ Million
1986	148	57.1
1987	131	50.6
1988	122	47.3
1989	108	42.0
1990	99	38.4
1991	95	36.7
1992	118	45.2
1993	124	47.0
1994	98	36.7
1995	120	44.5

Mississippi Fire Services Development, Department of Insurance; Vital Records, State Department of Health; and Bureau of the Census

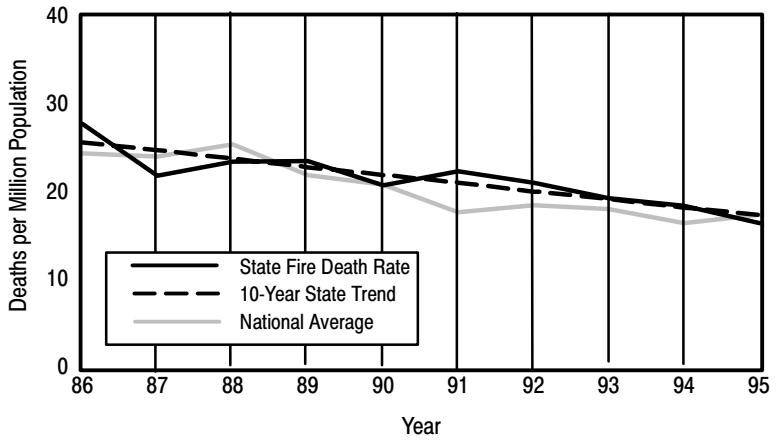
MISSOURI

No data are available from Missouri on the number of fires in the state in 1995. Because Missouri does not participate in NFIRS, causes of fires and deaths are also unavailable.

Fire prevention education is a primary concern of the Division of Fire Safety. Missouri has two remote-controlled units, Fire Truck Freddy and Flashy the Fire Dog, that are used by the Inspection Unit to promote fire safety. Flashy the Fire Dog was recently donated by the Missouri Farm Bureau Insurance Company. The Inspection Unit also sponsors the Junior Fire Inspector Program, courtesy of First Alert Company. Designed for students from grades K–3, this program teaches children the importance of fire safety in the home. The program takes approximately 1 hour to conduct. Upon completion, the students take an oath and receive a badge and fire safety certificate. The Division of Fire Safety currently has 100,000 copies of this program available to any fire department or school district. More fire-related information for Missouri can be found at Web site http://www.dps.state.mo.us/dps/msfs.

STATE FIRE DEATHS AND DEATH RATE

The 87 civilian fire deaths in 1995 was the lowest number over the 10-year period. During this time, the trend in number of deaths declined 28%. Although Missouri had 16.4 deaths per million population in 1995, slightly below the national average of 17.4, the state is in the top half of states with the highest death rate. Missouri's death rate has dropped by one-third since 1986.



Year	Fire Deaths	Deaths/ Million
1986	139	27.7
1987	110	21.8
1988	119	23.4
1989	120	23.5
1990	106	20.7
1991	115	22.3
1992	109	21.0
1993	101	19.3
1994	97	18.4
1995	87	16.4

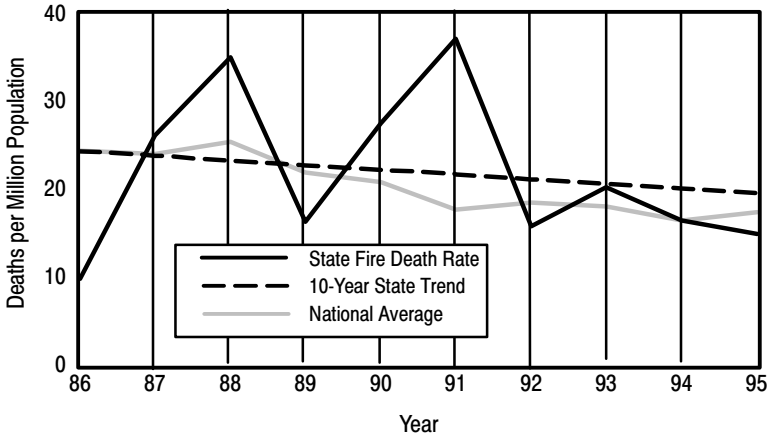
Missouri State Fire Marshal's Office; Missouri Vital Records, State Department of Health; and the Bureau of the Census

MONTANA

In 1994, 32 percent of Montana's fire departments reported to NFIRS, but there was no participation in 1995. The number of residential fires reported to NFIRS in 1994 was 903.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths in Montana as reported by the State Fire Marshal's Office have been erratic over 10 years, ranging from a low of 8 deaths in 1986 to a high of 30 deaths in 1991. The 10-year trend in deaths has declined 14%. Montana had 14.9 deaths per million population in 1995, with a 20% decline in death rate over 10 years. The state's death rate positions it in the middle of all states, and is below the national average of 17.4 deaths per million.

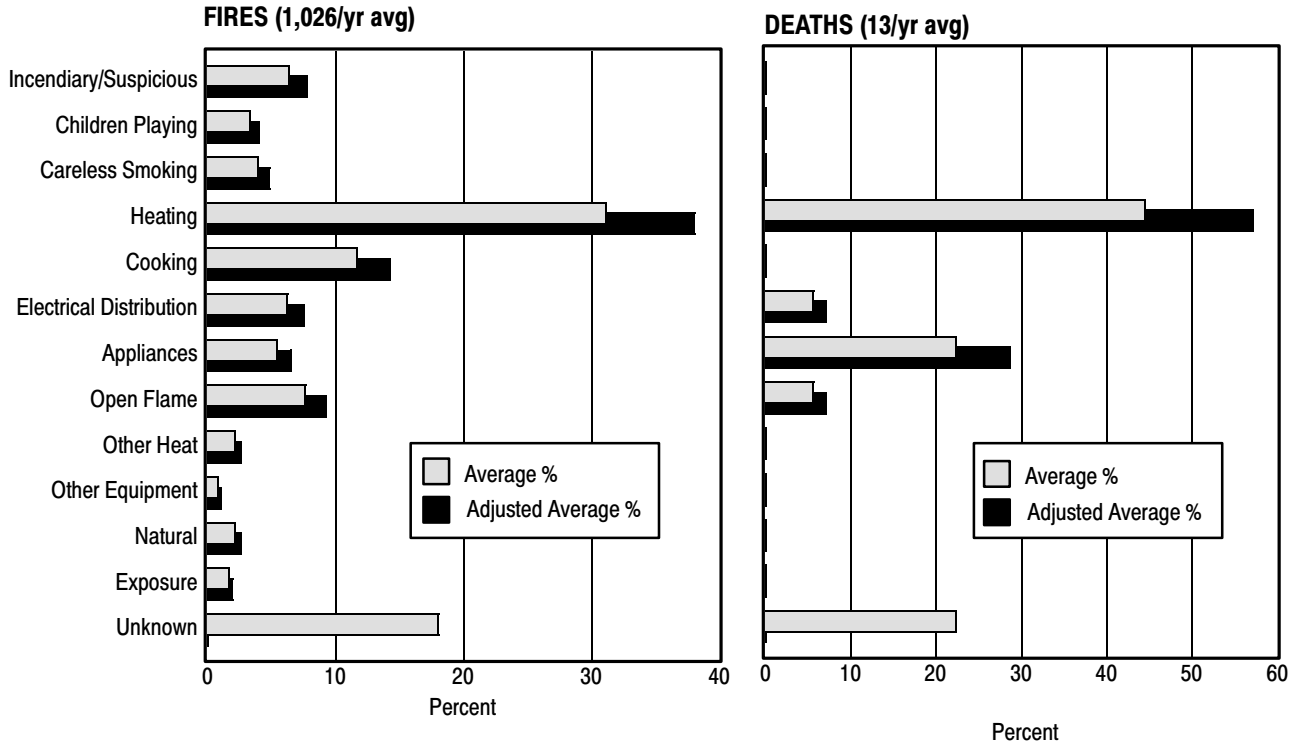


Year	Fire Deaths	Deaths/ Million
1986	8	9.8
1987	21	26.1
1988	28	35.0
1989	13	16.3
1990	22	27.5
1991	30	37.1
1992	13	15.8
1993	17	20.2
1994	14	16.4
1995	13	14.9

Montana State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–94 AVERAGE)

Over 2 years, the leading cause of fire deaths was heating by a two-to-one margin over the next leading cause, appliances. Heating was also the leading cause of fires by a wide margin (38%) over the next leading cause, cooking (14%).



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	71	59	No	0	0	No
Children Playing	33	34	Data	0	0	Data
Careless Smoking	39	42	Reported	0	0	Reported
Heating	388	251	to	3	5	to
Cooking	122	117	NFIRS	0	0	NFIRS
Electrical Distribution	64	63		0	1	
Appliances	65	45		4	0	
Open Flame	85	70		0	1	
Other Heat	22	21		0	0	
Other Equipment	3	14		0	0	
Natural	27	16		0	0	
Exposure	18	14		4	0	
Unknown	212	157				
Total	1,149	903		11	7	

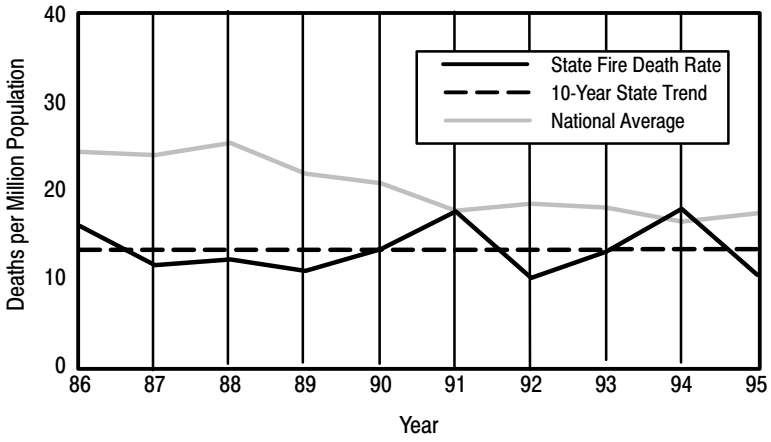
Source: NFIRS

NEBRASKA

Nebraska reported 7,808 fires to NFIRS in 1995, which represent 61 percent of the state's fire departments (293 of 483). The number of structure fires was 2,159, with 69 percent in residential structures. There are no data on 1995 fires from the Nebraska annual report; however, 8,214 fires were reported in 1994.

STATE FIRE DEATHS AND DEATH RATE

Although fire deaths and death rate have fluctuated in Nebraska, the 10-year trend indicates a 5% decline for deaths and virtually no change in the death rate. Except for 1994, Nebraska's death rate has been below the national average, and the state has the ninth lowest rate in 1995. This was a marked improvement from 1994, when Nebraska ranked 25th in the U.S. The state had 10.4 deaths per million population in 1995, well below the national death rate of 17.4.

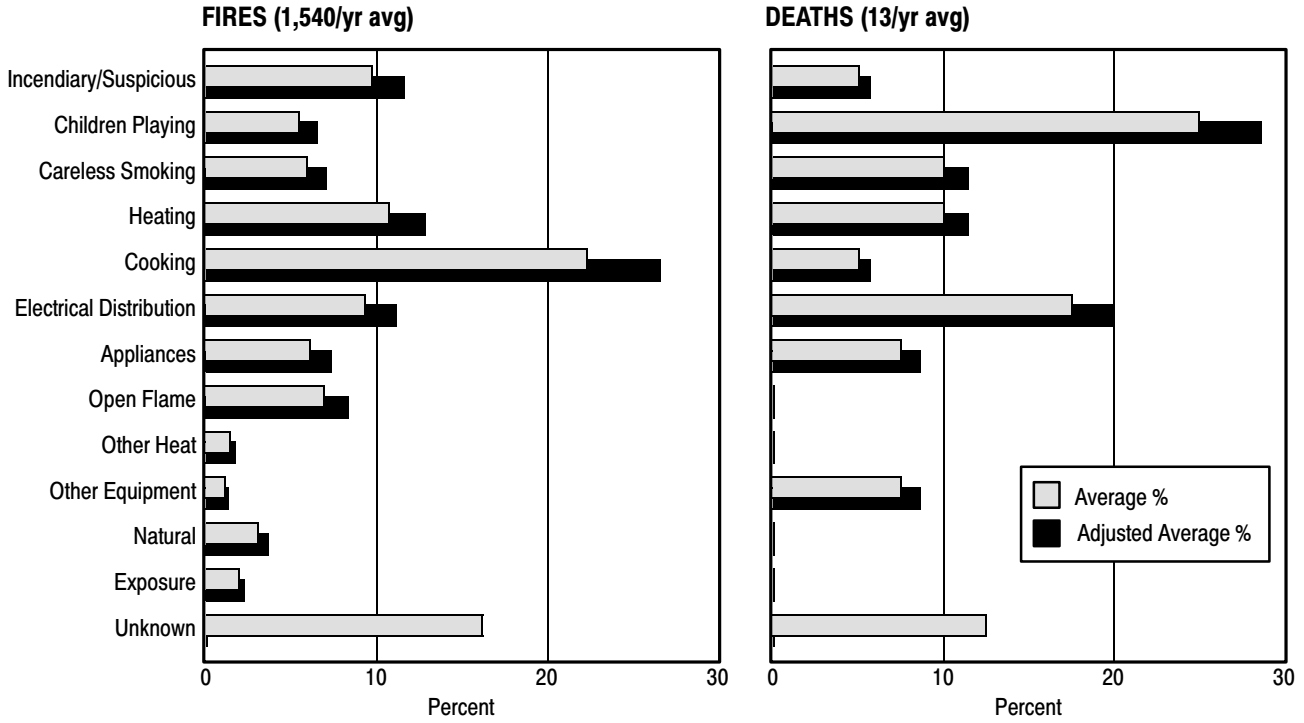


Year	Fire Deaths	Deaths/ Million
1986	25	15.9
1987	18	11.5
1988	19	12.1
1989	17	10.8
1990	21	13.3
1991	28	17.6
1992	16	10.0
1993	21	13.0
1994	29	17.9
1995	17	10.4

Nebraska State Fire Marshal's Office; Nebraska Bureau of Vital Statistics, Department of Health; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking is the leading cause of residential fires in Nebraska by more than a factor of two over heating, arson, and electrical distribution fires, all of which are within a percentage point of one another. Twenty-nine percent of deaths are due to children playing, with electrical distribution the second leading cause over 3 years.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	146	160	143	2	0	0
Children Playing	91	78	81	2	5	3
Careless Smoking	95	85	92	0	3	1
Heating	189	169	137	1	2	1
Cooking	344	351	336	1	1	0
Electrical Distribution	135	140	154	1	3	3
Appliances	86	97	98	0	3	0
Open Flame	109	99	113	0	0	0
Other Heat	33	19	14	0	0	0
Other Equipment	16	19	16	0	3	0
Natural	54	49	36	0	0	0
Exposure	24	33	29	0	0	0
Unknown	263	253	234	2	0	3
Total	1,585	1,552	1,483	9	20	11

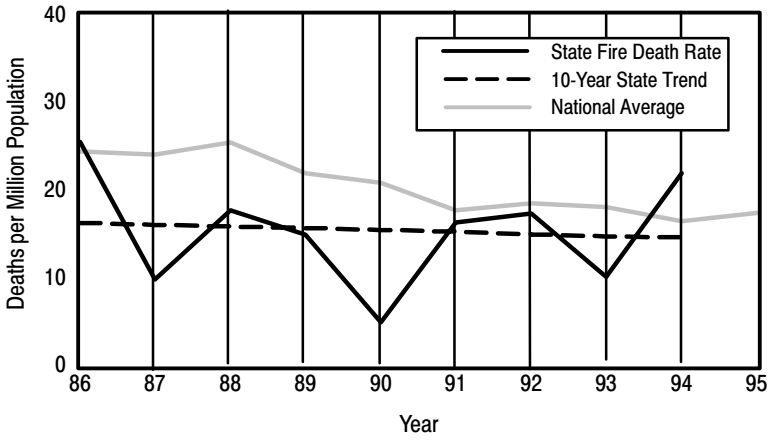
Source: NFIRS

NEVADA

Nevada has never reported to NFIRS, nor are there any data available for 1995 fires in the state. In addition, the number of deaths in the state for 1995 were not available.

STATE FIRE DEATHS AND DEATH RATE

The number of deaths have been erratic from year to year, ranging from a high of 32 in 1994 (the highest number in 9 years) to a low of 6 in 1990. The 9-year trend in fire deaths shows a 46% increase in fire deaths. Except for 1986 and 1994, Nevada's death rate has been below the national average. In 1994, the national death rate was 16.4 compared to Nevada's 21.9 deaths per million population. Because Nevada is a relatively small population state, a swing of just one or two deaths has a significant impact on the fire death rate. In 1994, the state had the 18th highest death rate and, against 1995 rankings, it would be 14th highest. The fire death rate trend declined 11%.



Year	Fire Deaths	Deaths/ Million
1986	25	25.5
1987	10	9.8
1988	19	17.7
1989	17	14.9
1990	6	4.9
1991	21	16.3
1992	23	17.3
1993	14	10.1
1994	32	21.9
1995	-	-

Nevada State Fire Marshal's Office; Nevada Division of Health, Vital Statistics; and the Bureau of the Census

NEW HAMPSHIRE

Thirty-eight percent of New Hampshire's fire departments (97 of 253) reported to NFIRS in 1995. Of the 3,625 fires, 1,171 were in structures, with 79 percent of these in residences.

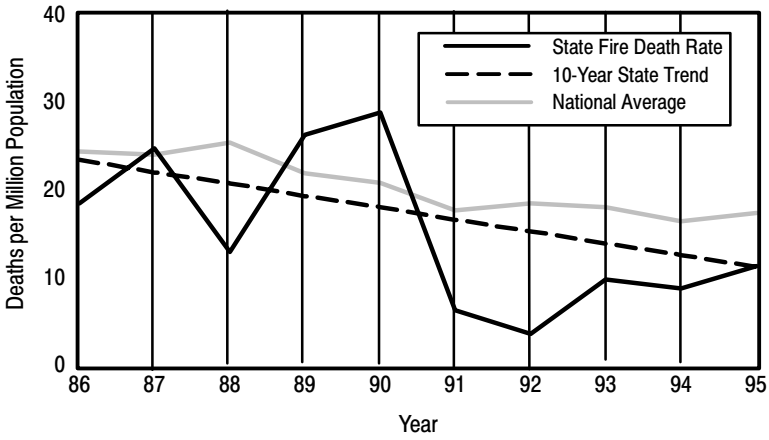
The Division of Fire Safety investigates all fatal fires that occur in the state of New Hampshire. The Biennial Report (1995–1997) notes that the most significant common factor in fire fatalities in New Hampshire continues to be the absence of a functioning smoke detector in the sleeping area of single and multifamily occupancies.

The division also uses canines in its accelerant detection program. Two Labrador retrievers and two investigators make up the canine accelerant detection program. The two canines have proven to be a valuable asset in the investigation of fires and apprehension of arsonists.

More fire-related information for New Hampshire can be found at Web site http://www.state.nh.us/safety/fire.htm.

STATE FIRE DEATHS AND DEATH RATE

With 11.3 deaths per million population in 1995, New Hampshire is below the national death rate of 17.4 and has the 14th lowest rate in the U.S.; in 1994, the state was ranked 5th lowest. The death rate trend has sharply declined over 10 years, by 68%. Fire deaths have trended down 63%. The number of deaths has ranged from a high of 32 in 1990 to a low of 4 in 1992.

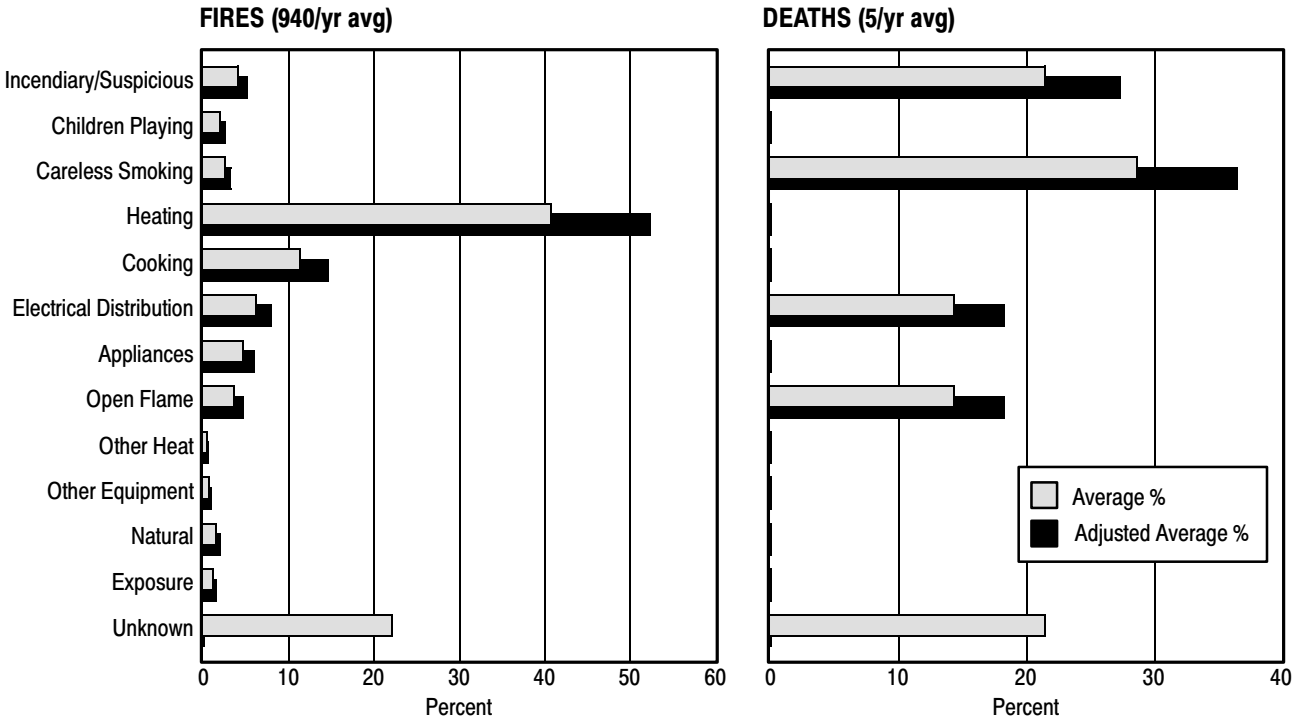


Year	Fire Deaths	Deaths/ Million
1986	19	18.5
1987	26	24.7
1988	14	12.9
1989	29	26.3
1990	32	28.8
1991	7	6.3
1992	4	3.6
1993	11	9.8
1994	10	8.8
1995	13	11.3

New Hampshire State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

More than half of all fires in New Hampshire are heating related, three times greater than the next leading cause, cooking (15%). Eleven of the 14 deaths in the 3 years were of known cause, with careless smoking being the leading cause at 36% and arson second at 27%.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	40	31	42	0	0	3
Children Playing	13	21	18	0	0	0
Careless Smoking	25	17	25	2	0	2
Heating	451	355	342	0	0	0
Cooking	108	110	100	0	0	0
Electrical Distribution	52	62	58	1	1	0
Appliances	43	39	48	0	0	0
Open Flame	37	30	31	0	0	2
Other Heat	3	1	6	0	0	0
Other Equipment	6	5	7	0	0	0
Natural	16	10	13	0	0	0
Exposure	10	12	8	0	0	0
Unknown	224	175	225	2	1	0
Total	1,028	868	923	5	2	7

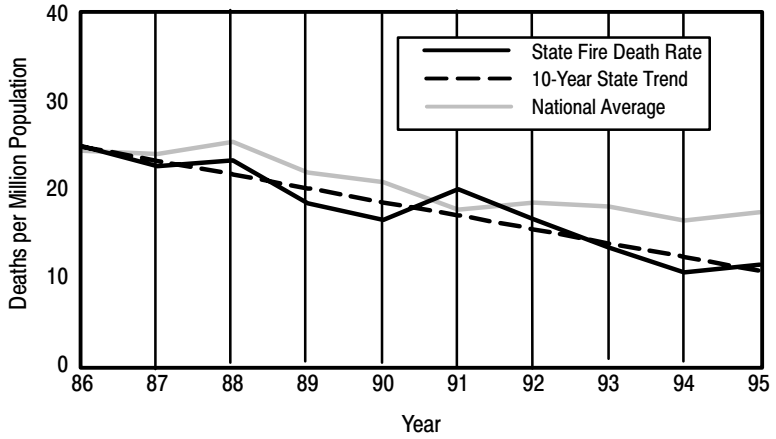
Source: NFIRS

NEW JERSEY

New Jersey's 1995 annual report stated that fire departments responded to 30,235 fires, with approximately 10,000 occurring in structures. Of the 91 fire fatalities, 76 occurred in residential structures. The 1995 NFIRS data, which represents 219 fire departments out of 788 (28 percent), show 10,161 fires in 1995. Seventy-five percent of the 2,949 structure fires were in residences—an excellent correlation with the state data. In 1994, 49 percent of fire departments participated in NFIRS, nearly twice the participation of 1995. More fire-related information for New Jersey can be found at Web site http://www.state.nj.us/dca/gydfire.htm.

STATE FIRE DEATHS AND DEATH RATE

Between 1986 and 1995, the trend in fire deaths in New Jersey has been downward, by 55%. At 11.4 deaths per million population in 1995, New Jersey ranks as the 15th lowest state in the nation, and below the national rate of 17.4. From 1986 to 1992, New Jersey's death rate tracked closely with the national rate, but in 1993, it dropped well below it, and in 1995 the gap was the largest ever—one-third lower than the national rate. The death rate has trended down by 57%, a significant improvement over the 10 years.

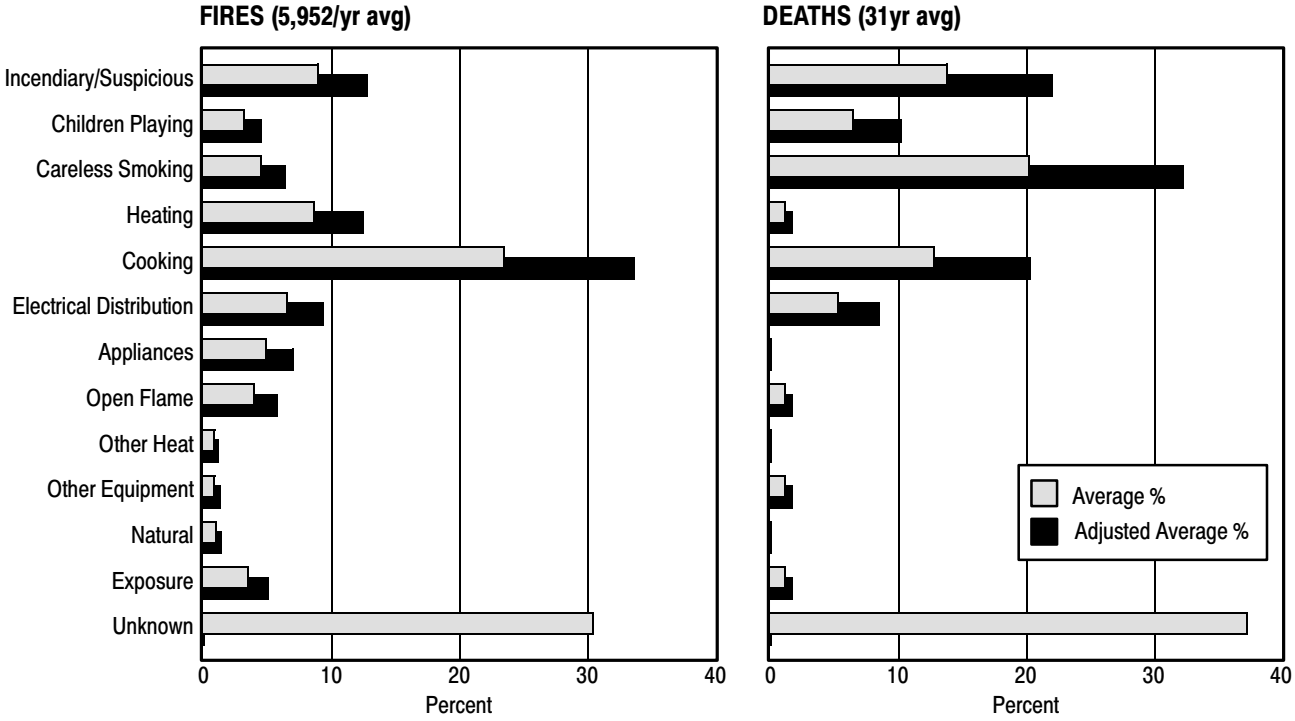


Year	Fire Deaths	Deaths/ Million
1986	190	24.9
1987	173	22.6
1988	180	23.3
1989	142	18.4
1990	128	16.5
1991	155	20.0
1992	130	16.6
1993	105	13.4
1994	83	10.5
1995	91	11.4

New Jersey Division of Fire Safety and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking is the leading cause of residential fires in New Jersey. In fact, 41% of all fires begin in the kitchen. Arson and heating fires are the next leading causes, but at less than half of the cooking fires. Careless smoking was the leading cause of residential fire deaths at 32%, followed by arson (22%) and cooking (20%). More than 30% of fires and 37% of deaths were not attributed to cause. Also, the 1995 data are sparser than other years because of the decline in NFIRS participation.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	754	556	274	8	2	3
Children Playing	279	206	64	2	4	0
Careless Smoking	382	307	95	11	5	3
Heating	766	598	178	0	0	1
Cooking	2,127	1,648	403	8	4	0
Electrical Distribution	562	460	139	4	1	0
Appliances	411	336	118	0	0	0
Open Flame	304	311	88	0	1	0
Other Heat	69	52	21	0	0	0
Other Equipment	90	43	14	1	0	0
Natural	53	87	18	0	0	0
Exposure	309	237	73	0	0	1
Unknown	2,617	2,087	721	19	14	2
Total	8,723	6,928	2,206	53	31	10

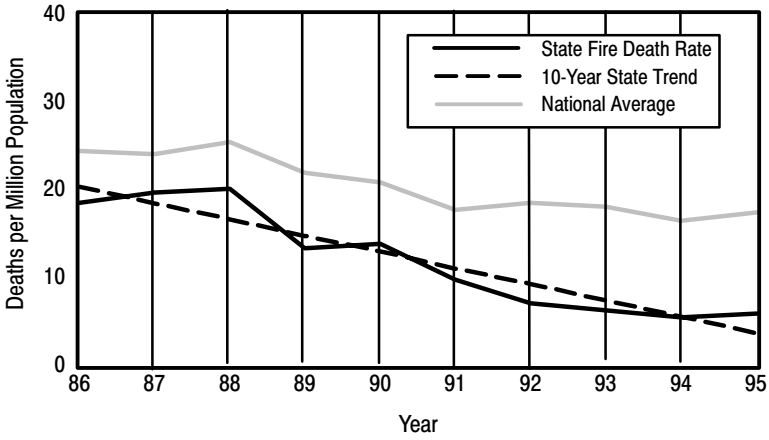
Source: NFIRS

NEW MEXICO

Except for one fire department that reported in 1994, New Mexico has never participated in NFIRS. No data are available from annual reports on the number or causes of fires in the state in 1995.

STATE FIRE DEATHS AND DEATH RATE

New Mexico's fire death rate in 1995 of 5.9 ranks it as the second lowest rate in the nation, behind only Hawaii which recorded no deaths in 1995. This rate is substantially below the national death rate of 17.4. The state traditionally has a very low number of deaths per million—in 1994, it was the third lowest. The trend in number of deaths has declined 78% over 10 years. Deaths per million population have also trended downward dramatically (82%).



Year	Fire Deaths	Deaths/ Million
1986	27	18.5
1987	29	19.6
1988	30	20.1
1989	20	13.3
1990	21	13.8
1991	15	9.7
1992	11	7.0
1993	10	6.2
1994	9	5.4
1995	10	5.9

New Mexico State Fire Marshal's Office and the Bureau of the Census

NEW YORK

According to the 1995 New York annual report, fire departments responded to 145,084 fires. The number of structure fires was 52,923, or 36 percent of the total. The annual report shows that approximately 50 percent of all civilian fire deaths occurred between 4 a.m. and noon. The majority of these occurred while the casualty was either sleeping or escaping. Eighty-nine percent of New York's fire departments (1,633 of 1,834) reported to NFIRS in 1995. Of the 59,499 fires, structure fires totaled 19,926, of which 61 percent occurred in residences.

New York has several special fire programs. In 1985, the New York State Burn Injury Reporting System (NY–BIRS) was created. This system was made possible due to the cooperation between the New York Department of State, Office of Fire Prevention and Control; physicians; health care facilities; and fire and arson investigators. NY–BIRS was designed to gather information on arsonists who were burned while attempting to commit a crime as well as to keep a database on burn injuries. Fire and arson investigators use these data to develop leads in investigations or locate suspected arsonists. NY–BIRS collects data on the victim, the burn injury, the treatment, and the county in which the burn injury occurred via a toll-free 24-hour burn reporting hotline.

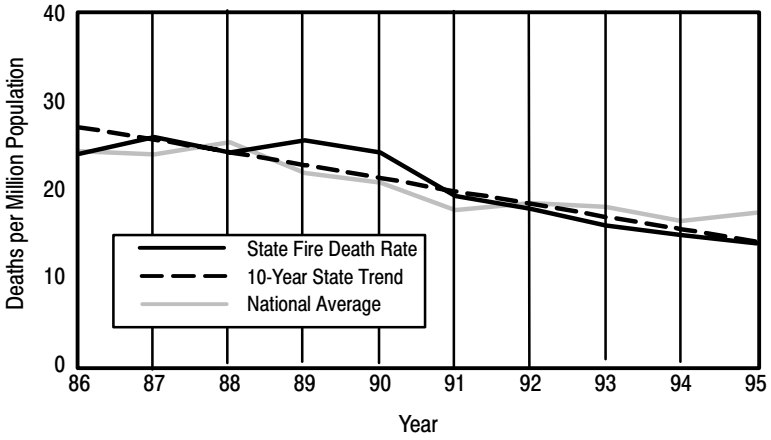
The State Department of Health implemented a program in 1988 to reduce the number of burn injuries in low-income rural areas. Participating agencies inspected homes of low-income families with children under age 15. The program included inspecting homes for burn risks on a room-by-room basis, correcting any hazardous situations, distributing educational materials, mobilizing community networks of agencies and volunteers, and distributing burn injury prevention kits at public health clinics.[3] The kits included a smoke detector and battery, a 9-volt replacement battery, three refrigerator magnets with burn prevention messages, a coloring book for kids, and a hot tap water temperature gauge. Approximately 4,000 kits were distributed. In all, the program installed 9,000 smoke detectors and 35 antiscald devices, and temperatures were lowered on 750 hot water heaters.

More fire-related information for New York can be found at Web site http://www.dos.state.ny.us/fire/firewww.html.

[3] *Effort To Increase Smoke Detector Use in U.S. Households: An Inventory of Programs,* op. cit.

STATE FIRE DEATHS AND DEATH RATE

The State Fire Administrator's Office reported 253 civilian fire deaths for 1995, the lowest number of deaths over the 10 years. The trend in number of deaths has declined by 47%. The 13.9 deaths per million population is below the national rate of 17.4, and the trend decline in New York is 48% over 10 years. The state is among the lowest half of states in terms of its death rate.

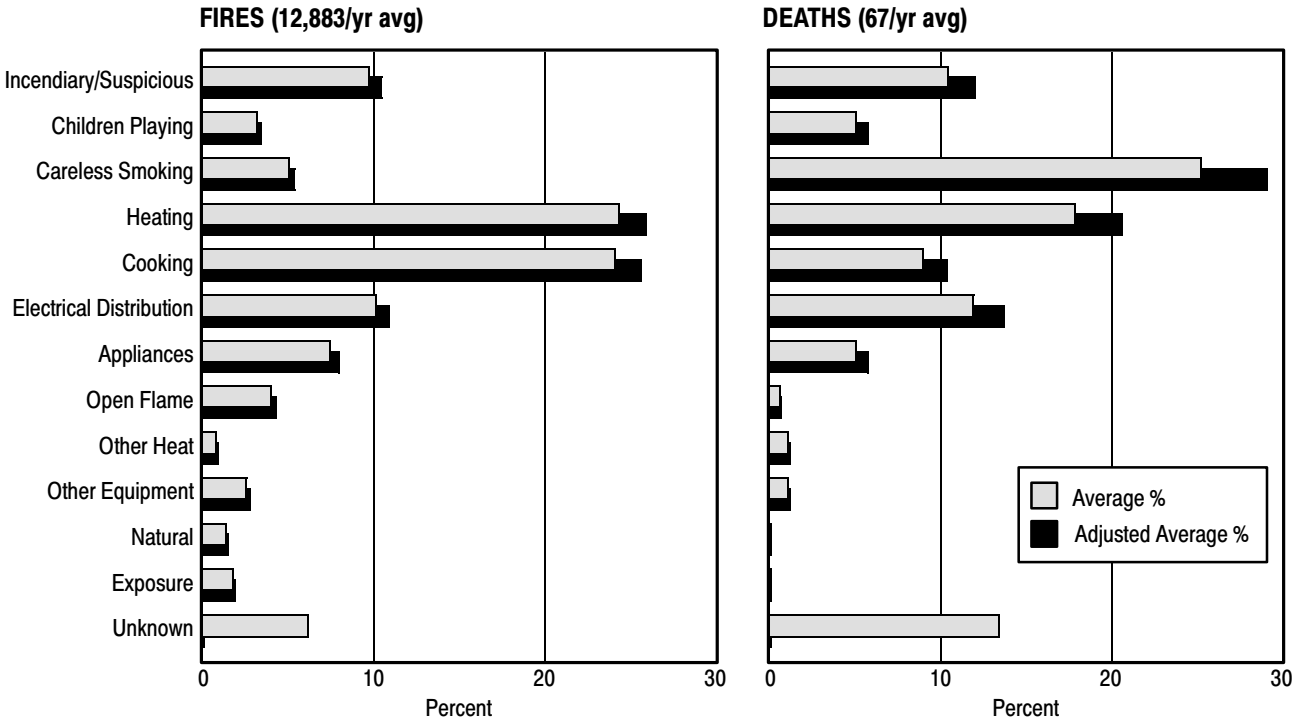


Year	Fire Deaths	Deaths/ Million
1986	429	24.1
1987	465	26.0
1988	434	24.2
1989	461	25.6
1990	435	24.2
1991	348	19.3
1992	322	17.8
1993	288	15.9
1994	268	14.8
1995	253	13.9

New York State Fire Administrator, Office of Fire Prevention and Control; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Over the 3-year period, heating and cooking are virtually tied as the leading causes of residential fires in New York. Combined, they account for more than half of all fires. Kitchens were the leading area of fire origin, at 31%. Chimneys and sleeping areas were next leading areas of fire origin, at 11% and 10%, respectively. Of the 62 fire deaths reported to NFIRS, 48 were of known cause. Careless smoking (29%) and heating (21%) were the two leading causes of residential fire deaths.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	1,272	1,340	1,155	4	13	4
Children Playing	421	414	364	3	4	3
Careless Smoking	640	622	654	17	17	17
Heating	3,642	3,080	2,667	21	12	3
Cooking	3,237	2,940	3,133	2	12	4
Electrical Distribution	1,319	1,327	1,274	8	6	10
Appliances	949	975	939	2	2	6
Open Flame	529	520	477	0	0	1
Other Heat	96	92	100	0	2	0
Other Equipment	350	330	304	0	2	0
Natural	162	195	141	0	0	0
Exposure	200	254	188	0	0	0
Unknown	758	763	827	8	5	14
Total	13,575	12,852	12,223	65	75	62

Source: NFIRS

NORTH CAROLINA

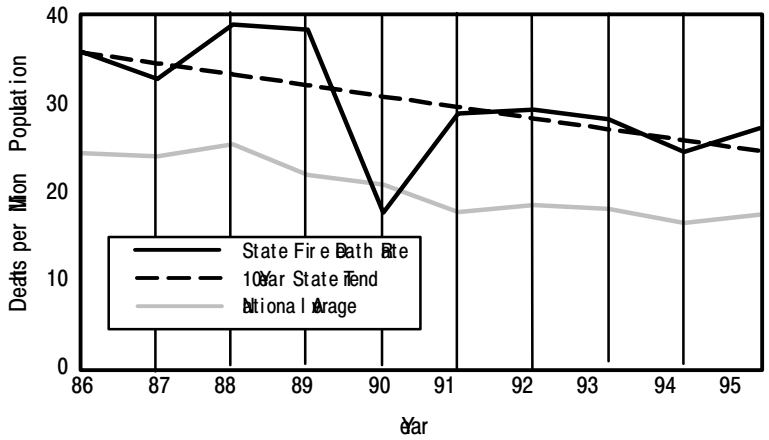
According to its 1995 annual report, North Carolina fire departments responded to 52,674 fires in 1995; 36 percent were structure fires (18,987 fires). The state has never participated in NFIRS.

In 1990, the Cherokee County Health Department implemented a program to distribute smoke detectors.[4] Personnel from 13 fire departments installed smoke detectors in low-income and elderly households and in rural areas. Smoke detectors were also distributed through the Health Department. Free smoke detectors were distributed to 849 households. A follow-up evaluation revealed that 569 smoke detectors were installed as a result of the program, and 383 fire safety checks were completed.

More fire-related information for North Carolina can be found at Web site http://www.ncdoi.com/ncfr.

STATE FIRE DEATHS AND DEATH RATE

North Carolina's death rate is tied with Georgia as the seventh highest in the nation, with 27.2 deaths per million population. This is considerably higher than the national death rate of 17.4. The trend over 10 years, however, is downward (31%). The actual number of deaths has also trended downward by 22%.



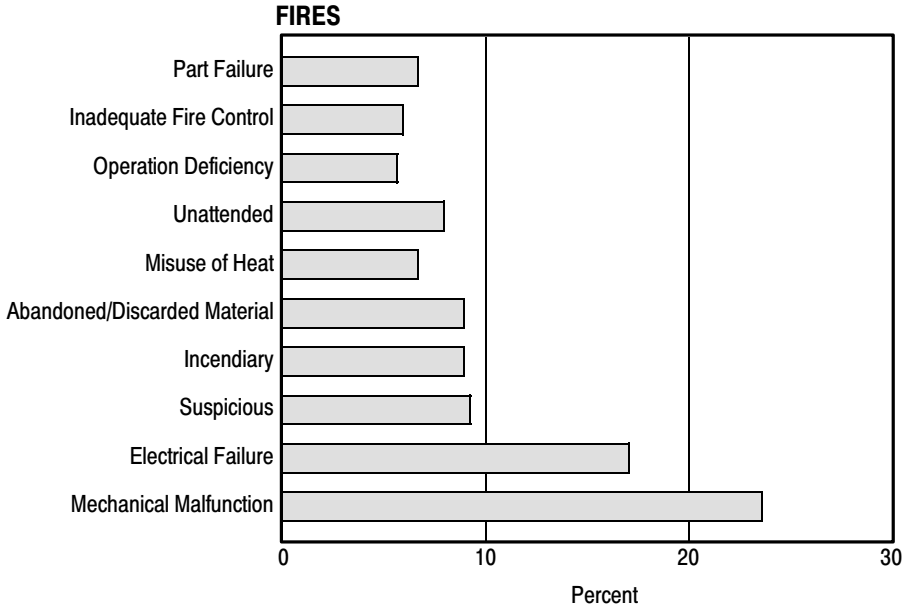
Year	Fire Deaths	Deaths/ Million
1986	227	35.9
1987	210	32.8
1988	253	39.0
1989	252	38.4
1990	117	17.6
1991	195	28.9
1992	200	29.3
1993	196	28.2
1994	173	24.5
1995	196	27.2

Commissioner, North Carolina Department of Insurance; and the Bureau of the Census

[4] *Effort To Increase Smoke Detector Use in U.S. Households,* op. cit.

RESIDENTIAL CAUSES OF FIRES
BASED ON NC FIRE INCIDENT REPORTING SYSTEM (1995)

Although North Carolina does not participate in NFIRS, North Carolina fire departments submit information to the North Carolina Fire Incident Reporting System. In 1995, mechanical malfunction was the leading cause of fire. Electrical failure was the second leading cause. The kitchen was the leading area of fire origin (42%), followed by the bedroom (15%) and chimneys (9%).



Source: North Carolina Fire Incident Reporting System

NORTH DAKOTA

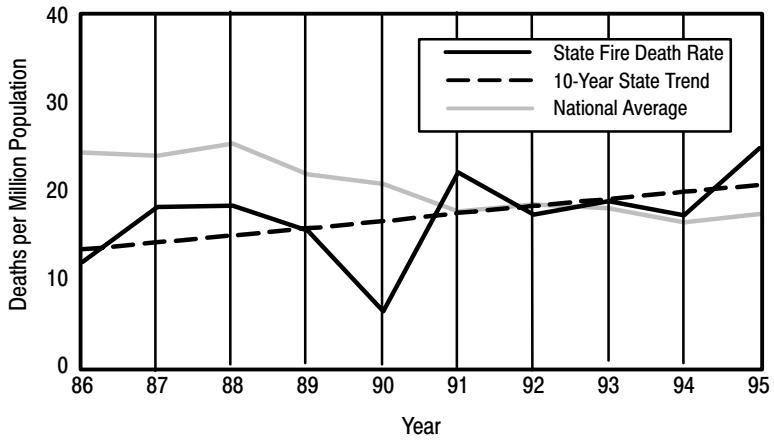
According to the 1995 North Dakota annual report, fire departments responded to 1,367 fires. Structure fires accounted for 50 percent of the total, with mobile property and crops and fields each representing 25 percent. Residential structures accounted for 27 percent of total fires. Eighty-one percent of fire fatalities occurred in residences; electrical distribution and heating fires were the leading causes of fatalities. Only 15 percent of the homes where a fatality occurred had a smoke detector.

The estimated property damage from all fires was $15.5 million. This represented a higher loss than in previous years, but this is attributed to the use of a new reporting method. In 1995, insurance company property loss reports were the basis for the estimates of the cost of fire loss, and this is suspected as increasing the accuracy of loss reporting by 25 percent.

North Dakota does not participate in NFIRS.

STATE FIRE DEATHS AND DEATH RATE

North Dakota's 24.9 deaths per million population ranks it as the 11th highest in the nation, well above the national average of 17.4. Over 10 years, the trend in death rate has increased, by 55%, the largest increase of the six states that have not shown a decline. Sixteen deaths were recorded in 1995, the highest in 10 years, part of a 48% upward trend. In terms of absolute numbers of deaths, however, the number of deaths is relatively small. Coupled with the fact that North Dakota is a small-population state, an increase or decrease of even one death has a large impact on deaths per million. In 1994, for example, the state had 11 deaths and its death rate was 26th highest among all states.



Year	Fire Deaths	Deaths/ Million
1986	8	11.9
1987	12	18.2
1988	12	18.3
1989	10	15.5
1990	4	6.3
1991	14	22.1
1992	11	17.3
1993	12	18.8
1994	11	17.2
1995	16	24.9

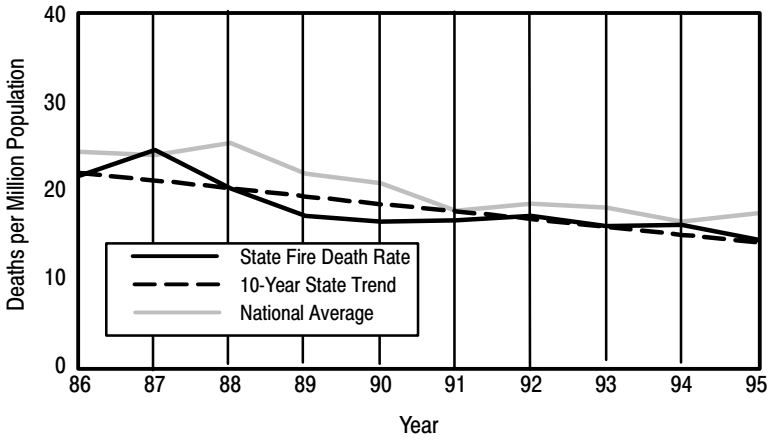
North Dakota State Fire Marshal's Office and the Bureau of the Census

OHIO

Seventy-six percent of Ohio's fire departments (955 of 1,252) participated in NFIRS. In 1995, 57,735 fires were reported to NFIRS. The number of structure fires was 21,534, of which 71 percent occurred in residential structures. More fire-related information for Ohio can be found at Web site http://www.state.oh.us/com/fire/index.htm.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths have been declining, with the number of deaths reaching their lowest level in 1995 with 160. Over 10 years, deaths have trended down by 34%. The decline in the death rate trend is similar, at 36%. Ohio has 14.4 deaths per million population in 1995, which is below the national rate of 17.4. In fact, except for 1987, the state is consistently below the national average. The state's death rate places it in the lowest half of all states in both 1994 and 1995.

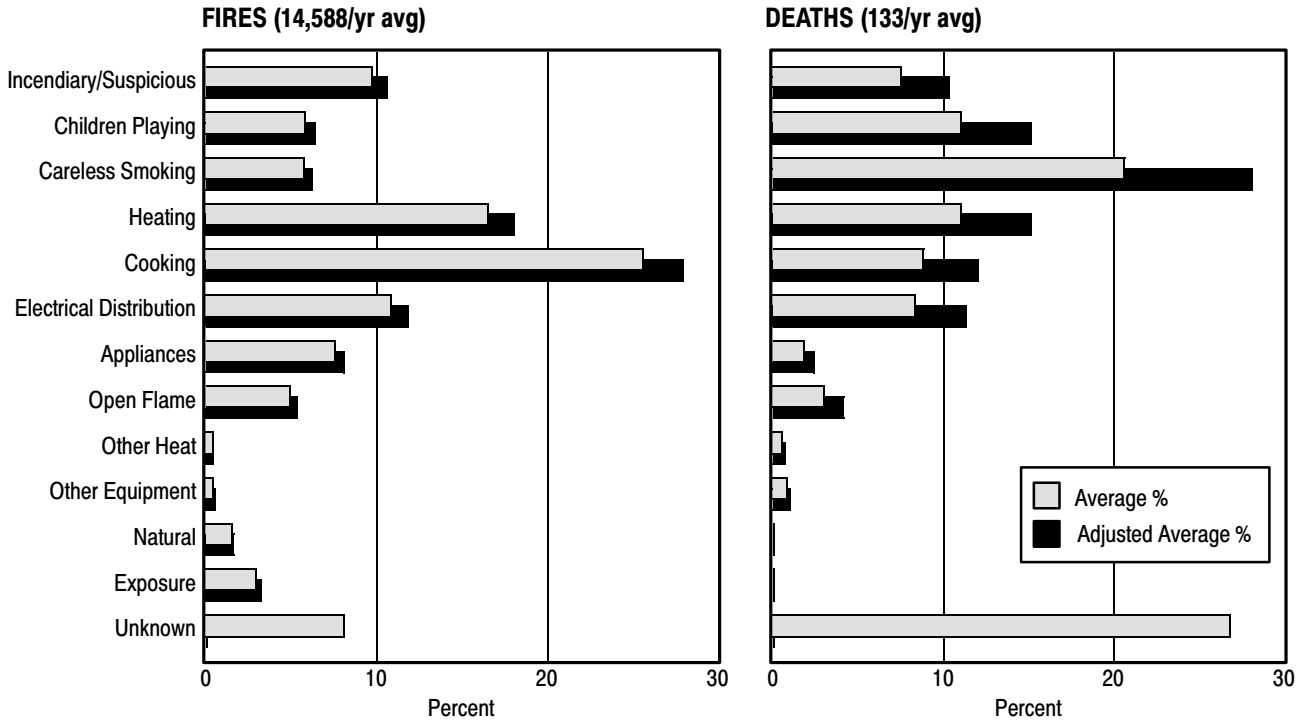


Year	Fire Deaths	Deaths/ Million
1986	233	21.7
1987	265	24.6
1988	218	20.2
1989	185	17.1
1990	178	16.4
1991	181	16.6
1992	188	17.1
1993	176	15.9
1994	179	16.1
1995	160	14.4

Ohio State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking is the leading cause of residential fires in Ohio at 28%, followed by heating fires at 17%. Electrical distribution and arson play a major role as the cause of fires. In every year, careless smoking is the leading cause of fire deaths, often by a two-to-one margin. Children playing and heating are tied at 11% as the next leading causes of death in Ohio. However, the cause of fire deaths was not determined in 27% of cases.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	1,307	1,430	1,509	10	5	15
Children Playing	838	917	804	22	12	10
Careless Smoking	822	778	905	27	30	25
Heating	2,624	2,314	2,304	16	18	10
Cooking	3,783	3,502	3,929	12	8	15
Electrical Distribution	1,453	1,599	1,696	7	16	10
Appliances	1,043	1,089	1,132	1	3	3
Open Flame	645	703	780	4	5	3
Other Heat	55	55	70	0	1	1
Other Equipment	64	61	68	2	0	1
Natural	199	212	235	0	0	0
Exposure	330	473	477	0	0	0
Unknown	1,135	1,127	1,297	24	42	41
Total	14,298	14,260	15,206	125	140	134

Source: NFIRS

OKLAHOMA

According to the 1995 Oklahoma State Fire Marshal's Annual Report, 146,132 fires were reported. These fires represent incidents from 88 percent of Oklahoma's fire departments. Of these fires, 17,356 fires were reported to NFIRS. The number of structure fires in NFIRS was 4,487, of which 77 percent occurred in residential structures. In 1995, there was a significant decline over 1994 in the number of participating fire departments in Oklahoma. Only 12 percent participated (105 of 863), whereas in 1994, 59 percent reported.

As reported by the Oklahoma Department of Health, the highest rates of residential fire fatalities between 1988 and 1994 occurred among children up to 4 years old and among adults 55 and older. Sixty-nine percent of all fire injuries occurred in residential structures that had no working smoke detector. The fire fatality rate was nearly three times higher among persons in structures without working smoke detectors than among those who were protected by working smoke detectors.

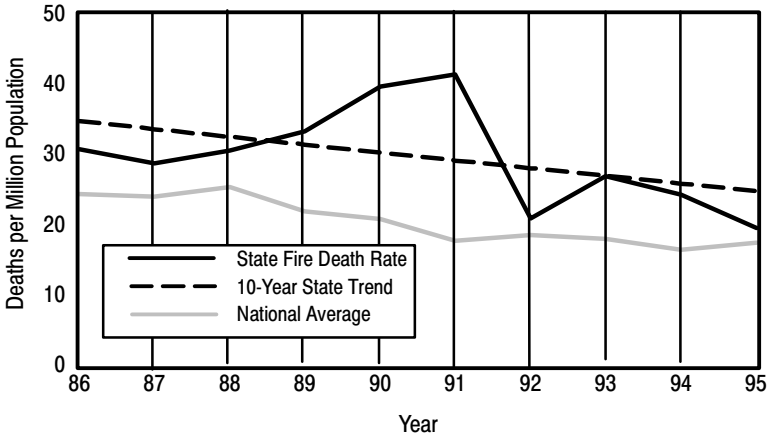
To reduce the number of residential injuries, the Department of Health implemented a smoke detector giveaway program in 1991.[5] The program installed 10,000 smoke detectors in four ZIP code areas in Oklahoma City. After 48 months, the program was evaluated and the target area experienced a 73 percent drop in the rate of fire injuries compared to a 30 percent increase for the rest of the city. The program prevented an estimated 39 injuries and deaths. A cost-benefit analysis showed that $20 was saved for each dollar spent on intervention in terms of averted health care costs and worker productivity losses.

More fire-related information for Oklahoma can be found at Web site http://www.health.state.ok.us/program/injury/okfacts/index.html#fire.

[5] *Effort To Increase Smoke Detector Use in U.S. Households,* op. cit.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths and the fire death rate have declined in Oklahoma over 10 years by 28% and 29%, respectively. The 64 deaths in 1995 were the lowest over the period. The number of deaths per million declined significantly (to 19.5) in 1995, but this is still higher than the national rate of 17.4. Oklahoma ranks in the top third of states with the highest death rate—an improvement over 1994 when it was eighth highest.

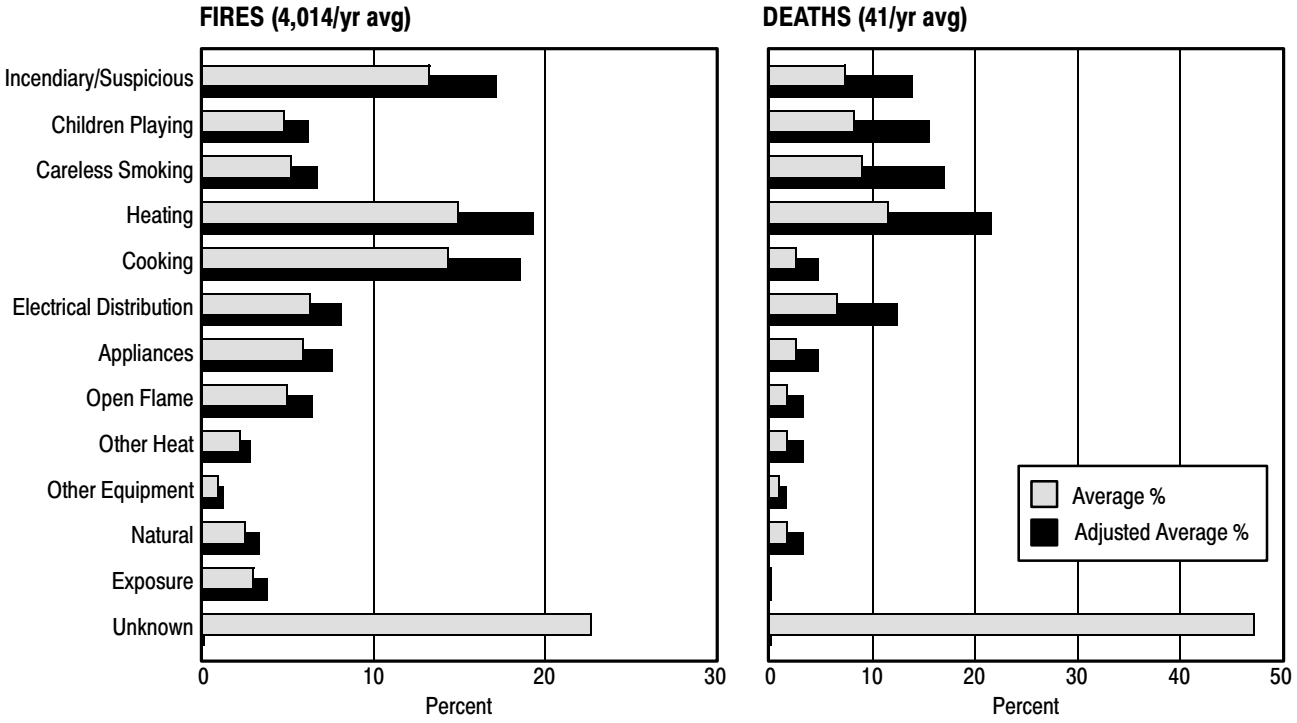


Year	Fire Deaths	Deaths/ Million
1986	100	30.7
1987	92	28.7
1988	97	30.6
1989	105	33.3
1990	125	39.7
1991	131	41.4
1992	67	20.9
1993	87	26.9
1994	79	24.3
1995	64	19.5

Oklahoma State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

The leading causes of residential fires in Oklahoma over 3 years are heating, cooking, and arson, each of which is within percentage points of each other. Heating was the leading cause of residential fire deaths at 21%, followed closely by careless smoking, children playing, arson, and electrical distribution. The causes of fire deaths may be skewed somewhat because of the large number of unknowns (47%) and the fact that the NFIRS sample size was much smaller in 1995 than in previous years.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	602	490	496	6	1	2
Children Playing	226	181	159	4	3	3
Careless Smoking	233	191	190	3	3	5
Heating	714	629	456	6	5	3
Cooking	622	563	538	1	2	0
Electrical Distribution	286	238	224	0	7	1
Appliances	272	219	205	3	0	0
Open Flame	197	217	171	0	1	1
Other Heat	90	105	57	0	2	0
Other Equipment	35	27	36	1	0	0
Natural	105	98	92	1	0	1
Exposure	112	100	137	0	0	0
Unknown	1,047	983	698	25	24	9
Total	4,541	4,041	3,459	50	48	25

Source: NFIRS

OREGON

Essentially all of Oregon's fire departments participate in NFIRS. In 1995, 13,557 fires were reported to the system. Structure fires totaled 5,675, with 72 percent of these in residential structures.

The Office of the State Fire Marshal provides services to the citizens of Oregon in 11 program areas. The Community Education Services Unit works to provide Oregonians with the information to protect themselves and their property by providing:

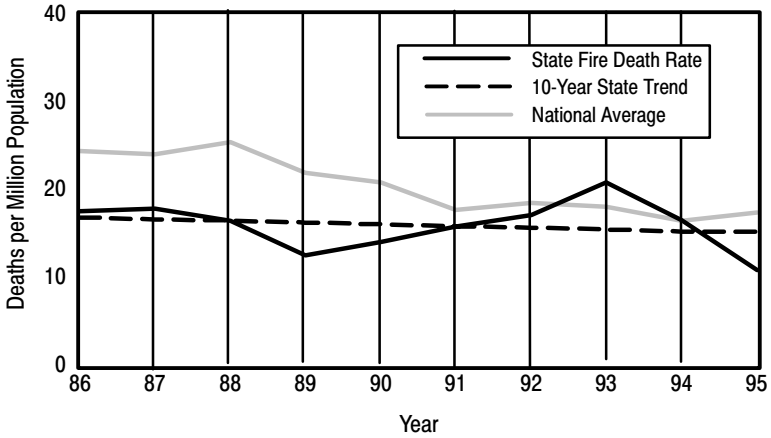
- Technical assistance and model programs for local fire departments and community-based groups
- Media safety messages
- Fire safety information
- An Oregon fire safety skills curriculum for teachers
- Community Education Resource Library
- *The Gated Wye*, a monthly newsletter.

The Juvenile Firesetter Intervention Unit seeks to reduce the incidence of child-set fires by developing and maintaining a continuum of care for child firesetters and their families using community-based intervention programs. Among other activities, the unit publishes a quarterly newsletter, *Hot Issues*, designed for professionals who work with children "at risk" for firesetting behavior.

More fire-related information for Oregon can be found at Web site http://www.osp.state.or.us/sfm.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths in Oregon have been relatively constant over 10 years, but in 1995 the state registered the lowest total at 34. The death trend is up a modest 6%, but the death rate has declined 10%. Oregon had 10.8 deaths per million in 1995, far below the national rate of 17.4. Oregon had the 12th lowest death rate in the nation in 1995, a significant improvement from its placement in 1994.

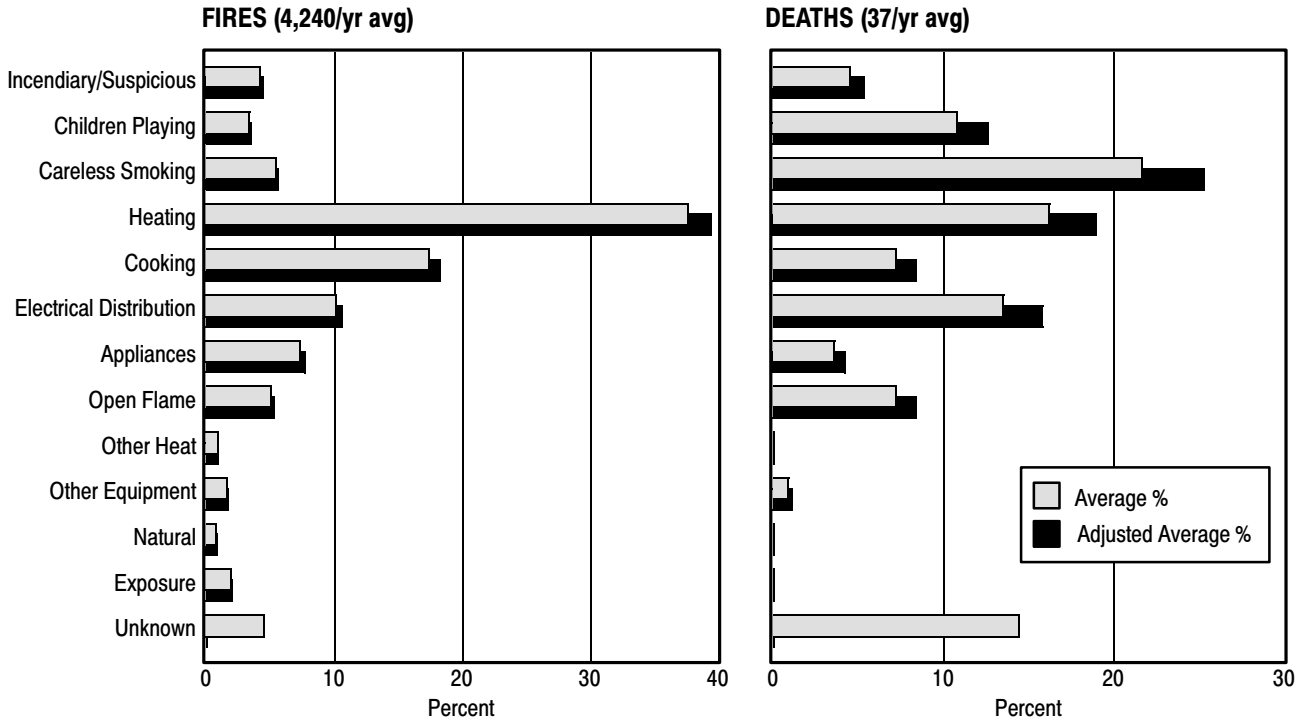


Year	Fire Deaths	Deaths/ Million
1986	47	17.5
1987	48	17.8
1988	45	16.4
1989	35	12.5
1990	40	14.0
1991	46	15.8
1992	51	17.1
1993	63	20.8
1994	51	16.5
1995	34	10.8

Oregon State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

There were more than twice as many heating fires in Oregon residences over the past 3 years than any other cause. Cooking and electrical distribution were the next leading causes of residential fires and, combined with heating, account for 65% of all fires. Arson is not a significant problem in Oregon. One-quarter of fatalities in residences were from careless smoking, followed by heating, electrical distribution, and children playing.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	172	172	186	2	3	0
Children Playing	159	129	142	6	3	3
Careless Smoking	219	248	216	11	11	2
Heating	1,927	1,480	1,374	7	7	4
Cooking	794	689	726	6	1	1
Electrical Distribution	439	398	449	8	4	3
Appliances	300	297	336	3	1	0
Open Flame	200	195	243	3	3	2
Other Heat	25	48	42	0	0	0
Other Equipment	69	69	66	0	0	1
Natural	42	25	28	0	0	0
Exposure	71	86	85	0	0	0
Unknown	200	187	186	6	3	7
Total	4,617	4,023	4,079	52	36	23

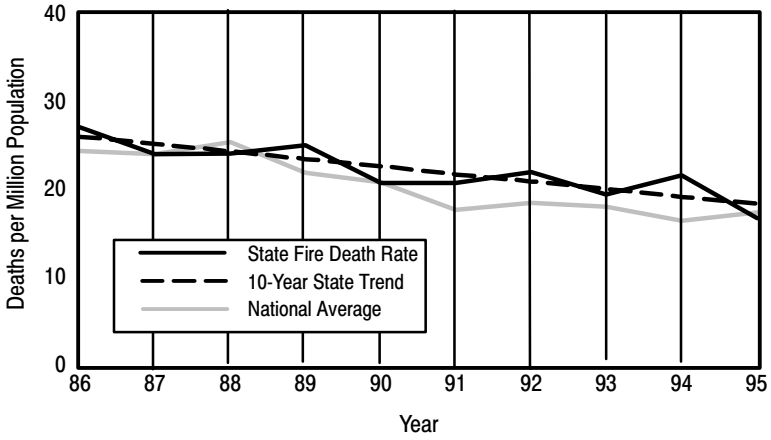
Source: NFIRS

PENNSYLVANIA

No data were available on the number of fires in Pennsylvania in 1995. Although the state has not submitted data to NFIRS in the past, Pennsylvania will begin participating in the new NFIRS in 1998.

STATE FIRE DEATHS AND DEATH RATE

Pennsylvania reported 201 fire deaths in 1995, the lowest total over the 10-year period. There has been a 28% downward trend in the number of deaths. This trend is mirrored by the 30% downward trend in death rate. Pennsylvania's death rate closely parallels the national rate, and in 1995, for the first time, was below it (16.7 versus the 17.4 deaths per million population). The state's fire death rate places it at the middle of all states.



Year	Fire Deaths	Deaths/ Million
1986	319	27.1
1987	284	24.0
1988	286	24.1
1989	297	25.0
1990	246	20.7
1991	247	20.7
1992	264	22.0
1993	234	19.4
1994	261	21.6
1995	201	16.7

Fire Marshal Division, Pennsylvania State Police; Pennsylvania Division of Vital Statistics; and the Bureau of the Census

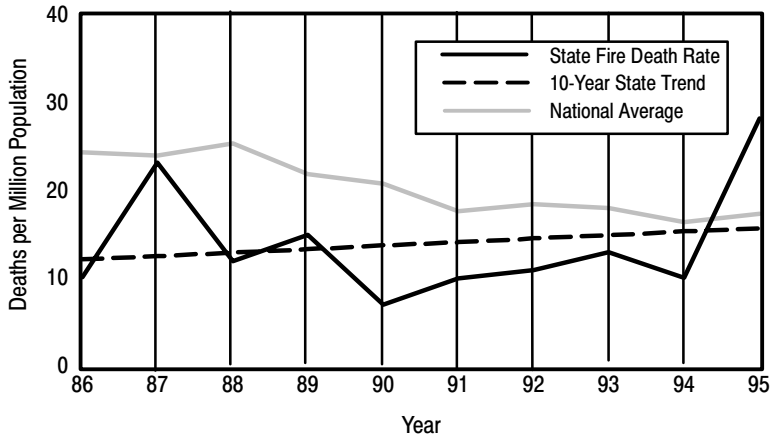
RHODE ISLAND

Forty-seven percent of Rhode Island's fire departments (38 of 81) report to NFIRS, a 9 percent decrease from 1994. There were 4,982 fires reported to NFIRS; 1,506 were structure fires, of which 73 percent were in residences.

The Rhode Island Division of Family Health (an agency within the State Department of Health) implemented a program in 1991 aimed at preventing fire injuries and detecting lead poisoning among children 6 and younger in low-income urban areas.[6] The program included staff members going door to door to homes in high-risk areas and installing smoke detectors where they were needed. By 1992, more than 2,100 households had been visited, 524 smoke detectors installed, and 168 smoke detector batteries replaced. More fire-related information for Rhode Island can be found at Web site http://www.state.ri.us/stdept/sd5.htm.

STATE FIRE DEATHS AND DEATH RATE

The 28 fire deaths recorded in Rhode Island in 1995 was its highest in 10 years. As a result, the 10-year trend increased 30%. The death rate trend also increased, by 29%—one of only six states whose trend was upward. With 28.3 deaths per million in 1995, well above the national rate of 17.4, Rhode Island had the sixth highest death rate in the nation compared to its eighth lowest rate in 1994. However, the relatively large number of deaths in 1995 was uncharacteristic of preceding years.



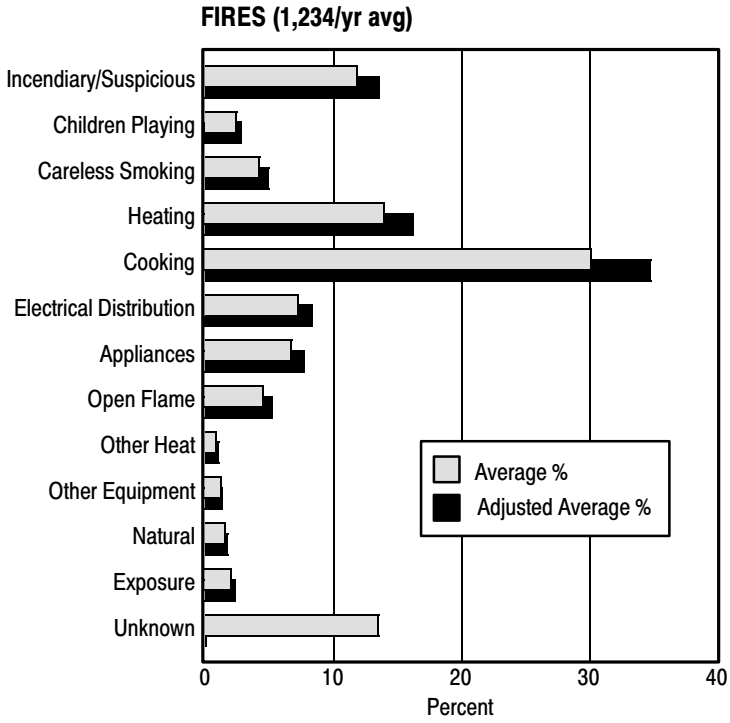
Year	Fire Deaths	Deaths/ Million
1986	10	10.2
1987	23	23.2
1988	12	12.0
1989	15	15.0
1990	7	7.0
1991	10	10.0
1992	11	11.0
1993	13	13.0
1994	10	10.1
1995	28	28.2

Rhode Island State Fire Marshal's Office and the Bureau of the Census

[6] *Effort To Increase Smoke Detector Use in U.S. Households,* op. cit.

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Half of the eight residential fire deaths reported to NFIRS in 1995 were attributed to arson, and two were of unknown cause. In each of the 3 years, cooking was the leading cause of residential fires by more than two to one over the next leading cause, heating. Cooking, heating, and arson account for 65% of all residential fires in Rhode Island.



Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	176	125	135	0	0	4
Children Playing	30	36	24	0	0	0
Careless Smoking	56	52	49	0	0	1
Heating	200	170	150	0	0	0
Cooking	423	348	343	0	0	0
Electrical Distribution	107	85	74	0	0	0
Appliances	105	85	58	0	0	0
Open Flame	58	61	48	0	0	0
Other Heat	11	13	7	0	0	0
Other Equipment	19	11	13	0	0	1
Natural	12	21	23	0	0	0
Exposure	44	14	17	0	0	0
Unknown	203	144	152	0	0	2
Total	1,444	1,165	1,093	0	0	8

Source: NFIRS

SOUTH CAROLINA

In 1995, 12,776 fires were reported to NFIRS. Structure fires totaled 4,040, of which 79 percent were in residential structures. Between 1994 and 1995, reported fires increased 44 percent. Although this increase may be due to a higher rate of fire incidents, it may also be due to the increase in the number of fire departments reporting to NFIRS. In 1995, 161 of 655 departments (25 percent) reported to NFIRS versus 157 in 1994 (24 percent).

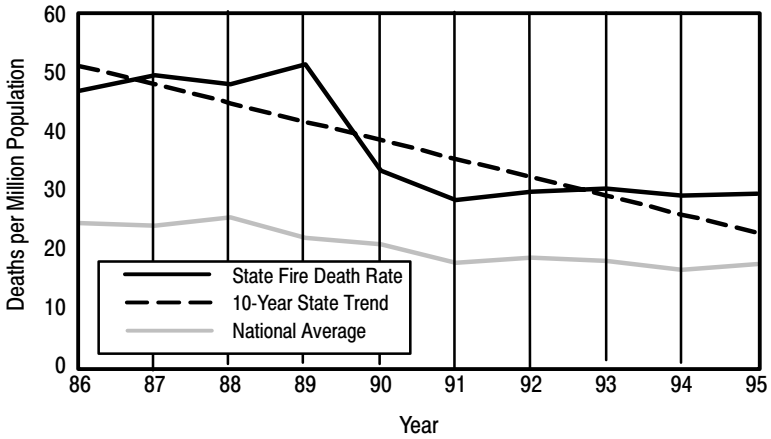
South Carolina's "Get Alarmed, South Carolina" public education program is credited with helping reduce the number of fire deaths in the state. The program is an ongoing fire safety awareness campaign whose main objective is to lower fire deaths by alerting citizens to the fire problem, teaching them about fire safety, and providing smoke detectors to high-risk citizens—the elderly, economically depressed, and handicapped. Donations by major corporations fund the program. Forty-six county coordinators are appointed and serve as liaisons to assist in distributing materials and smoke detectors associated with the program.

South Carolina's comprehensive, school-based, public fire safety education curriculum is for students in kindergarten through sixth grade. The curriculum contains lesson plans, student activity workbooks, graduation certificates, a video to coincide with each lesson plan, and a storybook that introduces "Freddie the Fireless Feline" and his life story. In-service training for teachers is scheduled by various means, and the State Fire Marshal's staff or Clemson University representatives conduct training. At present, South Carolina has a kindergarten and first grade curriculum that reaches approximately 3 of every 10 K–1 students. Implementation of the second and third grade curriculum is ongoing. The final phase is to revise the current fourth through sixth grade curriculum. The goal is to have a comprehensive elementary curriculum available for statewide delivery by the year 2000.

More fire-related information for South Carolina can be found at Web site http://www.llr.sc.edu/fm.htm.

STATE FIRE DEATHS AND DEATH RATE

Fire deaths in South Carolina were at a steady level from 1986 to 1989. In 1990, deaths declined significantly and have maintained that level to the present. As a result, the number of deaths have trended down by 44% over 10 years, and the death rate by 50%. Nevertheless, the 29.5 deaths per million population in 1995 makes South Carolina the fifth highest in the nation, the same ranking as in 1994, well above the national average of 17.4.

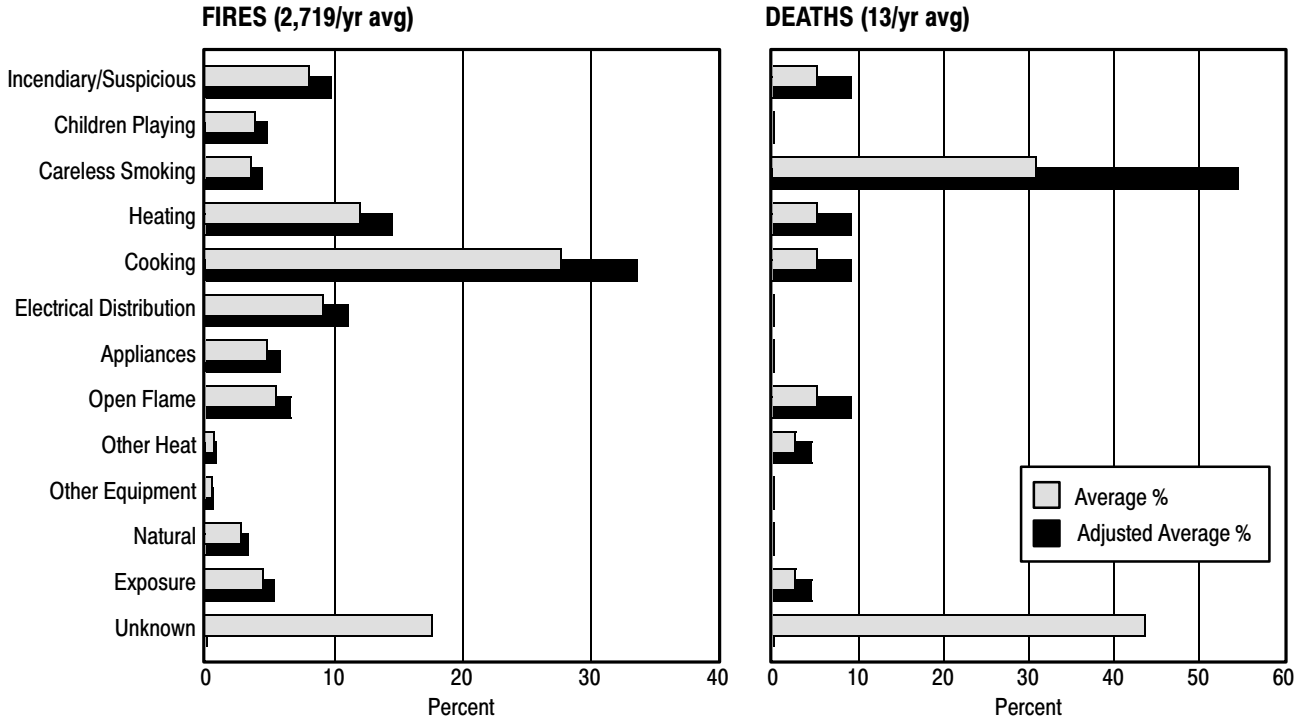


Year	Fire Deaths	Deaths/ Million
1986	157	47.0
1987	168	49.7
1988	164	48.1
1989	178	51.5
1990	117	33.4
1991	101	28.4
1992	107	29.8
1993	110	30.3
1994	106	29.1
1995	108	29.5

South Carolina State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking is the cause of 34% of all residential fires, leading the second leading cause, heating fires, by a two-to-one margin. Electrical distribution is the third leading cause. Combined, these three causes account for 59% of all residential fires in South Carolina. Careless smoking is the cause of 55% of all fatalities. However, the cause of 44% of all deaths are not determined in NFIRS.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	242	191	217	1	0	1
Children Playing	105	93	116	0	0	0
Careless Smoking	98	82	108	4	5	3
Heating	359	246	370	1	1	0
Cooking	774	626	861	2	0	0
Electrical Distribution	243	221	281	0	0	0
Appliances	133	105	146	0	0	0
Open Flame	144	115	183	1	0	1
Other Heat	17	11	21	0	1	0
Other Equipment	10	13	11	0	0	0
Natural	66	68	90	0	0	0
Exposure	126	78	152	1	0	0
Unknown	421	374	640	9	5	3
Total	2,738	2,223	3,196	19	12	8

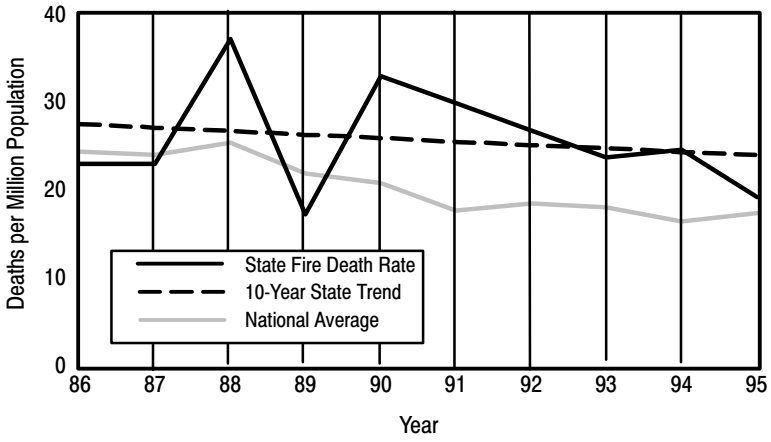
Source: NFIRS

SOUTH DAKOTA

Of the 2,984 fires reported to NFIRS in 1995, structure fires accounted for 932, with 64 percent of these occurring in residential structures. Sixty-five percent of South Dakota's fire departments (224 of 343) report to NFIRS.

STATE FIRE DEATHS AND DEATH RATE

There has been a gradual decline in both number of deaths and death rate in South Dakota over 10 years—9% and 13%, respectively. There are a relatively few number of deaths in the state, but the death rate is consistently above the national rate. Because South Dakota is a small-population state, an increase or decrease of just a few deaths has a marked impact on the death rate. For example, there were four fewer deaths in 1995 than in 1994, but this changed the death rate by 5.7 deaths per million population. At 19.2 deaths per million in 1995, South Dakota was above the national average of 17.4, and the state ranks in the top third of states with the highest death rate.

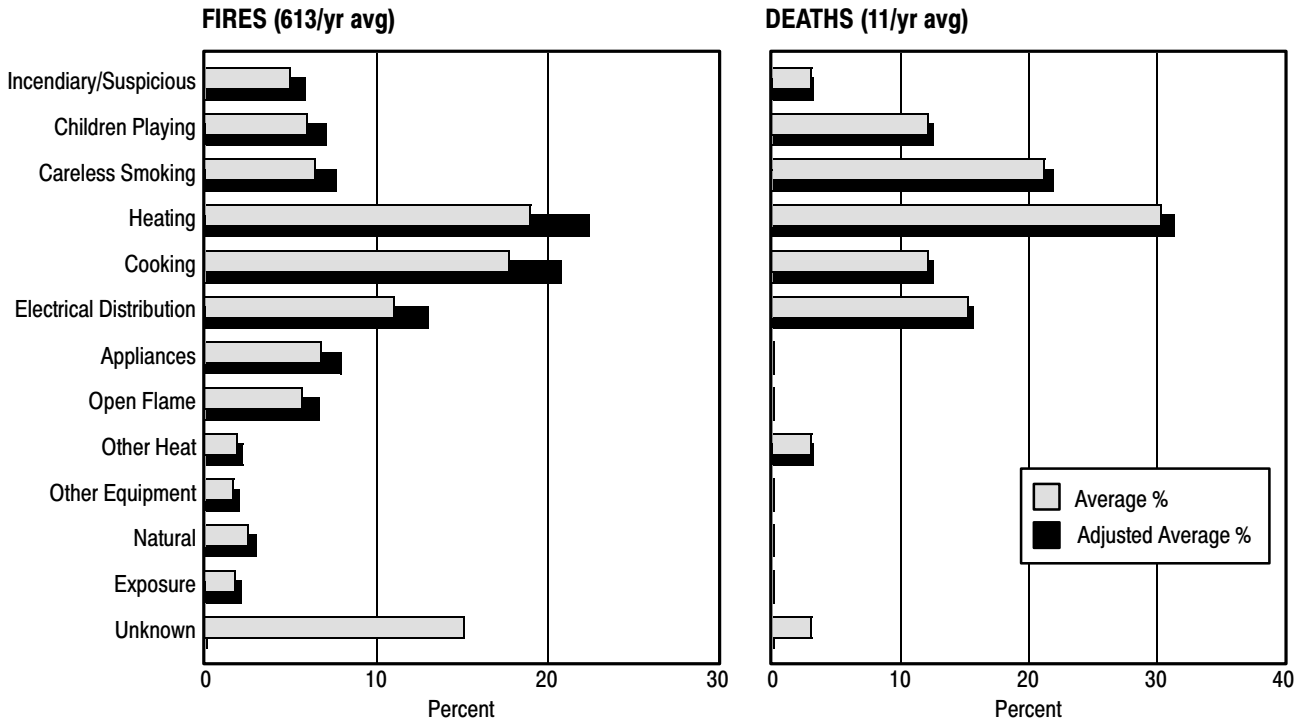


Year	Fire Deaths	Deaths/ Million
1986	16	23.0
1987	16	23.0
1988	26	37.2
1989	12	17.2
1990	23	33.0
1991	21	29.9
1992	19	26.8
1993	17	23.7
1994	18	24.4
1995	14	19.2

South Dakota State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Heating is the leading cause of both number of fires and deaths in South Dakota residences. Careless smoking is the second leading cause of deaths over the 3-year period. Cooking and electrical distribution are the second and third leading cause of residential fires and, combined with heating, account for 56% of all residential fires reported to NFIRS.



Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	19	35	36	0	0	1
Children Playing	40	47	22	3	0	1
Careless Smoking	36	45	37	1	5	1
Heating	118	117	114	6	1	3
Cooking	117	92	116	2	1	1
Electrical Distribution	68	69	66	2	2	1
Appliances	41	46	37	0	0	0
Open Flame	34	33	36	0	0	0
Other Heat	13	11	9	0	1	0
Other Equipment	13	6	11	0	0	0
Natural	13	12	20	0	0	0
Exposure	10	9	13	0	0	0
Unknown	100	100	77	0	0	1
Total	622	622	594	14	10	9

Source: NFIRS

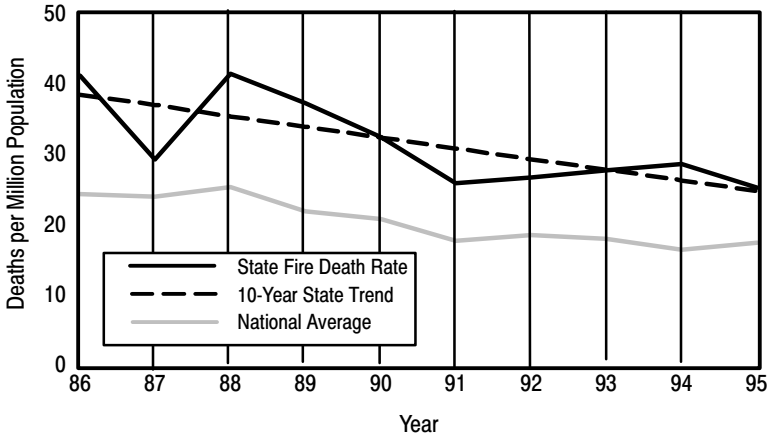
TENNESSEE

Thirty-one percent of Tennessee's fire departments (201 of 655) report to NFIRS, a slight increase over 1994 participation. In 1995, 22,718 fires were reported to NFIRS. Structure fires numbered 7,450, with 73 percent occurring in residences.

The Tennessee State Fire Marshal's Office maintains a separate Kid's Page on its Web site. This site can be directly addressed at http://www.state.tn.us/firesafekids. Additional fire-related information for Tennessee can be found at Web site http://www.state.tn.us/commerce/fpdiv.html.

STATE FIRE DEATHS AND DEATH RATE

Since 1990, the number of deaths in Tennessee has been relatively static, fluctuating between 128 and 159 per year. Over the 10-year period, however, the number of deaths has trended down by 29%. Tennessee's death rate of 25.3 per million population, although trending down 36% over 10 years, is considerably above the national rate of 17.4, ranking the state as the ninth highest in the nation.

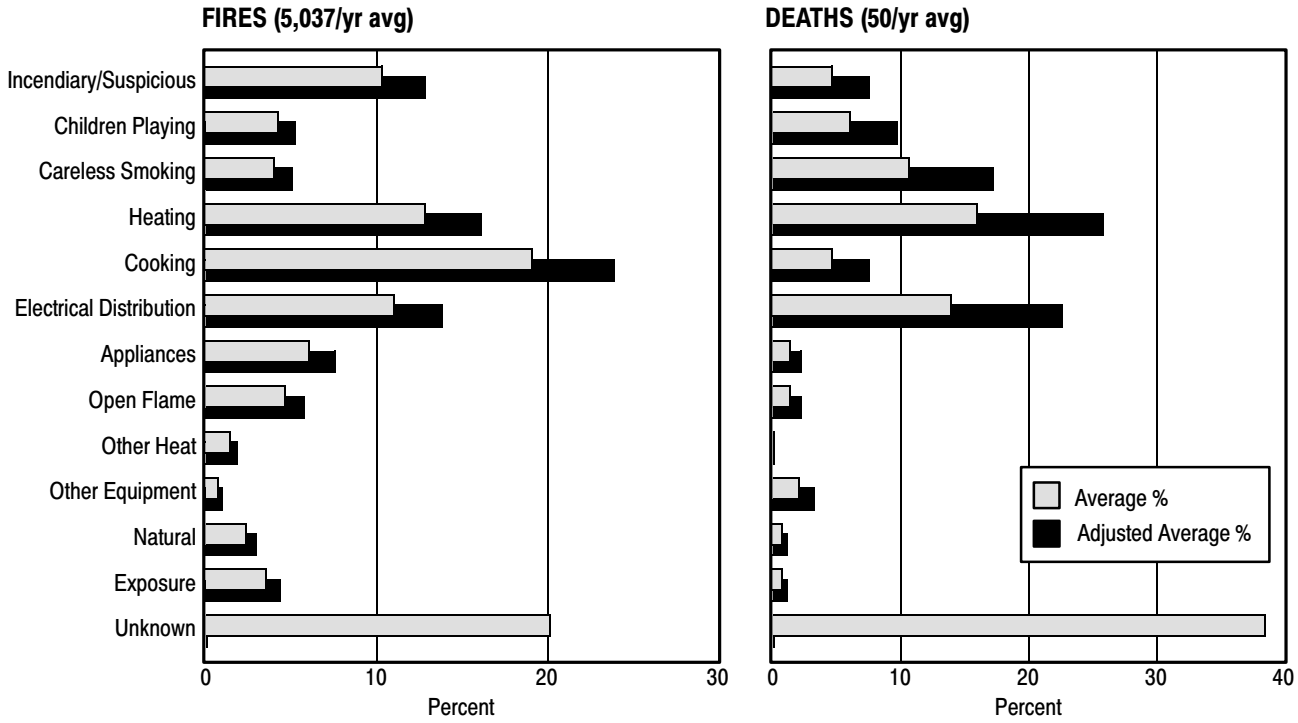


Year	Fire Deaths	Deaths/ Million
1986	195	41.2
1987	140	29.3
1988	200	41.5
1989	181	37.3
1990	159	32.5
1991	128	25.9
1992	134	26.7
1993	141	27.7
1994	148	28.6
1995	133	25.3

Tennessee State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

In each of the 3 years, cooking was the leading cause of residential fires in Tennessee, with a 3-year average of 24%. Heating, electrical distribution, and arson were closely grouped as the next leading causes of fires; 20% of all fires were not attributed to cause. Heating and electrical distribution were the leading causes of residential fire fatalities, at 26% and 23%, respectively. Careless smoking was third at 17%. Again, the cause of death was not reported to NFIRS in a large number of cases (38%).



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	419	494	636	1	4	2
Children Playing	197	229	204	6	3	0
Careless Smoking	184	204	217	5	7	4
Heating	643	660	634	12	10	2
Cooking	870	948	1,063	2	3	2
Electrical Distribution	525	568	568	3	7	11
Appliances	275	306	329	0	2	0
Open Flame	176	260	254	1	1	0
Other Heat	71	68	78	0	0	0
Other Equipment	30	42	40	0	2	1
Natural	111	107	134	0	0	1
Exposure	107	187	230	0	0	1
Unknown	890	1,079	1,074	16	28	14
Total	4,498	5,152	5,461	46	67	38

Source: NFIRS

TEXAS

Only the data reported to NFIRS is used in the 1995 Texas annual report. The annual report shows that fire departments responded to 97,167 fires. This underrepresents total fires in the state because only 25 percent of Texas' fire departments (580 of 2,317) report to NFIRS. Twenty-seven percent of these fires were in structures (25,941) and another 27 percent were categorized as trees, brush, and grass fires. Of the structure fires, 75 percent were in residences.

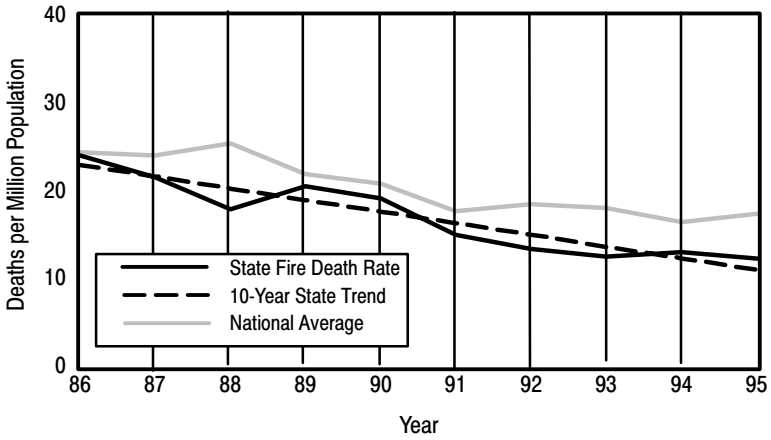
According to the annual report, one- and two-family dwellings accounted for 73 percent of residential structure fires and made up the greatest percentage of losses in terms of fires, deaths, injuries, and dollar losses. Cooking was the leading cause of fires, which were usually due to stoves or unattended food catching on fire.

The majority of civilian fire deaths occurred in residences (178 of 232). Vehicle fires accounted for an additional 41 deaths. Nearly 30 percent of deaths occurred in February and October.

More fire-related information for Texas can be found at Web site http://www.tdi.state.tx.us.

STATE FIRE DEATHS AND DEATH RATE

The death rate in Texas has consistently been below the national rate. In 1995, Texas had 12.3 deaths per million population, which is significantly below the national rate of 17.4. Over 10 years, the death rate trend has gone down by 52%. Texas' death rate places it among the bottom third of all states. The number of deaths has also declined, by 40% over the 10-year period.

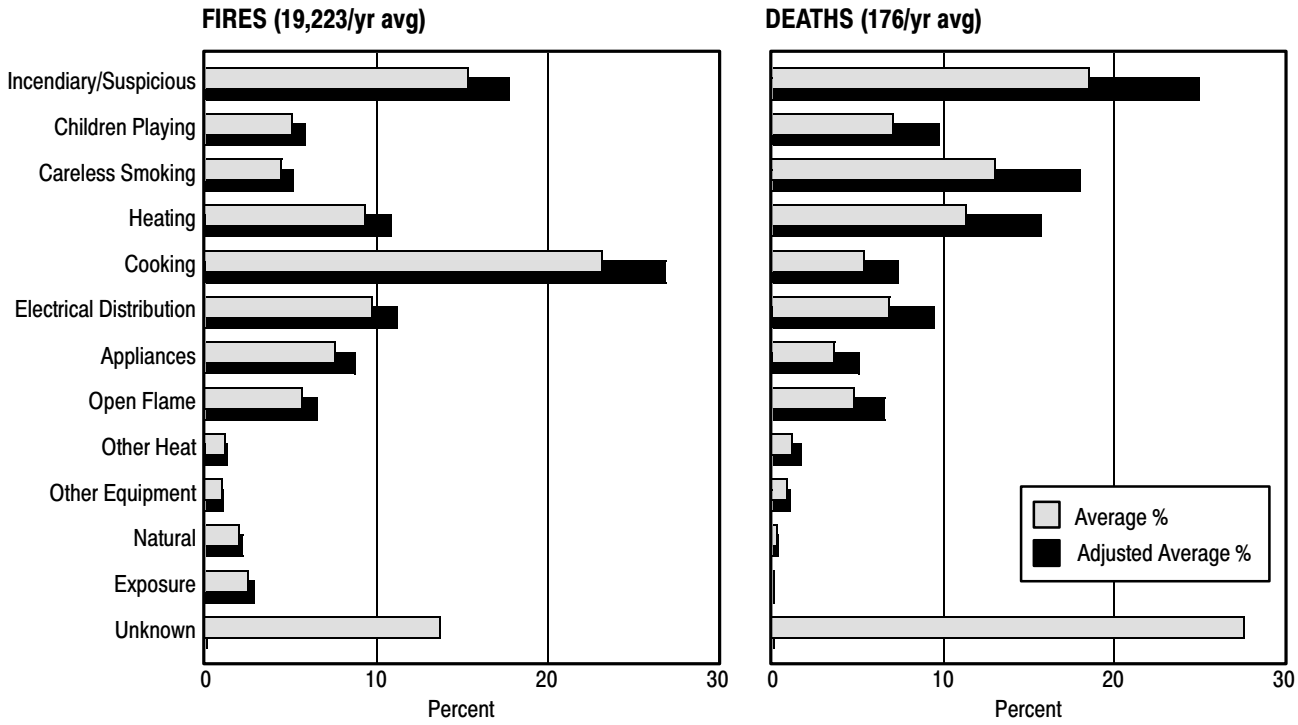


Year	Fire Deaths	Deaths/ Million
1986	398	24.0
1987	358	21.5
1988	299	17.9
1989	345	20.5
1990	326	19.1
1991	261	15.0
1992	237	13.4
1993	225	12.5
1994	239	13.0
1995	232	12.3

Texas State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

At an average of 27% over 3 years, cooking is the leading cause of residential fires in Texas. Arson is a very large problem in the state at 18% of residential fires. Arson accounts for 26% of residential fire deaths, followed by careless smoking (18%) and heating (16%). The cause of fatalities was not given in 28% of NFIRS reports.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	3,091	2,901	2,807	43	20	35
Children Playing	1,028	1,048	826	8	18	11
Careless Smoking	779	867	893	17	26	26
Heating	1,843	1,693	1,854	17	17	26
Cooking	4,531	4,426	4,444	10	11	7
Electrical Distribution	1,931	1,809	1,849	18	14	4
Appliances	1,435	1,424	1,491	2	8	9
Open Flame	1,031	1,055	1,142	8	7	10
Other Heat	228	205	182	1	5	0
Other Equipment	151	153	193	3	0	1
Natural	315	357	398	1	0	0
Exposure	465	449	481	0	0	0
Unknown	2,565	2,518	2,810	49	48	49
Total	19,393	18,905	19,370	177	174	178

Source: NFIRS

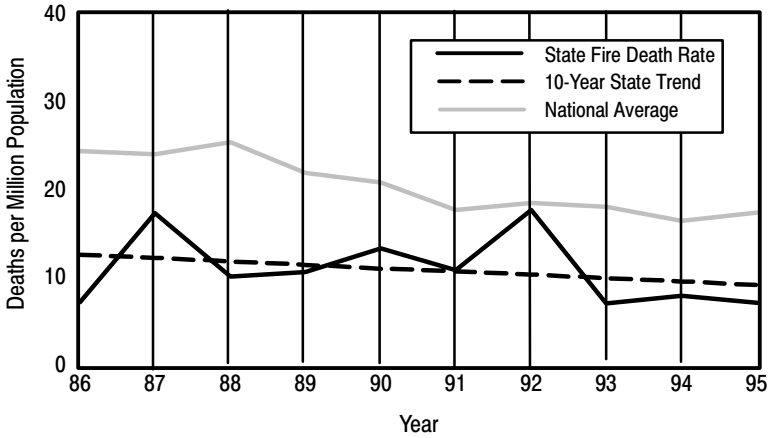
UTAH

There were 8,002 fires reported to NFIRS in Utah in 1995, with the greatest percentage involving trees, brush, and grass (53 percent). The number of structure fires was 1,962 (18 percent), of which 72 percent occurred in residential structures. Utah fires resulted in a dollar loss of more than $37 million. The majority of fire departments participate in NFIRS—133 of 211 or 63%, an increase over 1994.

In 1991, a federal grant was awarded to Utah to implement a public education and intervention program.[7] A Juvenile Firesetter Program was created to combat the high percentage of fire deaths attributed to children playing. The objectives of the program included training fire personnel to correctly identify problem juvenile firesetters, developing mental health community responses when dealing with juvenile firesetters, and developing a public awareness campaign using the news media and brochures that explain the juvenile firesetter problem.

STATE FIRE DEATHS AND DEATH RATE

The trend in the number of fire deaths in Utah has declined 16% over 10 years. At 7.1 deaths per million population, Utah has one of the lowest death rates in the nation (ranked as the fourth lowest in both 1994 and 1995). Utah has been below the national death rate every year, which in 1995 was 17.4. The death rate has trended down 27% over 10 years.



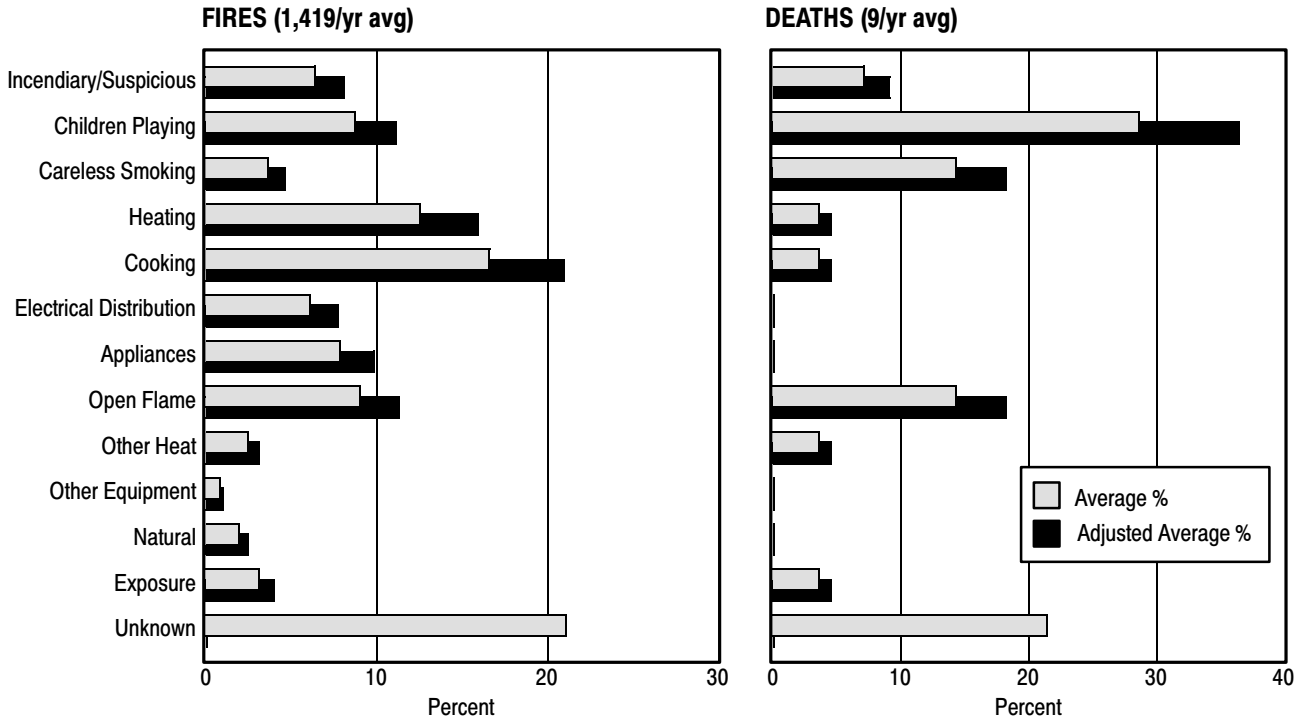
Year	Fire Deaths	Deaths/ Million
1986	12	7.2
1987	29	17.3
1988	17	10.1
1989	18	10.6
1990	23	13.3
1991	19	10.8
1992	32	17.7
1993	13	7.0
1994	15	7.9
1995	14	7.1

Utah State Fire Marshal's Office and the Bureau of the Census

[7] *Fire in Utah,* 1994 Annual Report, Office of the State Fire Marshal.

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Cooking (21%) and heating (16%) were the two leading causes of residential fires in each of the 3 years. Open flame and children playing were the next leading causes at 11%. Children playing was a major cause of fatalities in Utah residences, accounting for 36% of all deaths. Careless smoking and open flame, at 18% each, were the next leading causes of fire deaths. The cause of deaths, however, are based on a relatively small number of deaths in the state—11 in 1995.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	93	75	104	0	1	1
Children Playing	129	136	107	2	2	4
Careless Smoking	58	53	42	1	1	2
Heating	187	165	181	0	1	0
Cooking	234	227	244	0	0	1
Electrical Distribution	76	98	85	0	0	0
Appliances	105	129	96	0	0	0
Open Flame	139	107	135	2	0	2
Other Heat	39	36	29	0	1	0
Other Equipment	9	15	9	0	0	0
Natural	30	26	26	0	0	0
Exposure	31	46	57	0	1	0
Unknown	309	292	297	2	3	1
Total	1,439	1,405	1,412	7	10	11

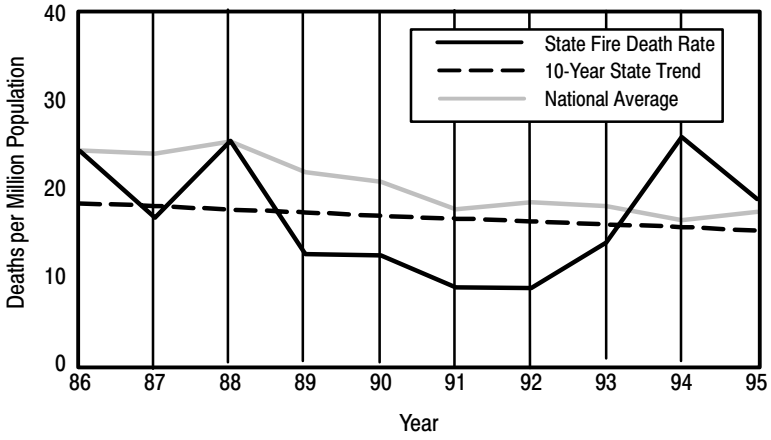
Source: NFIRS

VERMONT

Forty-six percent of Vermont's fire departments (112 of 243) report to NFIRS. In 1995, 2,463 fires were reported to the system. The largest percentage of fires (38%) involved trees, brush, and grass. There were 889 structure fires (36 percent), of which 78 percent occurred in residences. More fire-related information for Vermont can be found at Web site http://www.state.vt.us/labind/fpindex.htm.

STATE FIRE DEATHS AND DEATH RATE

Because of the relatively small number of deaths in Vermont in any year, the chart appears erratic. Over 10 years, the trend in fire deaths has decreased 8% and the death rate has decreased 17%. With a swing of only two deaths, the deaths per million population can vary significantly. In 1995, the death rate was 18.9 deaths per million population, slightly higher than the national rate of 17.4. Because of these variations, Vermont went from having the 10th highest death rate in 1994, to the 19th highest in 1995.

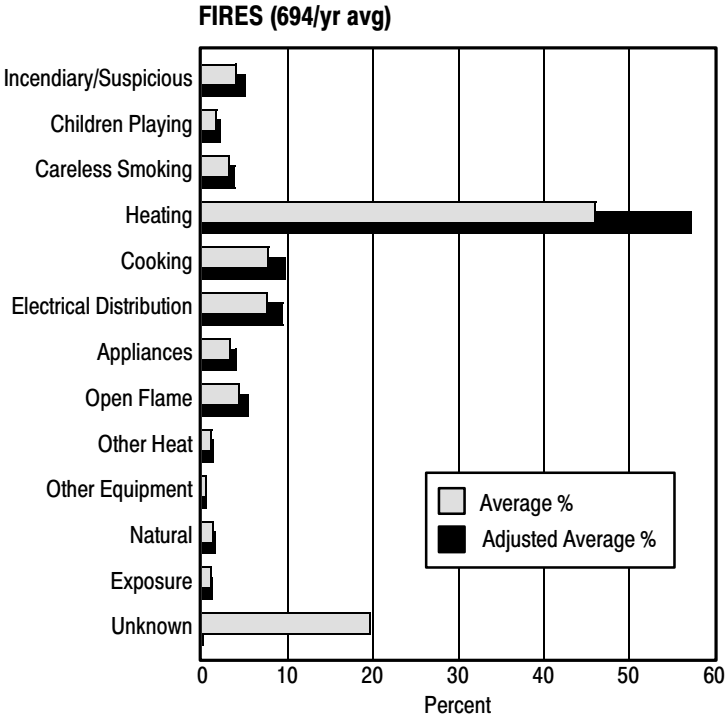


Year	Fire Deaths	Deaths/ Million
1986	13	24.3
1987	9	16.7
1988	14	25.5
1989	7	12.6
1990	7	12.4
1991	5	8.8
1992	5	8.7
1993	8	13.9
1994	15	25.9
1995	11	18.8

Vermont Fire Prevention Division (Inspection), Department of Labor and Industry; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

The leading cause of residential fires in Vermont was heating, by nearly a factor of six over any other cause. Only 11 residential fire deaths were reported to NFIRS over 3 years, 27% of which were of unknown cause. These sparse data show that electrical distribution was the leading cause of deaths with three fatalities and careless smoking and open flame the cause for two fatalities each.



Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	14	27	41	0	0	0
Children Playing	5	9	19	0	0	0
Careless Smoking	19	22	21	0	0	2
Heating	343	305	309	1	0	0
Cooking	56	48	57	0	0	0
Electrical Distribution	35	66	55	1	2	0
Appliances	15	28	23	0	0	0
Open Flame	27	27	34	0	2	0
Other Heat	2	11	7	0	0	0
Other Equipment	2	3	1	0	0	0
Natural	6	9	9	0	0	0
Exposure	6	8	5	0	0	0
Unknown	221	77	110	0	3	0
Total	751	640	691	2	7	2

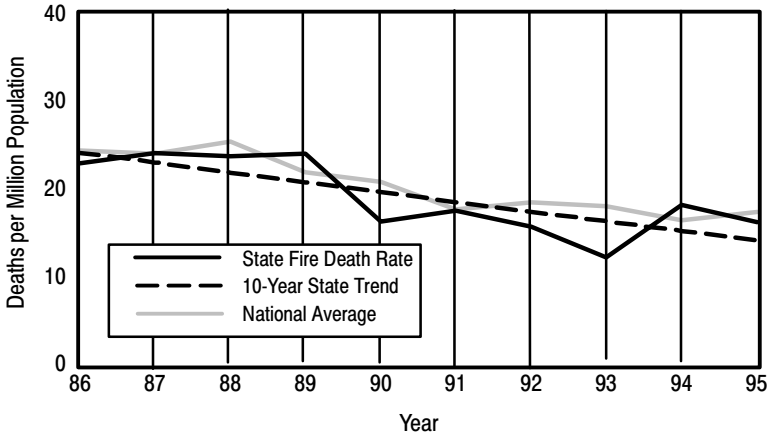
Source: NFIRS

VIRGINIA

There were 24,834 fires reported to NFIRS in Virginia in 1995. Seventy-one percent of the state's fire departments (428 of 600) report to NFIRS. Outside fires were responsible for 43 percent and structure fires for 34 percent. Of the structure fires, 79 percent were in residences.

STATE FIRE DEATHS AND DEATH RATE

Over 10 years, the trend in number of deaths has been downward, by 33%. The 16.2 deaths per million is lower than the 1995 national rate of 17.4 but still ranks Virginia in the top half of states with the highest death rate. The death rate trend has declined 42% over 10 years.

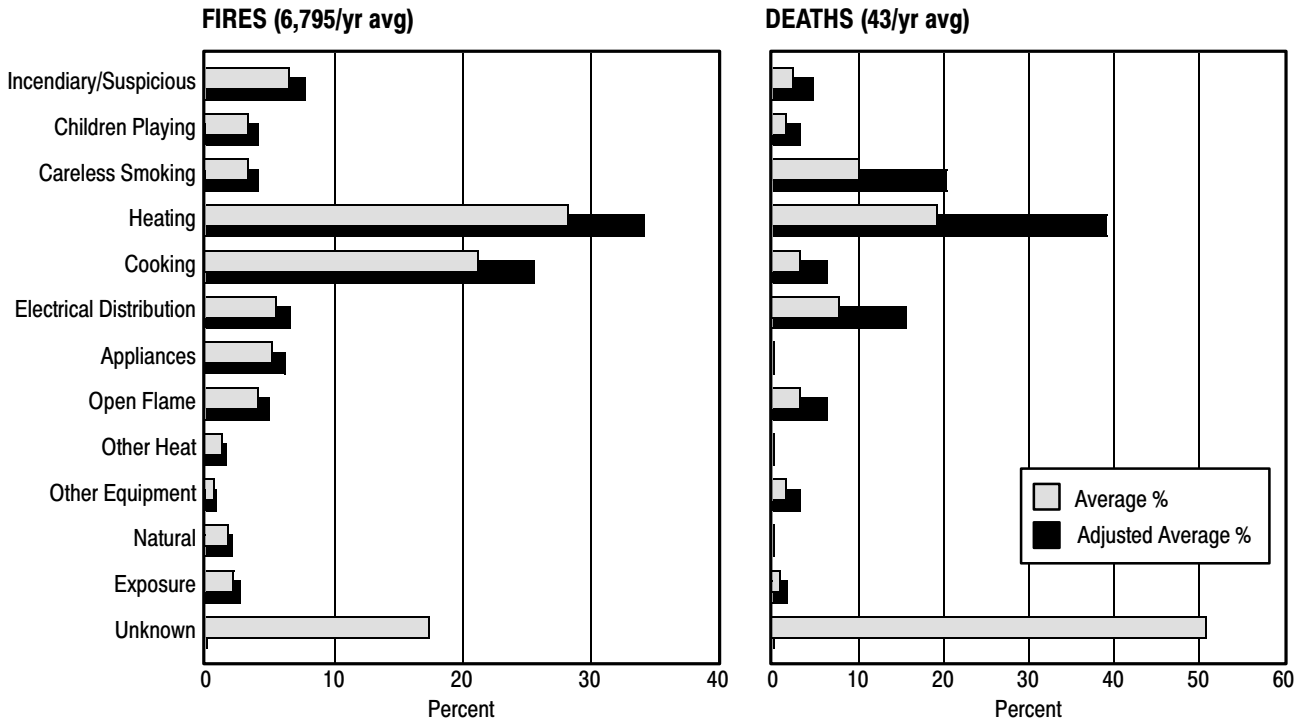


Year	Fire Deaths	Deaths/ Million
1986	133	22.9
1987	143	24.1
1988	143	23.7
1989	147	24.0
1990	101	16.3
1991	110	17.5
1992	100	15.7
1993	79	12.2
1994	119	18.2
1995	107	16.2

Virginia State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Heating is the leading cause of residential fires in Virginia, followed by cooking. Together, they account for 60% of all fires. Heating and careless smoking are the two leading causes of deaths, with 25 and 13 fatalities, respectively, over the 3-year period. More than half of the reported deaths, however, were not attributed to cause.



Cause	Fires 1993	Fires 1994	Fires 1995	Deaths 1993	Deaths 1994	Deaths 1995
Arson	426	413	466	2	1	0
Children Playing	206	243	227	0	1	1
Careless Smoking	218	222	241	6	4	3
Heating	2,133	1,931	1,688	6	10	9
Cooking	1,319	1,532	1,464	1	0	3
Electrical Distribution	328	409	363	4	4	2
Appliances	279	370	386	0	0	0
Open Flame	226	283	312	1	2	1
Other Heat	61	115	78	0	0	0
Other Equipment	30	58	38	2	0	0
Natural	96	143	106	0	0	0
Exposure	143	122	167	0	0	1
Unknown	1,173	1,245	1,126	17	34	15
Total	6,638	7,086	6,662	39	56	35

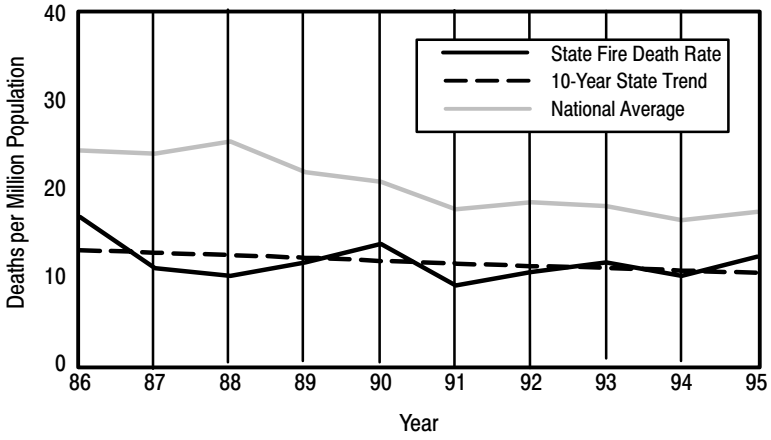
Source: NFIRS

WASHINGTON

Only 8 percent of Washington's fire departments (50 of 655) report to NFIRS. The number of fires reported to NFIRS in 1995 totaled 5,448. Outside fires accounted for 45 percent of this total, and structure fires accounted for 27 percent. Of the structure fires, 68 percent (998) occurred in residential structures.

STATE FIRE DEATHS AND DEATH RATE

The death rate in Washington has been below the national average, and in 1995 was 12.3 deaths per million population versus the 17.4 national rate. The state consistently is ranked in the third of all states having the lowest death rate, although it jumped from 7th lowest in 1994 to 16th lowest in 1995. With the increase in deaths in 1995, the 10-year trend in number of deaths is basically unchanged, increasing less than 1%. Because of the population growth, however, the death rate has trended down by 20% over 10 years.

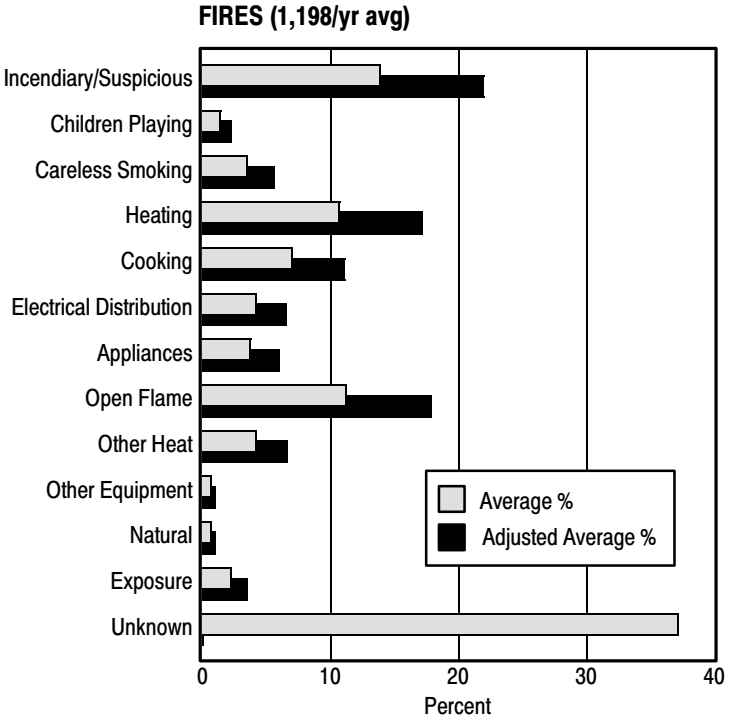


Year	Fire Deaths	Deaths/ Million
1986	75	16.8
1987	50	11.0
1988	47	10.1
1989	55	11.6
1990	67	13.7
1991	45	9.0
1992	54	10.5
1993	61	11.6
1994	54	10.1
1995	67	12.3

Washington State Fire Marshal's Office; Washington Vital Records; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993–95 AVERAGE)

Arson is the leading cause of residential fires over the 3-year period, although open flame was the leading cause in 1995. Open flame and heating were the next leading causes of fires over this period. Cooking fires, which is a leading cause in many states, is the fourth leading cause. In each of the 3 years, the number of unknown fire causes reported to NFIRS has increased; in 1993, it was 34% and in 1995 it was 43%. Only three residential deaths were reported to NFIRS in the 3 years. Arson was the cause of two of these deaths.



Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	271	118	107	1	0	1
Children Playing	21	19	10	0	0	0
Careless Smoking	61	37	29	0	0	0
Heating	172	110	104	0	0	0
Cooking	140	55	56	0	0	0
Electrical Distribution	72	40	35	0	0	0
Appliances	64	34	35	1	0	0
Open Flame	175	116	111	0	0	0
Other Heat	56	43	50	0	0	0
Other Equipment	11	6	4	0	0	0
Natural	9	5	6	0	0	0
Exposure	40	18	20	0	0	0
Unknown	553	349	431	0	0	0
Total	1,645	950	998	2	0	1

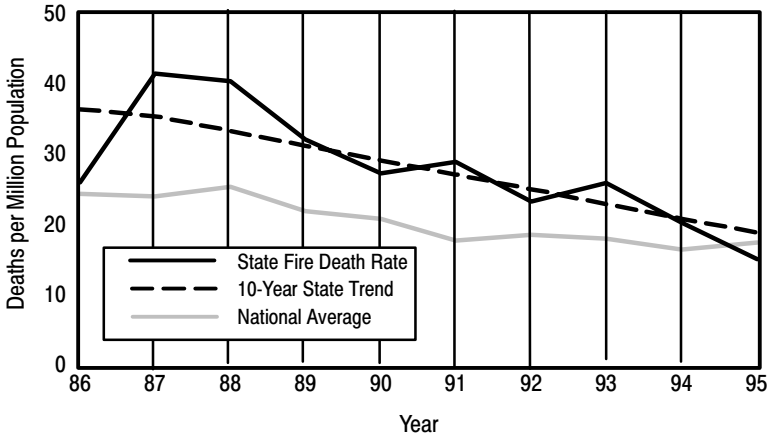
Source: NFIRS

WEST VIRGINIA

Nearly all of West Virginia's fire departments report to NFIRS—424 of 442 (96 percent). In 1995, 9,172 fires were reported to NFIRS, with structure fires accounting for 51 percent and outside fires accounting for 26 percent. Seventy-seven percent of structure fires are in residences.

STATE FIRE DEATHS AND DEATH RATE

The trends in deaths and death rate in West Virginia have declined significantly over 10 years, by 51% and 50%, respectively. In 1995, the deaths per million population in the state (15.3) were below the national rate (17.4) for the first time in 10 years. Ranking 26th in the nation in 1995, the state now moves into the lower half of fire death rates. The 28 deaths reported by the State Fire Marshal's Office in 1995 were also at their lowest level over the 10-year span.

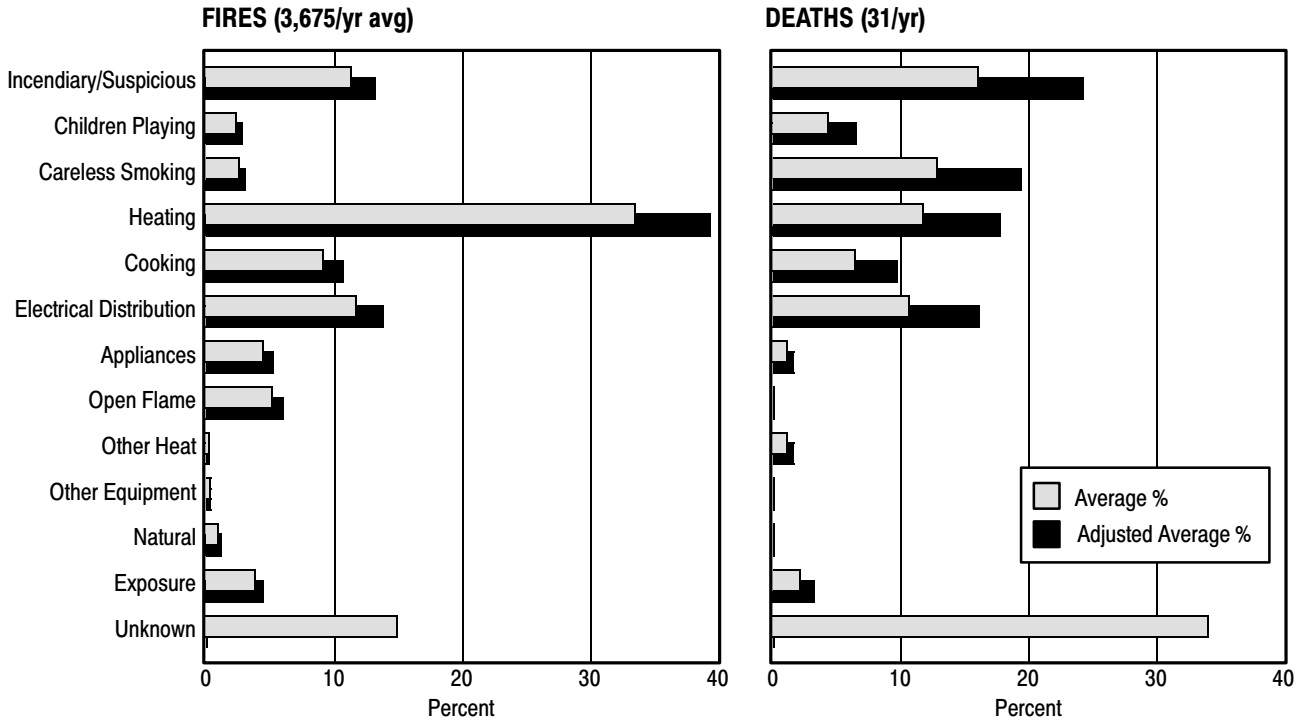


Year	Fire Deaths	Deaths/ Million
1986	49	26.0
1987	77	41.5
1988	74	40.4
1989	58	32.1
1990	49	27.3
1991	52	28.9
1992	42	23.2
1993	47	25.8
1994	37	20.3
1995	28	15.3

West Virginia State Fire Marshal's Office and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Heating fires in residences is a major problem in West Virginia, accounting for 39 percent of all fires and nearly three times more than any other cause. Electrical distribution and arson are the next leading causes of fire. Over the 3-year period, arson has been the leading cause of residential fire deaths, but this is due to the large number of deaths in 1993. Arson is the overall leading cause of fatalities, with careless smoking playing a major role in total deaths. More than a third of all fire deaths were not attributed to a fire cause.



Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	393	457	391	8	4	3
Children Playing	87	86	85	2	2	0
Careless Smoking	82	103	95	4	4	4
Heating	1,320	1,226	1,142	5	2	4
Cooking	336	338	327	6	0	0
Electrical Distribution	424	449	420	0	8	2
Appliances	178	147	158	1	0	0
Open Flame	169	208	187	0	0	0
Other Heat	6	7	9	1	0	0
Other Equipment	11	11	10	0	0	0
Natural	42	33	24	0	0	0
Exposure	128	123	166	2	0	0
Unknown	539	545	562	13	10	9
Total	3,715	3,733	3,576	42	30	22

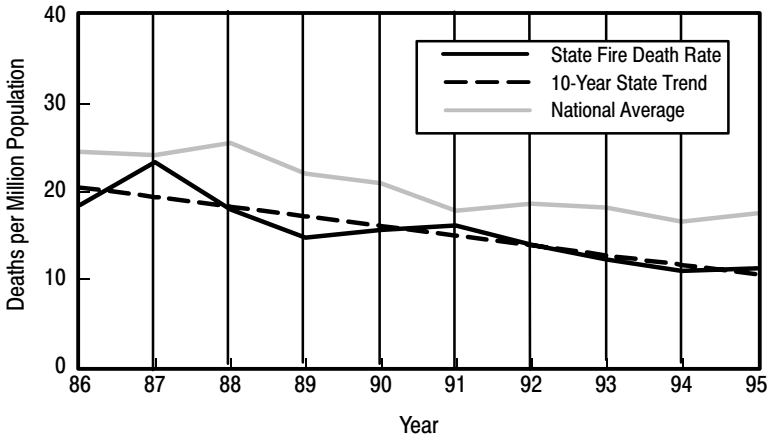
Source: NFIRS

WISCONSIN

There were 4,250 fires reported to NFIRS in 1995. This represents 18 percent of Wisconsin's fire departments (153 of 872), a significant drop from the 25 percent that participated in 1994. Structure fires were responsible for 40 percent of the fires and outside accounted for 34 percent of fires. Of the structure fires, 65 percent occurred in residences.

STATE FIRE DEATHS AND DEATH RATE

The 57 fire deaths in 1995 was the second lowest over the 10-year period and was almost half of the deaths recorded in 1987. The trend in deaths in Wisconsin has declined 44%. In all 10 years, the deaths per million population have been below the national rate—in 1995, it was 11.1 versus the national death rate of 17.4. The death rate trend has declined 49%.The state has the 13th lowest death rate of all states.

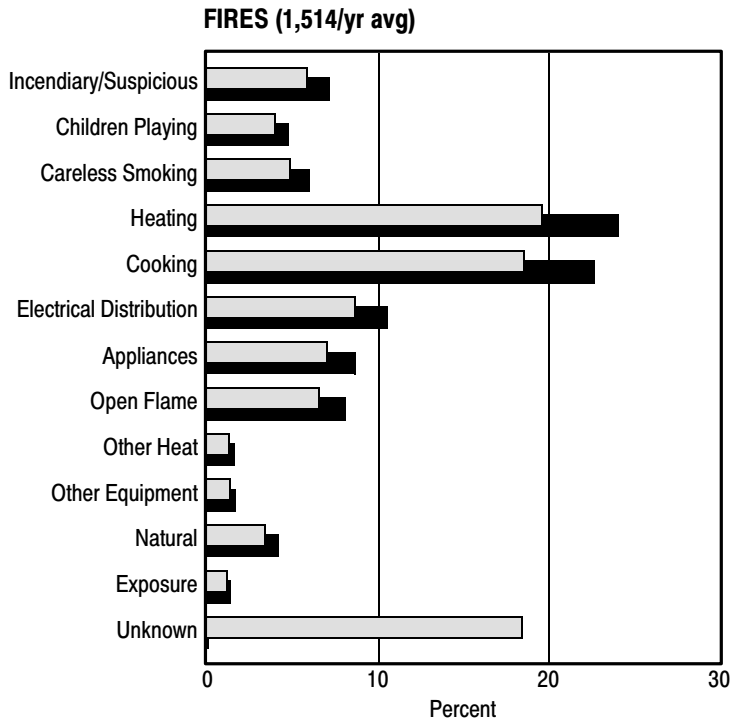


Year	Fire Deaths	Deaths/ Million
1986	87	18.3
1987	111	23.2
1988	86	17.8
1989	71	14.6
1990	76	15.5
1991	79	16.0
1992	69	13.8
1993	61	12.1
1994	55	10.8
1995	57	11.1

Wisconsin State Fire Marshal's Office; Wisconsin Vital Records; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Over 3 years, 25 deaths in residences were recorded by NFIRS. However, due to the reduction in the number of fire departments reporting to NFIRS, only five deaths were recorded in 1995, three of which were of unknown fire cause. Heating (24%) and cooking (23%) were the leading causes of fires over 3 years, but cooking was the leading cause in 1995.



Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	115	97	52	0	2	0
Children Playing	70	65	40	1	0	0
Careless Smoking	90	71	57	2	1	0
Heating	376	324	190	0	3	0
Cooking	343	266	230	1	0	1
Electrical Distribution	144	133	112	0	0	1
Appliances	132	112	74	0	0	0
Open Flame	122	105	68	0	0	0
Other Heat	15	26	14	0	0	0
Other Equipment	23	19	18	0	0	0
Natural	60	53	39	0	0	0
Exposure	17	15	18	0	0	0
Unknown	362	271	203	8	2	3
Total	1,869	1,557	1,115	12	8	5

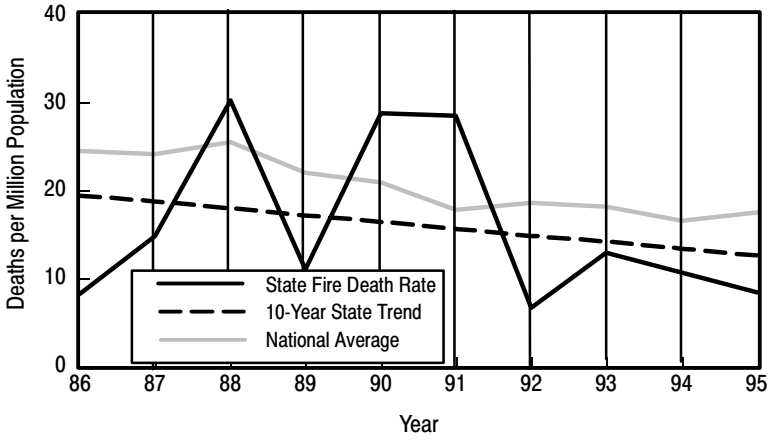
Source: NFIRS

WYOMING

Eighty-two percent of Wyoming's fire departments (109 of 133) participate in NFIRS. In 1995, 3,010 fires were reported to the system. Outside fires were responsible for 57 percent and structure fires accounted for 25 percent. Of the structure fires, 75 percent occurred in residences.

STATE FIRE DEATHS AND DEATH RATE

Since Wyoming has relatively few fire deaths each year, an increase or decrease of even one death can cause a spike in the death rate. In 1995, there were 8.3 deaths per million population, well below the national rate of 17.4. The state had the sixth lowest death rate in the nation in 1995. In 1994, with just one more death than 1995, Wyoming had the 10th lowest rate. The 10-year trend for both number of deaths and death rate has declined 36%.

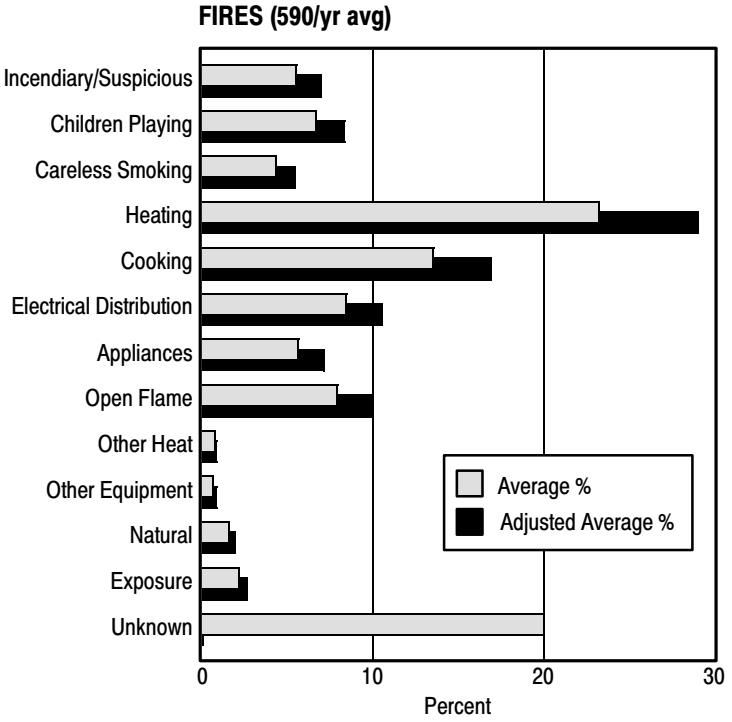


Year	Fire Deaths	Deaths/ Million
1986	4	8.1
1987	7	14.7
1988	14	30.1
1989	5	10.9
1990	13	28.7
1991	13	28.4
1992	3	6.5
1993	6	12.8
1994	5	10.5
1995	4	8.3

Wyoming State Fire Marshal's Office; Wyoming Vital Records; and the Bureau of the Census

CAUSES OF RESIDENTIAL FIRES AND DEATHS BASED ON NFIRS REPORTS (1993-95 AVERAGE)

Only two residential fire deaths were reported to NFIRS in each of the 3 years; half of the 6 deaths were attributed to heating fires. Heating is also the leading cause of fires in Wyoming (29%). Cooking and electrical distribution fires were the next leading causes. The cause of fire was not reported in 20% of cases.



Insufficient fire death data from NFIRS for plotting meaningful results.

Cause	Fires			Deaths		
	1993	1994	1995	1993	1994	1995
Arson	31	31	36	0	0	1
Children Playing	36	42	39	0	0	0
Careless Smoking	22	26	28	1	1	0
Heating	186	117	108	1	1	1
Cooking	89	74	76	0	0	0
Electrical Distribution	45	54	49	0	0	0
Appliances	39	32	29	0	0	0
Open Flame	59	35	46	0	0	0
Other Heat	4	5	3	0	0	0
Other Equipment	3	6	2	0	0	0
Natural	9	8	10	0	0	0
Exposure	7	15	15	0	0	0
Unknown	79	147	128	0	0	0
Total	609	592	569	2	2	2

Source: NFIRS

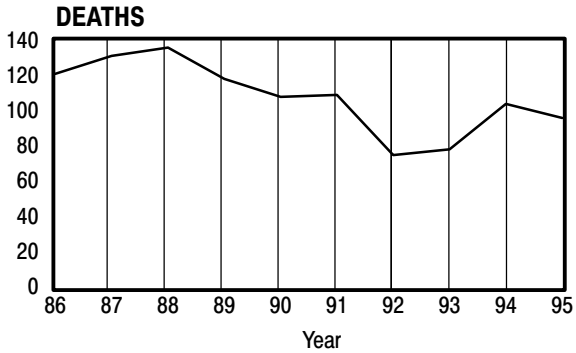
4

FIREFIGHTER CASUALTIES

There has been much progress in reducing on-duty firefighter deaths and injuries over the 10 years 1986–1995. Since 1988, firefighter deaths have dropped from 136 to 96. Deaths in 1992 and 1993 reached all-time lows at 75 and 77, respectively. Injuries declined 4 percent and ranged from 94,500 (1995) to 103,000 (1991). These deaths and injuries include casualties from fires, EMS incidents, training, and all other on-duty activities.

DEATHS

Ninety-six firefighters died while on duty in 1995[1] (Figure 26). This decrease from last year's total of 104 continues the long-term downward trend of reduced fatalities that began in 1979 after a peak of 171 deaths in 1978. Over the 10 years 1986–1995, firefighter deaths declined 35 percent. Deaths in 1995 decreased 8 percent from 1994.



1986	121	1991	109
1987	131	1992	75
1988	136	1993	77
1989	118	1994	104
1990	108	1995	96

10-Year Trend = –35.0%

Sources: NFPA Annual Surveys and the United States Fire Administration, Firefighter Fatality Project

Figure 26. Trends in Firefighter Deaths

[1] A total of 104 firefighters died in 1995 who would meet the criteria for an on-duty fatality. Eight of these deaths were attributed to events that took place in earlier years, and are not included in this analysis. Three firefighters died of complications directly attributable to exposures to hazardous chemicals at emergency incidents, including one from chronic obstructive pulmonary disease (COPD) after an exposure to formic acid at an incident in 1987. The other two died from exposures to hazardous chemicals that occurred in 1989 and 1990. One firefighter died from HIV, which he contracted during surgery that was necessitated by a 1980 on-duty injury. A firefighter who was paralyzed in an apparatus accident en route to an emergency in 1980 died from complications relating to his injuries. Two firefighters died while in comas, one resulting from an incident in 1979 and the other from a heart attack at a fire in 1994. One firefighter died from carbon monoxide poisoning that occurred at a 1994 incident.

The fatalities included 63 volunteer firefighters and 33 career firefighters. The fatalities by firefighter type and gender are presented in Table 5.

Table 5. 1995 Firefighter Deaths

Firefighter Type/Gender	Fatality
Firefighter	
Volunteer	63
Career	33
Wildland Firefighter	
Career	3
Seasonal/Part Time	4
Municipal/Local Fire Departments	
Career/Military	30
Volunteer	57
Industrial Brigade (volunteer)	1
Fire Police (volunteer)	1
Men	90
Women	6

Source: United States Fire Administration, Firefighter Fatality Project

The number of deaths associated with brush, grass or wildland firefighting dropped from the exceptionally high number of 38 in 1994 to 18 in 1995. Fireground deaths at wildland incidents have varied considerably from year to year, but have averaged between eight and ten in the most recent years.

Activity and Type of Duty

In 1995, 82 firefighter on-duty deaths were associated with emergency incidents, accounting for 85 percent of the 96 fatalities (Figure 27). This includes all firefighters who died returning/responding to an emergency, at the emergency scene, or immediately after an emergency incident.

Non-emergency activities accounted for 14 fatalities. Non-emergency duties include training, administrative activities, and other functions that were not related to an emergency incident.

Firefighter deaths by type of duty are also shown in Figure 27. As in previous years, the largest number of deaths occurred during fireground operations, 42 percent (down from 57 percent). Of the 40 fireground deaths, 18 resulted from heart attacks on the scene, 15 from asphyxiation, 4 from trauma, and 3 from burn injuries.

As in 1994, the second largest category was “responding to or returning from” emergency incidents, which accounted for 29 deaths in 1995. This has been the second leading cause of deaths since 1993. Twelve firefighters suffered fatal heart attacks while “responding or returning from” emergency incidents. Seven firefighters were killed in fire apparatus accidents while en route to emergency incidents. All six of these accidents involved apparatus rollovers and, in at least three of these

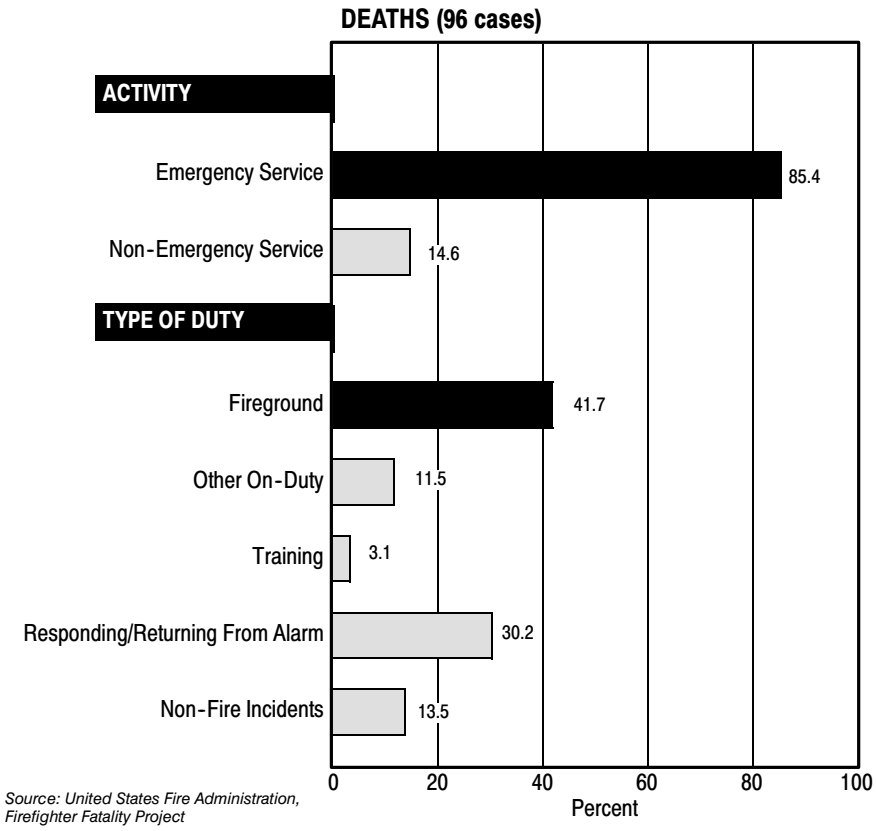


Figure 27. 1995 Firefighter Deaths by Activity and Type of Duty

incidents, the firefighters were not wearing seat belts. One death involved a firefighter who was thrown from the back step of an engine during an overturn accident.

Five firefighters were killed in accidents involving their personal vehicles while en route to emergency calls—three of these were collisions with vehicles driven by other emergency responders en route to the same incident. Three pilots were killed when two aircraft collided while returning from a wildfire. While backing a fire engine into the station after a call, one fire chief died when he fell and received a fatal head injury. One firefighter had a stroke while responding to the fire station.

Thirteen deaths were related to activities at the scene of non-fire emergency incidents. Six firefighters died of heart attacks at EMS or rescue incidents. Five firefighters died during technical rescue incidents, including three who drowned while operating in swift moving flood waters and a fourth who died during a diving accident in a quarry. (Two of these deaths occurred during body recovering operations.) One industrial fire brigade member died during a confined space operation when he was overcome by an oxygen deficient environment and asphyxiated while attempting to rescue a worker from an excavation. One firefighter died in a helicopter crash while involved in a search and rescue operation, and one firefighter was electrocuted by a downed power line.

Eleven deaths occurred during non-emergency duty activities. These deaths included nine firefighters who died from heart attacks while on duty—two at parades, two at fire department conferences, two while performing stress and agility tests, one while participating in a fire department

fundraiser, one while conducting a fire inspection, and one while on duty in the fire station. One firefighter died from a seizure while on duty as a dispatcher, and one other firefighter was killed when his ambulance crashed during a routine drive.

Three deaths were attributed to training activities, including one death in an apparatus accident during driver training. One firefighter was killed in a car accident while returning from a paramedic class, and an instructor collapsed and died while teaching a confined space rescue course. There were no deaths associated with live fire training.

Cause and Nature of Fatal Injury or Illness

The term *cause* refers to the action, lack of action, or circumstances that directly resulted in the fatal injury, while the term *nature* refers to the medical nature of the fatal injury or illness, or what is often referred to as the cause of death. The fatal injury usually is the result of a chain of events, the first of which is recorded as the cause. For example, if a firefighter is struck by a collapsing wall, becomes trapped in the debris, runs out of air before being rescued, and died of asphyxiation, the cause of the fatal injury is recorded as "struck by collapsing wall" and the nature of the fatal injury is "asphyxiation." Likewise, if a wildland firefighter is overrun by a fire and dies of burns, the cause of the death would be listed as "caught/trapped," and the nature if death would be "burns." This follows the convention used in NFIRS casualty reports, which are based on NFPA fire reporting standards.

Figure 28 shows the distribution of deaths by cause of fatal injury or illness. As in most previous years, the largest category is stress or overexertion—50 percent (up 15 percent). Firefighting has been shown to be one of the most physically demanding activities that the human body performs, and most deaths attributed to stress are from heart attacks. Of the 48 stress-related fatalities in 1995, 46 firefighters died of heart attacks, 1 died of a stroke, and 1 died of a seizure. Eleven of the 48 deaths listed as stress related occurred during non-emergency activities.

The second leading cause of firefighter fatalities was "struck by" or coming in "contact with an object." Of the 25 firefighters (26 percent) killed, 15 were involved in vehicle accidents, 4 died in aircraft crashes, 2 were struck by vehicles while on emergency scenes, 2 were struck by a train at a fire scene, and 1 was struck by a collapsing wall. One firefighter was electrocuted when he came in contact with a downed power line.

The third leading cause of firefighter fatalities was being "caught or trapped," accounting for 20 deaths (21 percent). Five firefighters died as a result of becoming trapped by floor collapses, four in a warehouse fire and one in a tenement house. Four firefighters were trapped by rapidly changing fire conditions inside burning structures, and one died at a residential fire when a garage door closed trapping his crew inside. A rapidly moving wildland fire overran two firefighters when their truck stalled. Two others were caught in a boilover in an oil refinery fire. Three firefighters were caught by swift moving flood currents and drowned—two who were tied into ropes while attempting flood rescues and one who was trapped by a hydraulic (recirculating water current) at a body recovery.

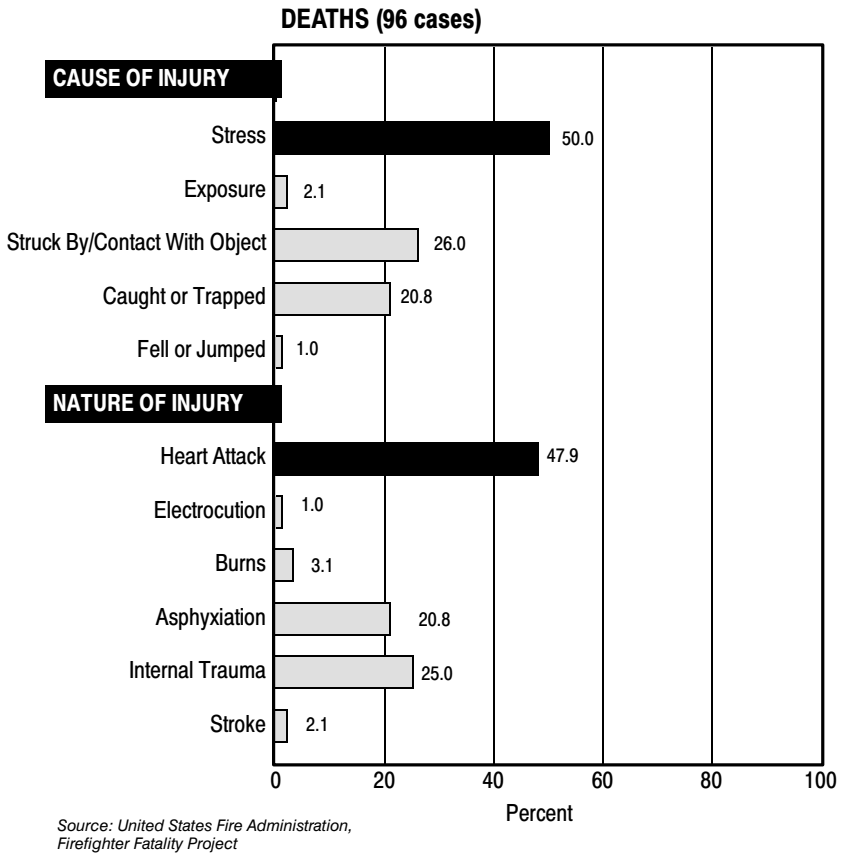


Figure 28. 1995 Firefighter Deaths by Cause and Nature of Injury

Two asphyxiation deaths were attributed to exposure. One of these was a firefighter who died after entering an oxygen-deficient atmosphere without an SCBA (self-contained breathing apparatus) or SABA (supplied air-breathing apparatus). The second death was a result of breathing a bad mixture of air from a SCUBA tank while engaged in a body recovery operation at a 200-foot depth.

One firefighter died when he fell and struck his head after returning from a fire incident.

Figure 28 also shows the distribution of the 96 deaths by the medical nature of the fatal injury or illness. Forty-six firefighters died of heart attacks in 1995, including at least 19 who were known to have high risk factors for heart attacks, including prior heart conditions, high blood pressure, obesity, or smoking.[8]

Internal trauma was the second leading nature of death, responsible for 24 deaths. This includes 17 firefighters who were involved in vehicle accidents and 4 in aircraft crashes. This category also includes two firefighters also were killed when they were struck by vehicles at emergency scenes, and one firefighter who died after being struck by a collapsing wall at a warehouse.

Asphyxiation was the third leading medical reason for firefighter deaths, responsible for 20 deaths. A total of 13 firefighter deaths resulted from carbon monoxide poisoning or inhalation of

[8] Autopsy results and medical records were not available for all of the heart attack victims.

smoke or superheated gases during structural firefighting. All of these deaths occurred when the firefighters were caught and trapped by rapidly spreading fires or structural collapses. (Seven of these deaths occurred in only two incidents.) Two firefighters died of asphyxiation in a stalled brush truck when they were overrun by a wildfire. Three firefighters drowned in fast moving flood waters, one while attempting a body recovery in a creek, one while conducting a search for occupants of a vehicle caught in rising flood waters, and one after successfully rescuing an occupant of a vehicle trapped in flood water. One rescuer died of asphyxiation during a body recovery in a quarry, and one industrial firefighter was asphyxiated when he attempted a rescue in an oxygen-deficient atmosphere without breathing apparatus.

Burn injuries claimed the lives of three firefighters. Two of these firefighters died of burns after being caught by a boilover at a oil refinery fire, and one died of burns after being caught in the basement of a tenement building when the floor collapsed beneath him.

A downed power line electrocuted one firefighter. One died of a stroke while en route to the station, and one died from seizure while on duty.

Age of Firefighters

Table 6 shows the distribution of firefighter deaths by age and nature and cause of death. Age information was available for 94 of the 96 fatalities. Younger firefighters were more likely to have died as a result of traumatic injuries from an apparatus accident or after becoming caught or trapped during firefighting operations. Stress was shown to play an increasing role in firefighter deaths as ages increased—all seven of the firefighters over 60 years old died of heart attacks. Trauma and asphyxiation were the primary natures of death among younger firefighters, and heart attacks were much more prevalent among older firefighters.

Table 6. Age of Firefighter at Time of Death by Cause and Nature in 1995

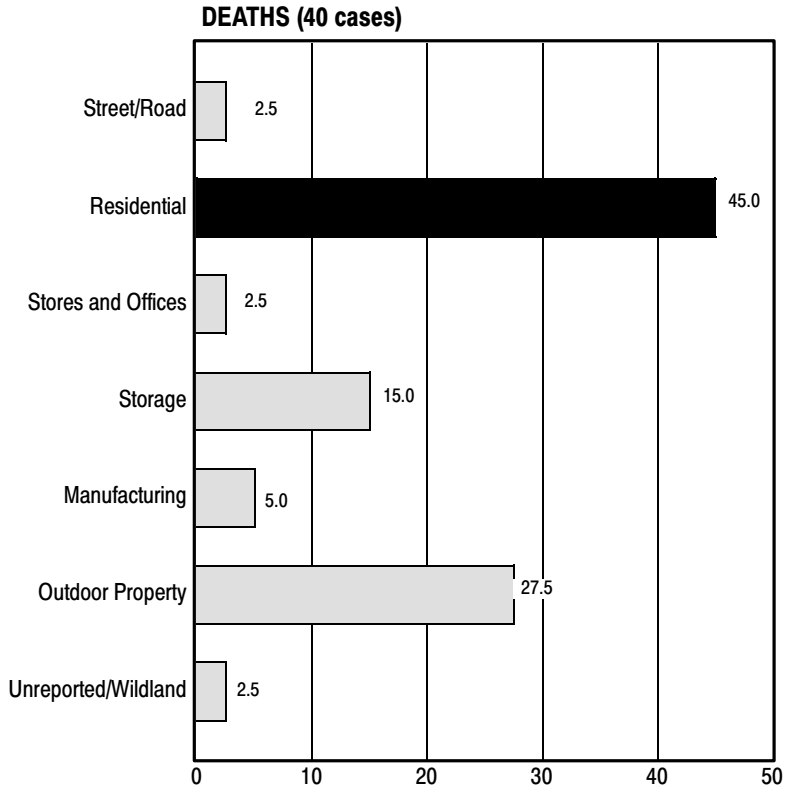
	Age										Total
	Under 21	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	Over 60	
Cause											
Stress	1	1	1	1	5	5	7	7	10	7	45
Exposure	0	0	0	0	1	0	0	1	0	0	2
Struck/Contact With Object	2	4	3	4	3	0	7	1	1	0	25
Caught/Trapped	2	1	2	7	2	5	1	0	1	0	21
Fell or Jumped	0	0	0	0	0	0	0	1	0	0	1
Nature											
Heart Attack	1	0	1	1	4	5	7	7	10	7	43
Electrocution	0	0	0	0	1	0	0	0	0	0	1
Burns	1	0	0	2	0	0	0	0	0	0	3
Asphyxiation	1	1	2	5	3	5	1	1	1	0	20
Internal Trauma	2	4	3	4	2	0	7	1	1	0	24
Stroke	0	1	0	0	1	0	0	1	0	0	3

Source: United States Fire Administration, Firefighter Fatality Project

Fireground Deaths

Fireground deaths decreased by a third from 1994 to 1995, primarily due to the decrease in wildland firefighting deaths.[9] There were 40 fireground deaths in 1995. Figure 29 shows the distribution of fireground deaths by fixed property use.

Residential occupancies accounted for the highest number of these fireground fatalities with 18 deaths (19 percent). This is consistent with most prior years. It is not that residential fires are necessarily more dangerous, but rather that they are more common. (Residential occupancies usually account for 70–80 percent of all structure fires and a similar percentage of the civilian fire deaths each year; 45 percent of the firefighter deaths in 1995 occurred in residential structures.)



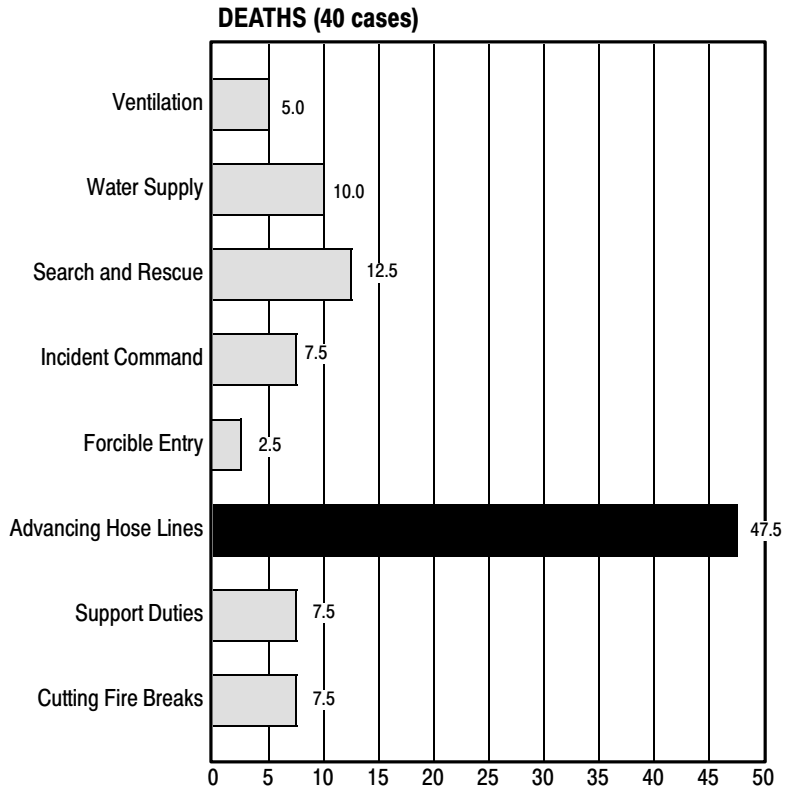
Source: United States Fire Administration, Firefighter Fatality Project

Figure 29. 1995 Firefighter Deaths on Fireground by Fixed Property Use

Outdoor properties accounted for 13 deaths. Two firefighters died at an oil refinery fire. Ten firefighters died while engaged in grass, brush or wildland firefighting in 1995, down from 22 in 1994. One chief was killed when he was struck by a passing car during an auto fire.

[9] The number of fireground fatalities would be approximately the same as 1994 if the 14 deaths at Storm King Mountain were not included in the 1994 statistics.

Figure 30 illustrates the activities the firefighters were engaged in at the time they sustained their fatal injuries or illnesses. There was a substantial increase this year compared to past years in the number of firefighters who died while engaged in traditional engine company duties of fire attack and advancing hose lines. Twenty-three firefighters died while performing these fireground operations, including nine who died from asphyxiation after becoming trapped by rapid fire spread or structural collapse while advancing hose lines. Eight other firefighters suffered heart attacks while performing similar functions. Two firefighters died while attacking an oil refinery fire in a foam crash truck. Four other firefighters suffered heart attacks while performing water supply operations on the fireground.



Source: United States Fire Administration, Firefighter Fatality Project

Figure 30. 1995 Firefighter Deaths on Fireground by Type of Activity

Traditional truck and ladder company duties accounted for nine deaths. Search and rescue operations in burning structures were in process when 5 deaths occurred, a drop from 14 search and rescue deaths in 1994. Analysis of these deaths reveals that four died of asphyxiation (all caught or trapped by rapidly spreading fires), one died of burns, three died of heart attacks, and one died while forcing entry to a building when a brick wall collapsed, crushing him.

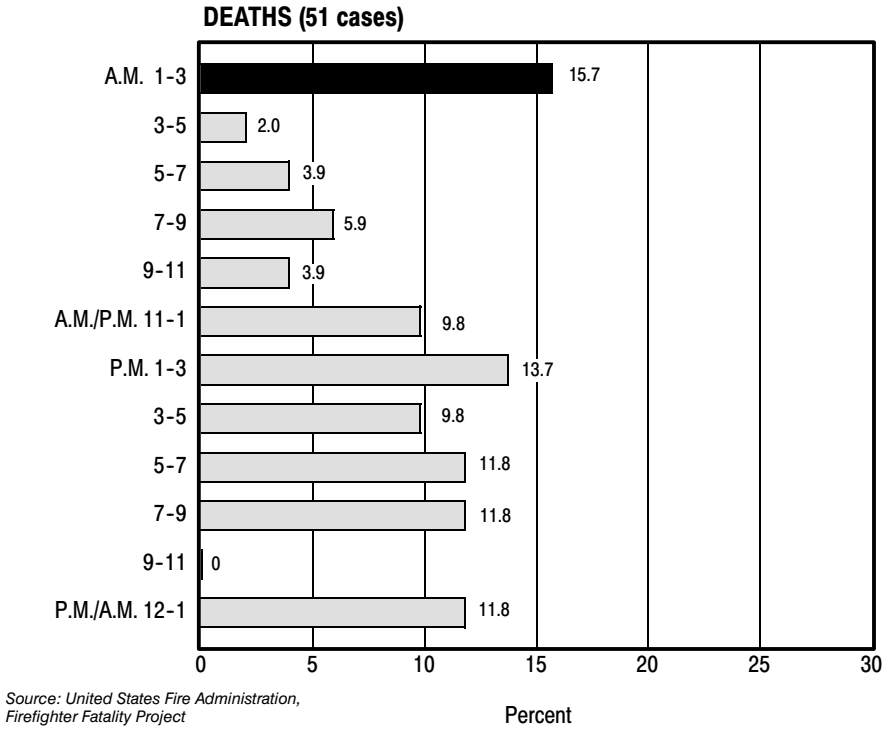
Three firefighters died of heart attacks while performing support functions or standing by on the fireground.

Cutting fire lines to contain grass, brush, and forest fires accounted for three firefighter fatalities. All three died as a result of heart attacks.

Two incident commanders suffered fatal heart attacks at fire incidents, and one was struck by a vehicle.

Time of Alarm

The distribution of 1995 fireground deaths according to the time of day when the incidents were reported is shown in Figure 31. The highest number of fireground deaths occurred for alarms that were received between 1:00 a.m. and 3:00 a.m. The second highest number was between 1:00 p.m. and 3:00 p.m. There were no fireground deaths between the hours of 9:00 p.m. and 11:00 p.m.



Source: United States Fire Administration, Firefighter Fatality Project

Figure 31. 1995 Firefighter Deaths by Time of Alarm

Month of the Year

Figure 32 illustrates firefighter fatalities by month of the year. Firefighter fatalities peaked in June and July. Other high months recorded were January and March. The late fall months into early winter (October, November, and December) were among the lowest months. (Conversely, the number of residential fires peaked during the winter and was lowest during June and July.)

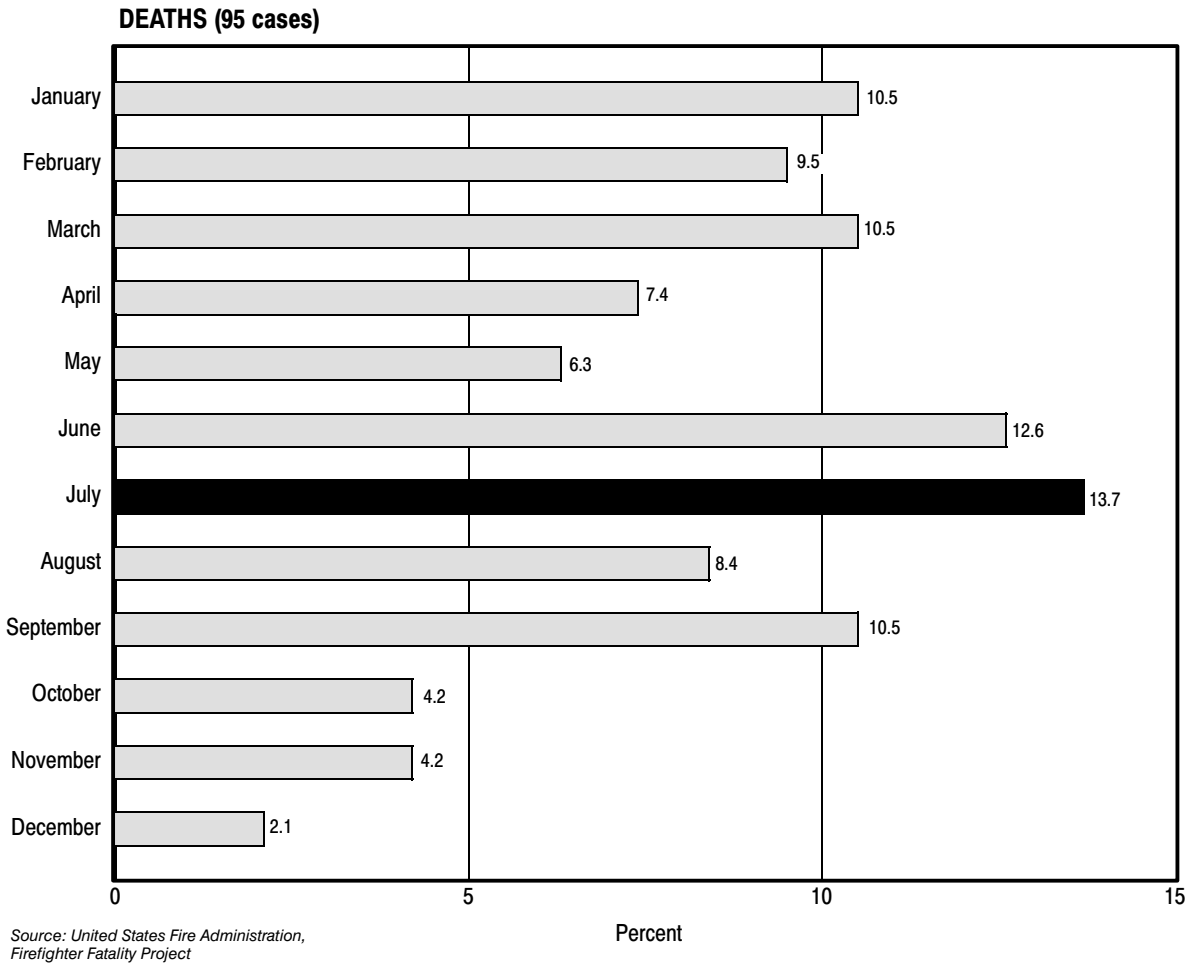


Figure 32. 1995 Firefighter Deaths by Month of Year

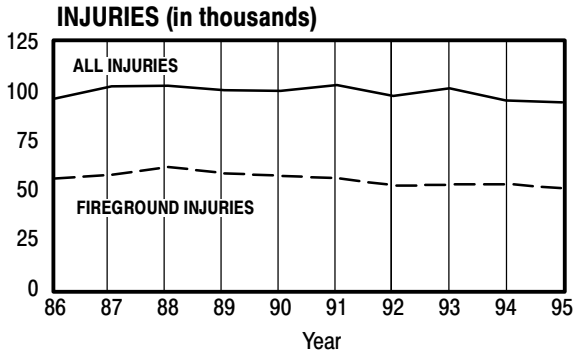
INJURIES

Fire-related injuries constitute about 54 percent of all firefighter injuries, and numbered about 51,000 in 1995.[10] As in previous years, in 1995 there were twice as many reported firefighter injuries as civilian injuries. Figure 33 shows the 13 percent downward trend in the fireground portion of these injuries.

Injuries by Property Type

The majority of firefighter injuries (58 percent) reported to NFIRS are associated with residential fires, largely because that is the largest single subcategory of structural fires (Figure 34).

[10] NFPA reports fireground injuries as 50,640. To this should be added a portion of the injuries categorized as responding to or from an incident (which includes but is not limited to fires).

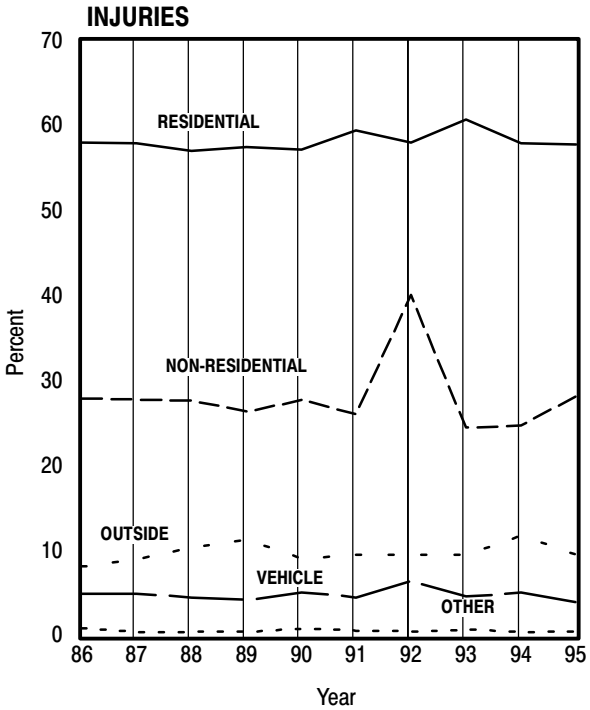


Source: NFPA Annual Surveys

	All Injuries	Fireground
1986	96.5	56.0
1987	102.6	57.8
1988	102.9	61.8
1989	100.7	58.3
1990	100.3	57.1
1991	103.3	55.8
1992	97.7	52.3
1993	101.5	52.9
1994	95.4	52.9
1995	94.5	50.6

10-Year All Injuries Trend = –4.3%
10-Year Fireground Injuries Trend = –13.4%

Figure 33. Trends in Firefighter Injuries



Source: NFIRS

	Residential	Non-Residential	Vehicle	Outside	Other
1986	58.0%	27.9%	4.9%	8.2%	0.9%
1987	57.9	27.7	4.9	9.0	0.4
1988	57.0	27.6	4.5	10.4	0.5
1989	57.5	26.4	4.2	11.3	0.5
1990	57.2	27.7	5.1	9.1	0.9
1991	59.4	26.0	4.5	9.5	0.6
1992	58.0	40.1	6.4	9.5	0.5
1993	60.7	24.5	4.6	9.5	0.7
1994	57.9	24.7	5.1	11.8	0.5
1995	57.8	28.2	3.9	9.5	0.6

Figure 34. Trends in Firefighter Injuries by General Property Type

Residential fires have double the number of firefighter injuries as do non-residential structures (28 percent). The proportions have been quite consistent over the 10-year period 1986–1995. Outside, vehicle, and other fires combined are 14 percent of firefighter injuries.

Figure 35 gives a more detailed look at the relative proportion of firefighter injuries by property type. Nearly half of all firefighter injuries occur in structures at one- and two-family dwelling fires. Apartments account for another 19 percent.

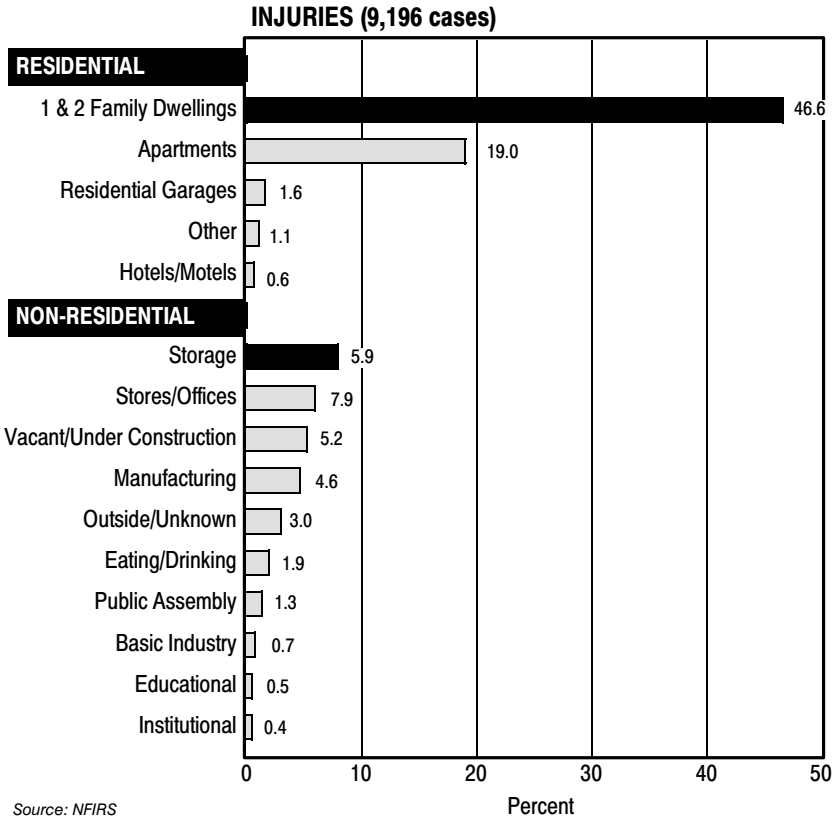


Figure 35. 1995 Firefighter Injuries by Property Type (Structure Fires Only)

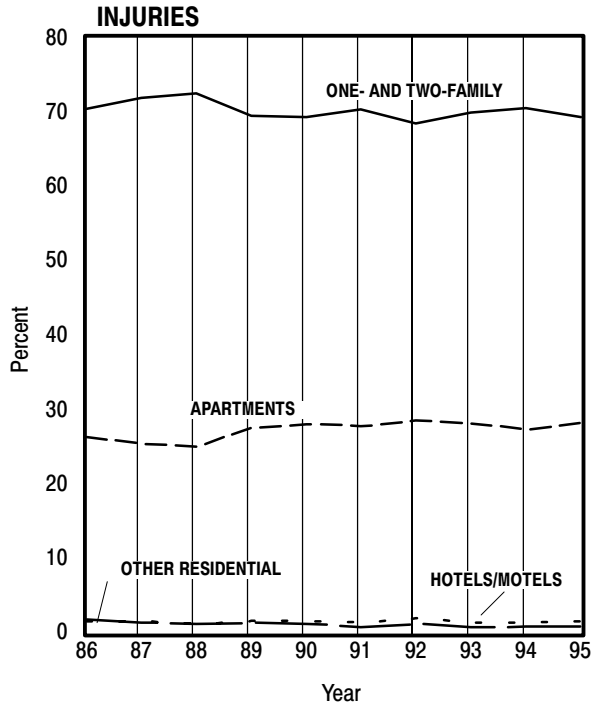
The proportions of injuries by property type were consistent over 1986–1995. Figures 36 and 37 show these proportions for residential and non-residential properties.

Injuries per Fire

Firefighter injuries per fire have been gradually trending downward.[11] The injury rates for structural fires are over ten times those for outside, vehicle, and other fires (Figure 38).

Figure 39 shows that the firefighter injuries per fire for apartments and one- and two-family homes fires declined slightly over the 10-year period. The injury rate for hotel/motel fires and other residential is down sharply, but both of these categories fluctuate considerably from year to year because of small sample sizes.

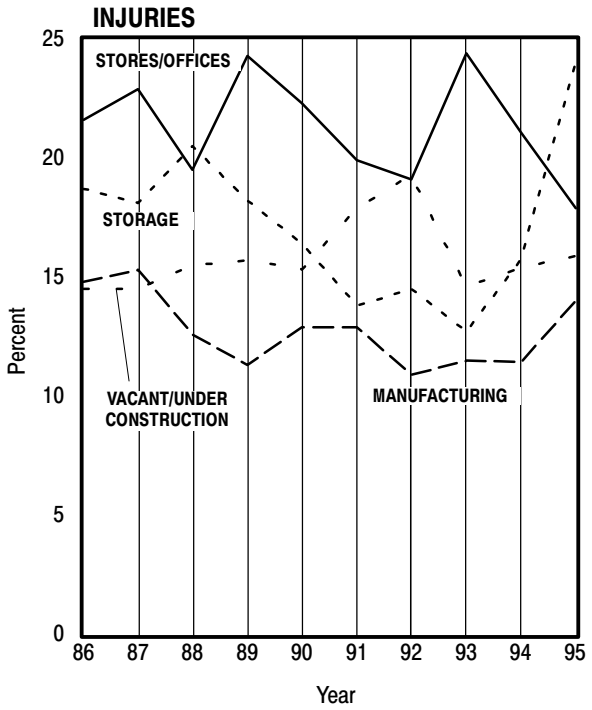
[11] The 1986–1995 NFPA *Fire Command* and NFPA *Journal* articles on firefighter injuries show a downward trend in injuries; however, little change was noted in the injury rate over the 10-year period 1986–1995. The NFPA firefighter injury rate averaged 26.3 injuries per 1,000 fires during this period—twice that of the NFIRS data.



Source: NFIRS

	One- and Two-Family	Apartments	Hotels/Motels	Other Residential
1986	70.4%	26.3%	1.8%	1.5%
1987	71.9	25.3	1.3	1.5
1988	72.5	25.0	1.2	1.2
1989	69.5	27.6	1.3	1.6
1990	69.3	28.0	1.2	1.5
1991	70.3	27.7	0.7	1.3
1992	68.4	28.5	1.2	1.9
1993	69.9	28.1	0.7	1.3
1994	70.5	27.3	0.8	1.4
1995	69.3	28.3	0.8	1.6

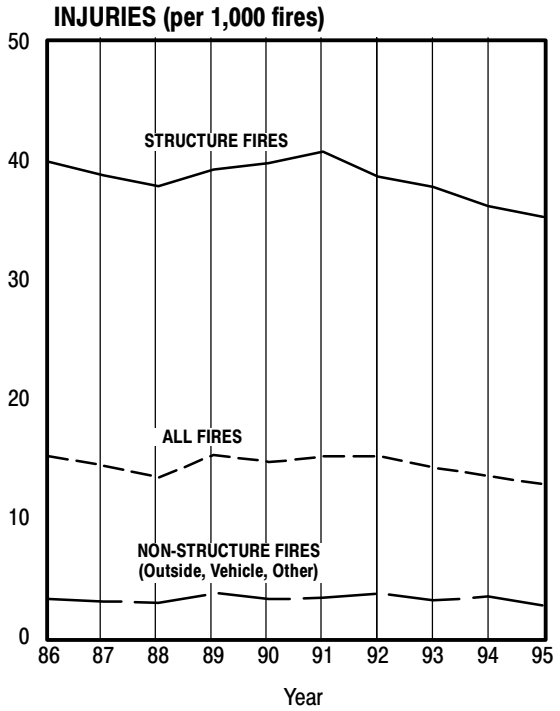
Figure 36. Trends in Firefighter Injuries in Residential Structure Fires



Type	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Percent of Injuries in Fires										
Public Assembly	4.9	6.0	4.5	5.0	5.4	5.3	4.6	4.0	3.7	3.8
Eating, Drinking	7.5	5.6	6.3	5.8	7.6	5.5	7.4	5.5	6.0	5.7
Educational	3.3	2.3	2.5	3.3	3.3	2.4	3.6	2.2	2.6	1.7
Institutions	2.1	2.5	2.1	1.5	2.1	3.0	2.8	2.7	3.1	1.1
Stores, Offices	21.6	22.9	19.5	24.3	22.3	19.9	19.1	24.4	21.1	17.9
Basic Industry	3.0	1.0	2.4	4.1	3.0	2.8	2.8	2.2	3.5	2.1
Manufacturing	14.8	15.3	12.6	11.3	12.9	12.9	10.9	11.5	11.4	14.0
Residential Garage	5.4	5.3	6.8	5.3	4.9	8.6	6.6	7.3	7.7	4.8
Storage	18.7	18.1	20.5	18.2	16.4	13.8	14.5	12.7	15.7	24.0
Vacant, Construction	14.5	14.5	15.5	15.7	15.3	17.9	19.3	14.6	15.4	15.9
Outside Structure, Unknown	4.3	6.4	7.4	5.6	6.8	7.8	9.4	12.8	9.7	9.0

Sources: NFIRS and NFPA Annual Surveys

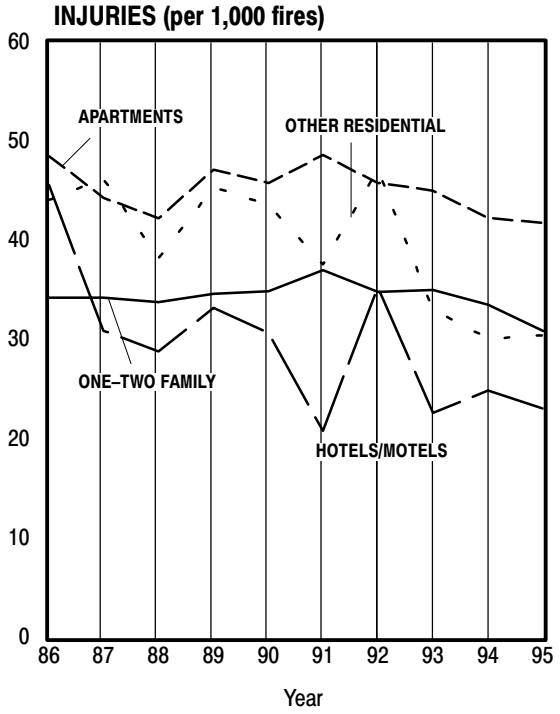
Figure 37. Trends in Firefighter Injuries by Type of Non-Residential Structure Fires



Source: NFIRS

Injuries per 1,000 Fires			
	Structure Fires	All Fires	Non-Structure Fires
1986	39.9	15.2	3.2
1987	38.8	14.4	3.0
1988	37.9	13.4	2.9
1989	39.3	15.3	3.7
1990	39.8	14.7	3.2
1991	40.8	15.2	3.3
1992	38.7	15.2	3.7
1993	37.8	14.2	3.1
1994	36.2	13.5	3.4
1995	35.3	12.8	2.6

Figure 38. Trends in Severity of Firefighter Injuries by Type of Fire



Source: NFIRS

Injuries per 1,000 Fires				
	One–Two Family	Apartments	Hotels/Motels	Other Residential
1986	34.2	48.5	45.6	44.1
1987	34.2	44.3	30.9	46.2
1988	33.8	42.2	28.8	38.2
1989	34.6	47.1	33.2	45.3
1990	34.9	45.8	30.7	43.6
1991	37.0	48.6	20.8	37.6
1992	34.8	45.8	35.3	47.1
1993	35.0	45.0	22.6	33.0
1994	33.5	42.2	24.9	30.1
1995	30.9	41.7	23.0	30.5

Figure 39. Trends in Severity of Firefighter Injuries in Residential Structure Fires

Figure 40 shows the firefighter injury rates per 1,000 fires for structural occupancies. Several types of non-residential properties, especially manufacturing, storage, vacant/under construction, and stores/offices pose the greatest risk in 1995. Residential properties pose less risk per fire than these non-residential properties.

Vacant properties have long been a firefighting concern (Figure 41). In the mid 1970s, the most dangerous fires were those in vacant properties and properties under construction. The layout of these structures is often unfamiliar and continually changing from week to week. Fire defenses built into such structures are often not working or only working partially. Also, there are many pitfalls where a misstep can cause serious injury. Many of these fires are started when no one is around and the fire gets considerable headway before the fire department is called. This combination continues to make these properties hazardous, and in 1995 they ranked third behind manufacturing and storage. When fighting fires in vacant properties, there is less of an inclination to risk firefighters' lives.

For non-residential properties in general, the injury rate per fire fluctuates widely from year to year, but the four highest risk properties (storage, manufacturing, vacant/construction, and stores) are all trending downward—a promising pattern for firefighter fireground safety.

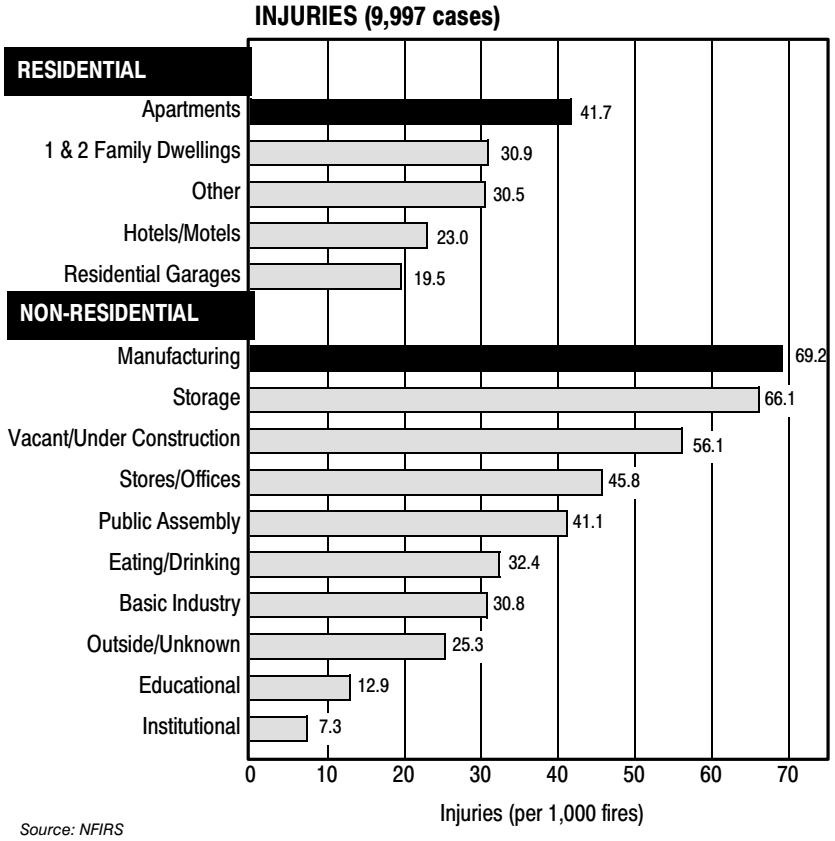
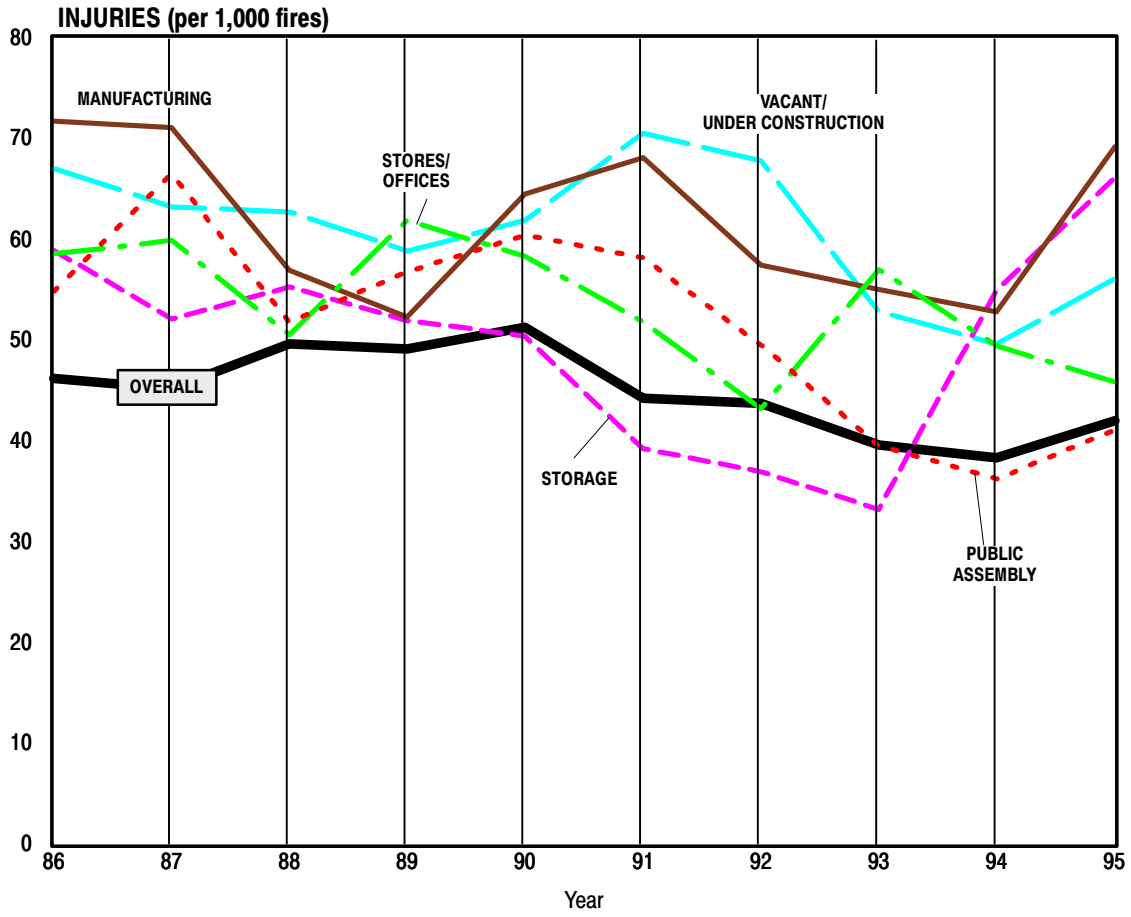


Figure 40. Severity of 1995 Firefighter Injuries by Property Type (Structure Fires Only)



Type	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Number of Injuries Per 1,000 Fires										
Public Assembly	54.8	66.5	51.8	56.8	60.4	58.1	49.5	39.5	36.2	41.1
Eating, Drinking	47.0	33.9	39.1	36.2	46.7	34.1	43.4	29.8	32.6	32.4
Educational	34.2	24.8	26.0	33.8	34.3	22.5	38.8	16.6	19.5	12.9
Institutions	13.0	14.6	12.4	8.8	12.7	18.6	17.2	15.0	18.1	7.3
Stores, Offices	58.6	59.9	50.5	61.9	58.3	51.8	43.2	57.0	49.4	45.8
Basic Industry	52.7	16.4	36.9	60.7	50.0	42.6	43.3	34.0	48.3	30.8
Manufacturing	71.7	71.1	56.9	52.3	64.5	68.1	57.4	55.0	52.8	69.2
Storage	58.9	52.1	55.3	51.9	50.4	39.2	36.9	33.2	54.9	66.1
Vacant, Construction	67.0	63.2	62.7	58.8	61.9	70.5	67.8	52.8	49.6	56.1
Outside Structure, Unknown	17.2	31.0	33.9	25.0	30.8	28.7	29.3	37.5	29.3	25.3
Average	46.2	45.2	49.6	49.1	51.3	44.2	43.7	39.6	38.3	38.7

Sources: NFIRS and NFPA Annual Surveys

Figure 41. Trends in Severity of Firefighter Injuries in Non-Residential Structure Fires

Characteristics of Injuries

AGE. Figure 42 shows the profile of firefighter injuries by age for all property types. One-third of all injuries occur to firefighters aged 30–39. The types of injuries incurred by firefighters vary with age. Typically, the leading cause of injury among younger firefighters relates to smoke inhalation and for older firefighter it is strains and sprains. These results relate to physical fitness variations with age, to the effect of age on assignments, and perhaps to the bravado of younger firefighters.

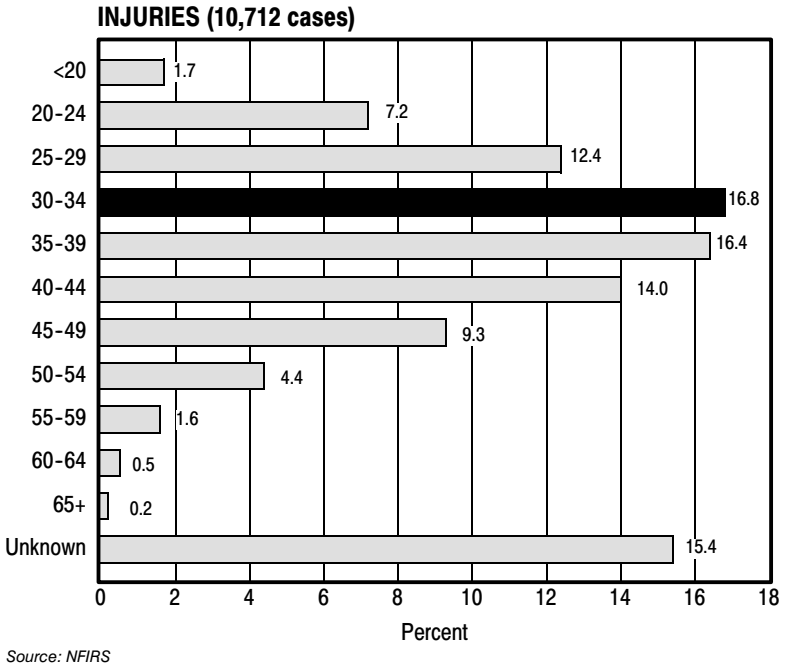


Figure 42. 1995 Firefighter Injuries by Age

TIME OF DAY. More firefighter injuries occur after noon than before. However, there is no sharp peak. The times that are most hazardous to civilians (evening meal times for injuries) are not the same as the times firefighters get injured (Figure 43).

MONTH OF YEAR. Firefighter injuries are somewhat higher in the winter (December–March) when residential fires peak and again in June–August when fire incidence peaks and the warmer weather intensifies the stress effects of firefighting (Figure 44).

PART OF BODY INJURED. The most common firefighter injuries in 1995 were to the torso (trunk), followed closely by arm/hand and leg/foot. All areas of the body are vulnerable, including internal injuries from smoke inhalation. The firefighter must protect his or her entire body with a complete protective outfit and be in good physical condition (Figure 45).

CAUSE OF INJURY. As shown in Figure 46, by far the largest category of firefighter injuries associated with fires was reported to be contact with or exposure to the flames or to smoke

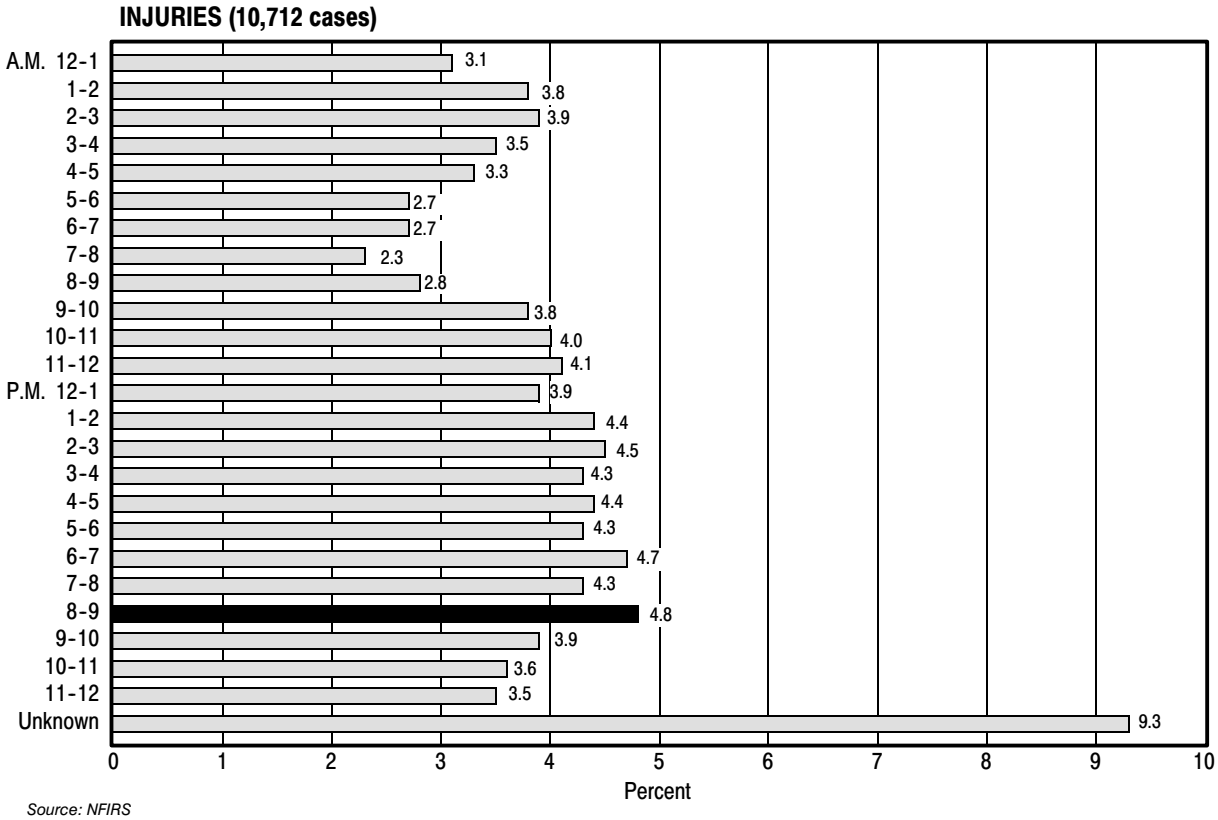


Figure 43. 1995 Firefighter Injuries by Time of Day

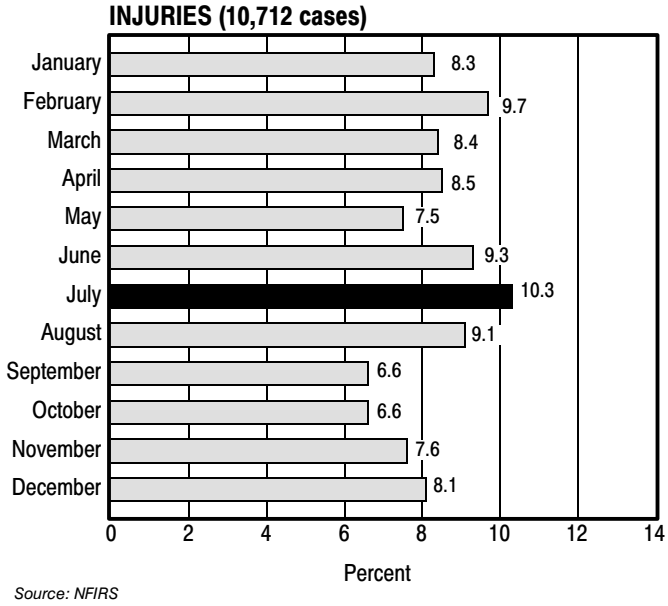


Figure 44. 1995 Firefighter Injuries by Month of Year

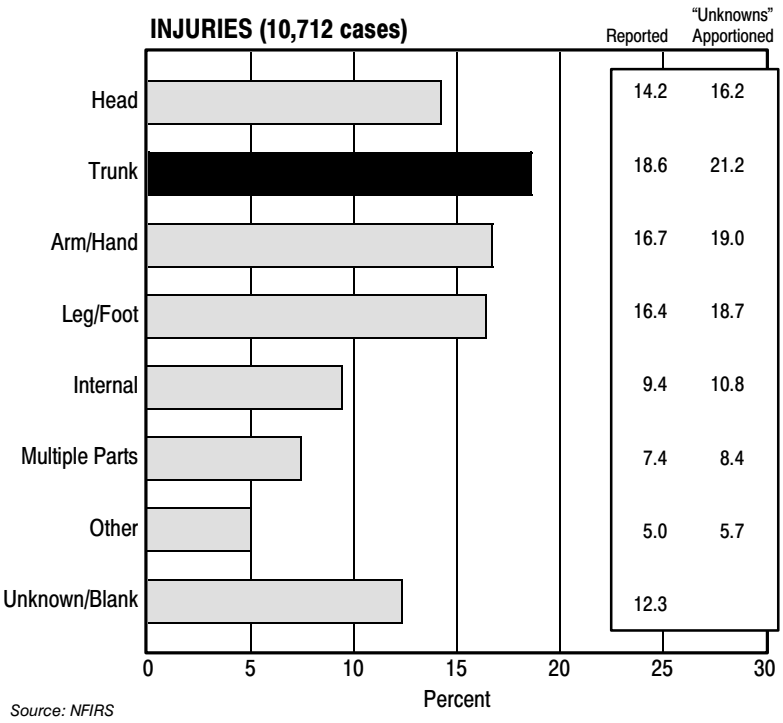


Figure 45. 1995 Firefighter Injuries by Part of Body Injured

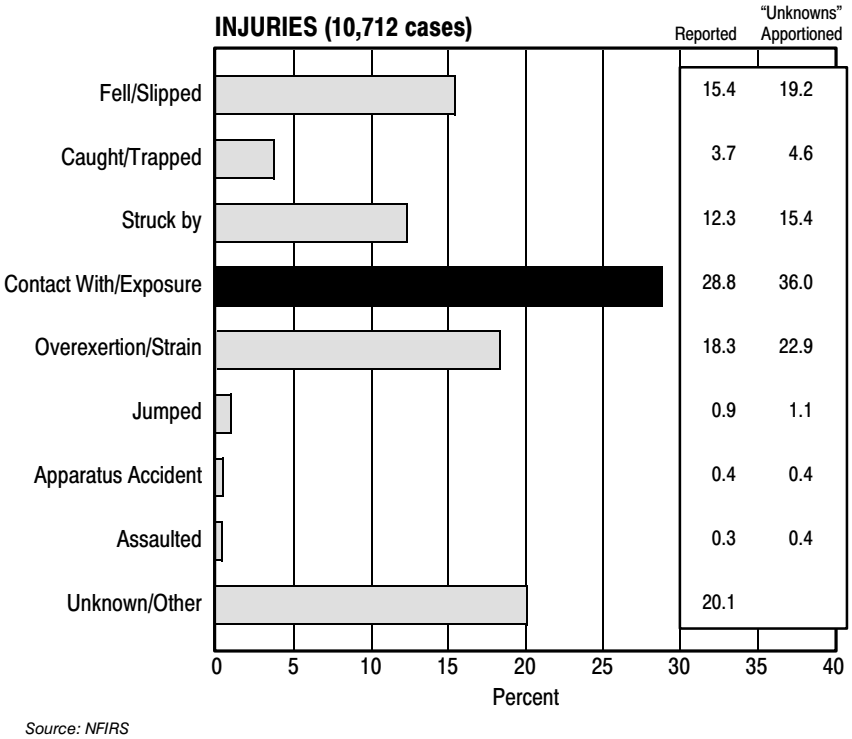


Figure 46. 1995 Firefighter Injuries by Cause

(36 percent of injuries, adjusted). The second highest category was overexertion and strains (23 per-

cent), followed closely by fell or slipped (19 percent). No cause was reported for 20 percent of the injuries.

WHERE INJURIES OCCUR. According to NFIRS, 91 percent of the firefighter injuries associated with reported fires occur on the scene above ground (Figure 47). This percentage is nearly equally divided between injuries occurring inside and outside the structure. Significantly smaller percentages are reported as occurring en route or below ground level. (As a reminder, there also are many firefighter injuries that are not associated with fires and that are not included here.) More than one-quarter of injuries did not have a reported location.

The striking point here is that many firefighter injuries (47 percent) occur in areas outside the fire building, where the firefighter might feel relatively safe. There often are more firefighters operating outside the fire building and exposed to injury than there are inside. Outside fires include vehicle fires, which contribute to this high incidence of injuries.

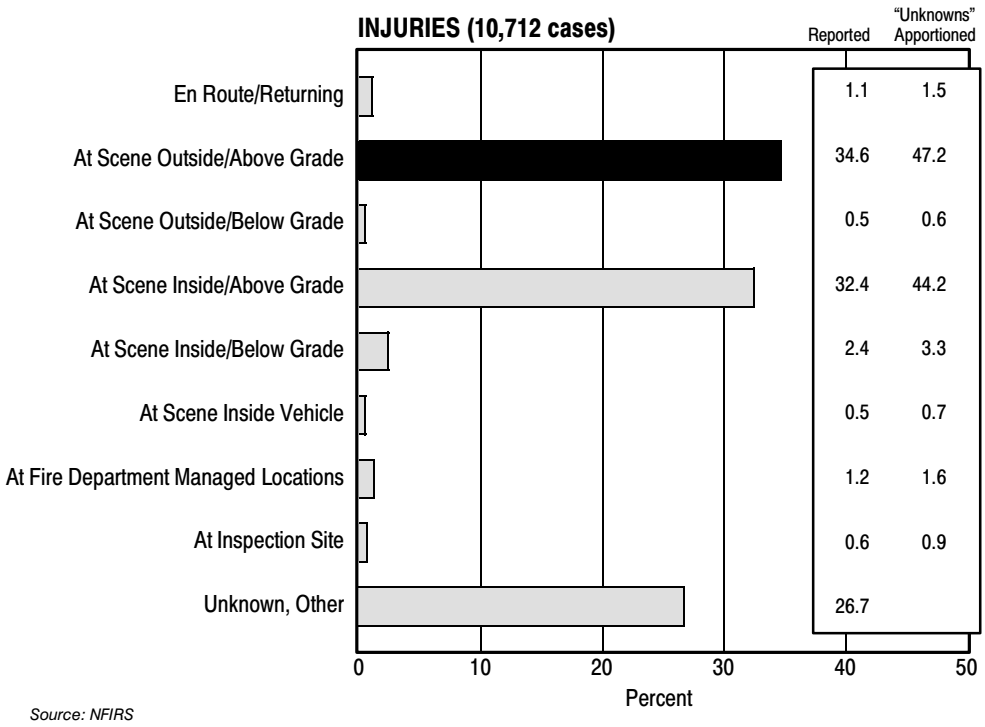


Figure 47. 1995 Firefighter Injuries (All Fires) by Where Injury Occurs

TYPE OF ACTIVITY WHEN INJURED. More than half of firefighter injuries occurred while extinguishing the fire; suppression support accounted for 24 percent (Figure 48).

NATURE OF INJURY. Unlike firefighter fatalities, asphyxiation, heart attacks, and internal trauma combined account for less than 10 percent of firefighter injuries (Figure 49). (Internal trauma is included in the "other" category.) These same categories accounted for more than 90

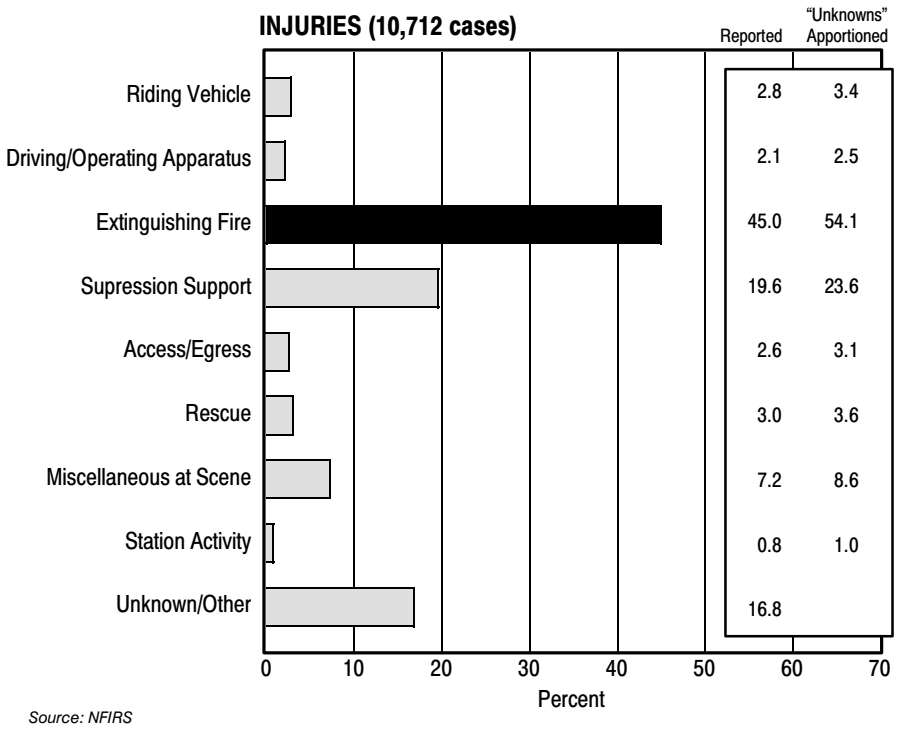


Figure 48. 1995 Firefighter Injuries by Type of Activity

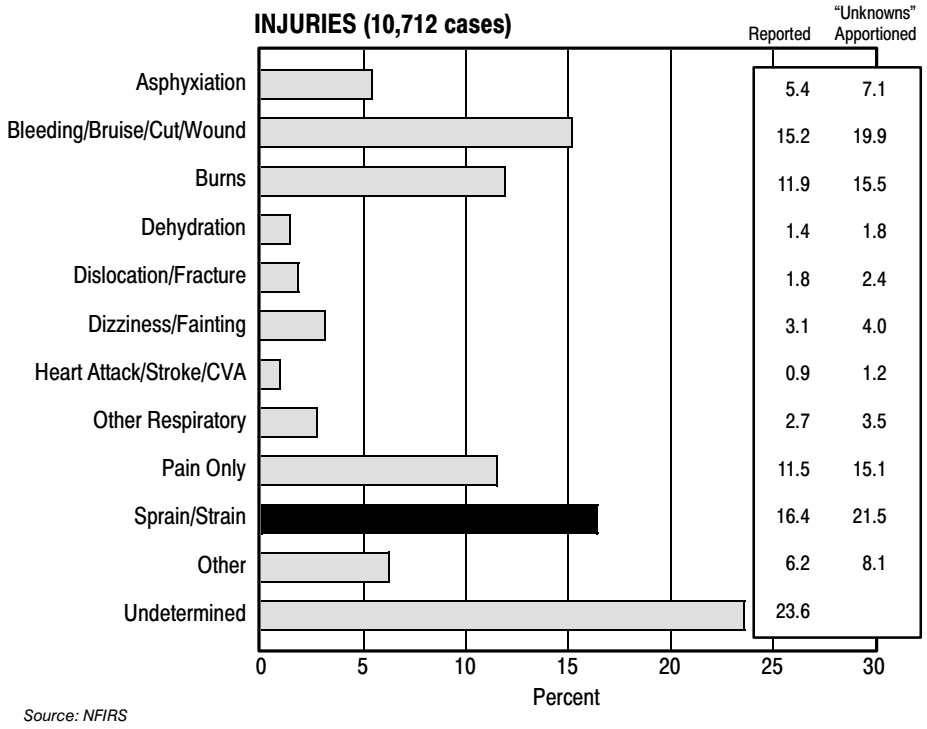


Figure 49. 1995 Firefighter Injuries by Nature of Injury

percent of firefighter fatalities. Cuts and wounds and sprains and strains accounted for 40 percent of injuries. Burns and pain combined accounted for an additional 30 percent.

TYPE OF MEDICAL CARE. Over half of the reported fire injuries associated with fires were treated at hospitals. Another 45 percent were treated but not transported. A small percentage (less than 5 percent) of firefighters were treated elsewhere (Figure 50).

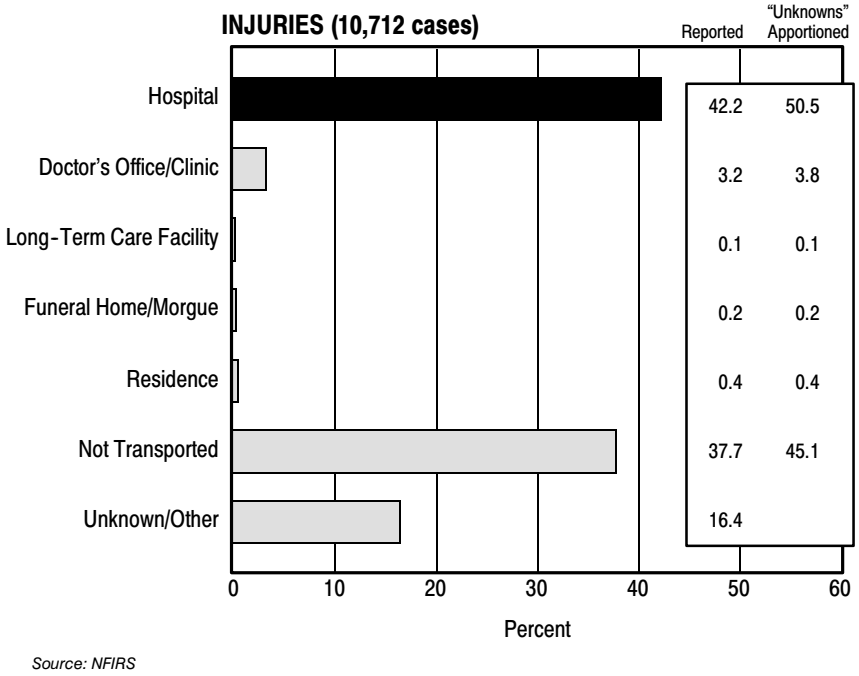


Figure 50. 1995 Firefighter Injuries (Fire Incidents) by Where Treated

USFA RESOURCES ON FIREFIGHTER CASUALTIES

Publications

The U.S. Fire Administration recently revised its NFIRS Firefighter Casualty Report to improve the quality of available data in its annual review of firefighter line-of-duty deaths. The 1995 report of the Firefighter Fatality Project, *Firefighter Fatalities in the United States in 1995*, describes in detail the data collected on the line-of-duty firefighter deaths. This and other USFA-supported research and development are intended to increase the safety and well-being of emergency response personnel. USFA encourages sharing of research findings and incorporation of innovations in equipment available to firefighters and other responders through programs that focus on health and safety studies; research, training and awareness; emergency medical services; search and rescue; and equipment and technology development.

Because accidents involving emergency vehicles are one of the leading causes of firefighter death and injury, USFA has several resources on the subject for fire departments and emergency medical services departments. *Emergency Vehicle Driver Training* (#FA–110) is a 220-page training package that includes both an instructor manual and a student workbook designed to assist fire and emergency medical service (EMS) departments with training in emergency vehicle operations. *Alive on Arrival—Tips of Safe Emergency Vehicle Operations* (#L–195) is a pamphlet detailing actions that emergency vehicle operators, passengers, and officers-in-charge can do to improve safe operation of emergency vehicles.

Also available is a 48-page special report titled *Fire Apparatus/Train Collision* (#FA–104), which presents the investigation of the collision near Catlett, Virginia, on September 28, 1989.

Publications addressing incident response issues have been developed for fire and EMS departments. Among these are *Emergency Incident Rehabilitation* (#FA–114), a short booklet that includes a sample standard operating procedure and guidelines for establishing a rehab area to reduce heat- or cold-related injuries to emergency response personnel operating in labor-intensive or extreme climate conditions.

Guides are also available on recommended safe practices, including response to crashes involving cars equipped with air bags and on a comprehensive safety program designed for fire department safety officers.

USFA also emphasizes research and development of protective clothing for chemical, emergency medical, and search-and-rescue emergencies as well as structural firefighting protective clothing and self-contained breathing apparatus (SCBA). For example, USFA has been involved in the development of a new test method for evaluating the performance of complete firefighter protective clothing ensembles. A suite integrity field test was conducted during hazardous materials training for USFA's study, *Qualitatively Evaluating the Comfort, Fit, Function, and Integrity of Chemical Protective Suite Ensembles* (#FA–107). Three protective clothing ensembles were evaluated in *Physiological Field Evaluation of Hazardous Materials Protective Ensembles* (#FA–109). Another study, the *Non-Destructive Testing and Field Evaluation of Chemical Protective Clothing* (#FA–1060), details a procedure, field tested by the Cambridge, Massachusetts, Fire Department, developed for assessing the presence of contamination before or after decontamination of chemical protective clothing.

USFA has supported research into health hazards faced by firefighters, including the *Northwest Firefighters Mortality Study: 1945–1989* (#FA–105). USFA also supports symposia on the occupational health and hazards of the fire service focusing on emerging firefighter safety and health issues.

A manual has been prepared for emergency response managers on infection control programs based on federal laws, regulations, and standards. The *Guide to Developing and Managing an Emergency Service Infection Control Program* (#FA–112) addresses modes of disease transmission, measures for prevention, incident response and recovery, station issues, and training/role modeling. The 200-page manual provides a step-by-step approach to designing, implementing, managing, and

evaluating a fire or emergency medical services department infection control program. The guide also is a key resource in a National Fire Academy course on infection control.

USFA has developed a series of comprehensive manuals for fire service and EMS managers interested in instituting programs for firefighter health promotion and injury prevention. The 80-page *Fire and Emergency Service Hearing Conservation Program Manual* outlines measures to reduce the risk of occupationally induced hearing loss. USFA also is conducting research to identify causes and to develop solutions to reduce the stress level in EMS providers. A 175-page *Stress Management Model Program* (#FA–100) is available.

USFA has also studied major urban search-and-rescue incidents for lessons learned regarding safety of firefighting, EMS, and other rescue personnel. Six reports published in November 1992 describe *Urban Search and Rescue: in Will County, Illinois, Following the 1990 Tornado* (#FA–122); *in Crested Butte, Colorado State Bank, Following an Explosion Collapse* (#FA–120); *in New York City, Following a Commercial Building Collapse* (#FA–121); *in Brownsville, Texas, Following a Commercial Building Collapse* (#FA–123); *in the Santa Cruz Area, Following the Loma Prieta Earthquake* (#FA–124); and *in San Bernadino, California, Following a Major Train Derailment in a Residential Neighborhood* (#FA–125).

Reports produced under USFA's Major Fires Investigations series are directed primarily to chief fire officers, training officers, fire marshals, and investigators as a resource for training and prevention. Recent reports on incidents with firefighter deaths and injuries include: *Four Firefighters Killed, Trapped by Floor Collapse, Brackenridge, Pennsylvania, December 20, 1991* (#061); *Indianapolis Athletic Club Fire (Two Firefighter Fatalities), Indianapolis, Indiana, February 6, 1991* (#063); *Six Firefighter Fatalities in Construction Site Explosion, Kansas City, Missouri, November 1988* (#024); *Three Firefighter Fatalities in Training Exercise, Milford, Michigan, October 1987* (#015); *High-Rise Office Building Fire, One Meridian Plaza, Philadelphia, Pennsylvania, February 1991* (#049); and *Wood Truss Roof Collapse Claims Two Firefighters, Memphis, Tennessee, January 1993* (#069). The report on *Michigan—Industrial Plastics Fire Sends 97 to Hospital, Flint, Michigan, November 1988* (#025) credits the successful outcome of this fire to the incident command system used, including a strict requirement for SCBA use and rotation of personnel.

These publications are available by writing to:

U.S. Fire Administration
Federal Emergency Management Agency
Publications Center, Room N310
16825 S. Seton Avenue
Emmitsburg, MD 21727

Documents may also be ordered via the World Wide Web: http://www.usfa.fema.gov. USFA publications are free.

Video Training

FEMA's Emergency Education NETwork (EENET) provides video training and education via satellite for the fire service and emergency management community. EENET programs are satellite-distributed videoconferences broadcast over the "C" band and allow for audience interaction when originally broadcast. Each program is designed as a standalone training activity of 4½ hours, and student materials are provided for each workshop.

Several previous EENET programs dealing with firefighter health and safety include the following:

- *U.S. Fire Administration's Forum on Communicable Diseases,* May 17, 1989
- *Heat Stress Induced by Chemical Protective Clothing,* July 19, 1989
- *Protective Actions for Hazardous Materials,* October 4, 1989
- *Infection Control: Today's Requirements for Fire and EMS Departments,* December 4, 1991
- *Chemical Protective Clothing Standards: An Overview of NFPA 1991, 1992 & 1993,* June 24, 1992
- *Protective Clothing for Emergency Medical Operations: An Overview of NFPA 1999,* August 19, 1992

Tapes of these and other broadcasts from 1989 to the present are available for a modest cost through:

The National Audiovisual Center
Customer Service Section
8700 Edgeworth Drive
Capitol Heights, MD 20743–3701
(301) 763–1896; (800) 788–6282 for credit card orders

In addition, all broadcasts prior to 1989 and all current broadcasts may be borrowed from state emergency management offices or from FEMA regional offices.

For further information on EENET or if you would like to get on the EENET mailing list, contact:

Emergency Education NETwork
National Emergency Training Center
16825 S. Seton Avenue
Emmitsburg, MD 21727
(301) 447–1068; Fax: (301) 447–1363

National Fire Academy Courses

USFA's National Fire Academy (NFA) works to enhance the ability of the fire service and allied professions to deal more effectively with fire and related emergencies. Courses are delivered on campus at the resident facility in Emmitsburg, Maryland, and off campus throughout the nation in cooperation with state and local fire training officials and local colleges and universities. A new initiative begun in 1992 offers NFA resident courses on a regional basis. Expanded opportunities are available for fire service personnel to participate in academy courses that are handed off through NFA's train-the-trainer program. Academy handoff courses are also available through the National Audiovisual Center.

While firefighter health and safety issues are addressed in numerous NFA courses, several offerings include these issues as a major thrust. NFA's course on *Command and Control of Fire Department Major Operations* (Resident Course #R304) is a 2-week on-campus course for fireground managers that links the subjects of fireground operations and safety. Emphasis is placed on increasing the command officer's awareness regarding the causes of firefighter fatalities and types and kinds of injuries.

Protective clothing and breathing apparatus are among the topics covered in NFA's course on *Hazardous Materials Operating Site Practices* (Resident Course #R229), which focuses on the strategies and safe procedures for alleviating the danger of a hazardous materials accident.

Firefighter safety is also an emphasis in NFA's *Volunteer Incentive Program*, a series of on-campus courses designed specifically for volunteer fire officers.

An off-campus course addressing firefighter health and safety issues is *Firefighter Safety and Survival: The Company Officer's Responsibility (FSCO)*. This course examines significant areas of firefighter fatalities and injuries associated with emergency and non-emergency situations and provides recommended solutions and implementation methods. Another off-campus offering is *Firefighter Health and Safety: Program Implementation and Management (FHSP)*, which focuses on the design and implementation of a departmental safety program. *Infection Control for Emergency Response Personnel: The Supervisor's Role and Responsibilities (ICERP)* is a 2-day course covering a broad range of infection control issues.

For information about course offerings, eligibility, and application procedures, write to:

The National Fire Academy
U.S. Fire Administration
16825 S. Seton Avenue
Emmitsburg, MD 21727

National Fire Academy off-campus course materials are available for purchase for locally sponsored delivery from the National Audiovisual Center. Current academy off-campus courses, consisting of an instructor guide, student manual, and supporting audiovisual aids, are also available. Courses available for purchase include *Firefighter Safety and Survival: The Company Officers*

Responsibility (1988), *Firefighter Health and Safety: Program Implementation and Management (1988)*, and *Infection Control for Emergency Response Personnel: The Supervisors Role and Responsibilities (1993)*. For information on how to order courses, contact the National Audiovisual Center at the address and phone number listed earlier.

5

SPECIAL TOPICS

In each edition of *Fire in the United States,* several topics of special interest, particularly as it relates to the severity of the fire problem, are examined in detail. The ninth edition (1985–1994) presented four special topics: (1) the fire problem of the United States compared to that of 13 industrial nations; (2) an analysis of the arson problem; (3) an investigation of wildland fires, which have become an important and visible problem with the rapid expansion of the urban population to rural areas; and (4) aggregating the hidden cost of fires with known costs in order to better understand the magnitude of the fire problem.

This edition presents two new topics. First, an overview of the uses of NFIRS is presented—its history, how it works, and who uses it. Second, socioeconomic factors and the incidence of fire are examined through a review of building stock characteristics and human factors that are related to increased incidences of fires and their resulting deaths, injuries, and dollar losses.

USES OF NFIRS[1]

The National Fire Incident Reporting System (NFIRS) is an information system initiated and supported by the U.S. Fire Administration. The U.S. Fire Administration developed NFIRS as a means of assessing the nature and scope of the fire problem in America. The system first came on line in 1975, and has since grown in both participation and use. Organizations that use this rich information source include:

- Agencies within the fire service itself, such as local fire departments, State Fire Marshal's offices, and the U.S. Fire Administration.
- Other agencies of the federal government, such as the Consumer Product Safety Commission, the National Highway Traffic Safety Administration, and the National Institute of Standards and Technology.
- Private industry organizations, including national associations for home appliance product manufacturers, hotel and motel industry, insurance companies, attorneys, and many others.

[1] This section summarizes a report published by the U.S. Fire Administration. The report is available in hard copy or online from the U.S. Fire Administration Web site at http://www/usfa.gov/pdf/nfirsuse.pdf.

How NFIRS Works

NFIRS is jointly managed by the U.S. Fire Administration (USFA) and the National Fire Information Council (NFIC). NFIC is a users' group comprised of volunteers who donate their time to maintain the existing system and research and implement changes to improve it.

As critical a role as the members of NFIC play, the heart of the system is dispersed across the country, in the 13,000 fire departments that participate in NFIRS. After responding to an incident, fire department personnel fill out the appropriate NFIRS reports describing the nature of the call, the actions firefighters took in response to the call, and the end results. The latter include the number of any civilian or firefighter injuries or deaths and an estimate of property loss.

NFIRS data are aggregated at the local then state levels, and ultimately at the national level. National level data are used as the basis for the U.S. Fire Administration's publication *Fire in the United States,* which is the single most comprehensive reference on the nature and scope of the fire problem in the United States.

History of NFIRS Participation

Because NFIRS is a voluntary system, not all states or fire departments within states participate. In 1977, one of the early years of the system, 5 states regularly reported data to the National Fire Data Center and 19 others had data systems in some stage of development. Since then participation has increased to 41 states, and over 13,000 of the nearly 34,000 U.S. fire departments report to NFIRS. It is estimated that 44 percent of all fires that fire departments respond to are captured in NFIRS, making NFIRS an extremely large sample of all fires that occur each year.

State Uses of NFIRS

Perhaps the most fundamental use of NFIRS is in understanding the nature of the fire problem, whether conceived at the national, state, or local level. One indicator of the usefulness of the system is its utilization by State Fire Marshal's offices in preparing their annual reports. In an informal review of 31 states' annual reports, all but one included data available from state NFIRS systems. Many states, such as California, Maryland, New York, and Texas, use their local NFIRS as the basis for the majority of the content of their annual reports.

One example of the myriad ways NFIRS data can be used for analysis at the state and local levels comes from the Commonwealth of Massachusetts. Using MFIRS, the state reporting system, the Division of Fire Prevention was able to identify vehicle arson as a major problem in the Commonwealth. In 1987, a new law went into effect that required vehicle owners to complete a report at fire headquarters if they experienced a vehicle arson and wanted to pursue an insurance claim. In 1990 the Division of Fire Prevention issued a follow-up report based on MFIRS data to demonstrate the

effectiveness of that law. It reported that motor vehicle fires dropped by 35 percent between 1987 and 1990 and that vehicle arsons dropped by an even more dramatic 52 percent.[2]

Local Uses of NFIRS

Thousands of local fire departments use NFIRS, making it impossible to document all the ways in which they use these data. But there is little doubt that NFIRS has stimulated thousands of communities to use hard data for their fire protection management decision making and to improve local data systems generally. This is among NFIRS's most important achievements.

The fire department of San Antonio, Texas, relies heavily on its local NFIRS. The system is automated at the level of the firehouse and runs almost in real time because firefighters file reports on calls within 20 minutes of returning to the station. The location of calls is recorded in the system using X–Y coordinates that refer to the location the firefighters responded to, which is not always the same as the address recorded when the original call for service was placed. The rich resources of this system allow the fire department to conduct many sophisticated analyses, including:

- Identification of trends in the number of calls to the fire department, the types of calls made, and the origin of calls. This information is used, for example, to plan station relocations.
- Justification of fire department budgets to the city council. The system will allow the fire department to count the number of brush fires to which it has responded, identify whether the trend is upward or downward, and then make an assessment as to whether the department has enough brush fire trucks in service. This is but one example of the system's potential.

U.S. Fire Administration Uses of NFIRS

The USFA uses NFIRS for many purposes, including:

- Identifying aspects of the fire problem that require continued monitoring, additional research, or administrative action.
- Prioritizing current fire issues and setting agency goals and objectives.
- Quantifying the costs of fire, both in terms of lives and property and for educating the public and political leaders about the need for improved fire safety.
- Preparing congressional testimony and justifying budget requests to support the work of USFA.

[2] *Motor Vehicle Fires in Massachusetts, 1990*. The Commonwealth of Massachusetts, Department of Public Safety, Division of Fire Prevention, Publication No. 16965–17–200–10–1–91 P.S., September 25, 1991.

- Facilitating agency management reviews based on performance-based budgeting.
- Providing a means of measuring the impact of agency programs and activities.

Other Federal Agency Uses of NFIRS

Many federal agencies other than the U.S. Fire Administration use NFIRS data, including:

Federal Emergency Management Agency, U.S. Fire Administration
Consumer Product Safety Commission
Military Services (Air Force, Army, Coast Guard, Marines, Navy)
U.S. Department of Commerce, National Institute on Standards and Technology, Center for Fire Research
U.S. Department of Transportation, National Highway Traffic Safety Administration
U.S. Congress, House Science, Research, and Technology Subcommittee
U.S. Public Health Service, Centers for Disease Control and Prevention
U.S. Department of Justice, Federal Bureau of Investigation
U.S. Department of Housing and Urban Development
U.S. Department of Treasury, Bureau of Alcohol, Tobacco, and Firearms
Library of Congress

The Consumer Product Safety Commission is a heavy user of NFIRS data. The data are used to conduct research on potential product fire hazards and to identify the need for product recalls or product repairs in order to limit the fire hazards associated with any product.

The Center for Fire Research, located within the National Institute of Standards and Technology, is another federal agency that uses NFIRS data on a regular basis. NFIRS data have been used to develop fire models and conduct analyses of fire risk. The Center was one of the first organizations to rank order fire scenarios on a national scale to better define the U.S. fire problem.

Private Industry Uses of NFIRS

Private organizations have benefited from the information available in NFIRS as well as public organizations. The organizations include national associations for home appliance product manufacturers, hotel and motel industry, insurance companies, attorneys, and many others. In 1996 NFIRS data was used to assist with the selection of potential pilot sites of a study conducted by the Association of Home Appliance Manufacturers (AHAM) on residential cooking fires.

Courts and Law Firms

NFIRS data are frequently used both in litigating court cases and in settling cases out of court. If NFIRS data show that a product has a pattern of causing fires, this information can be used by plaintiffs to build a case against a manufacturer. Particularly helpful is that many years worth of

data are available in NFIRS, so patterns of a product's involvement in fires over several years can be studied. NFIRS data are especially valuable to the extent that manufacturers may be convinced to revisit the safety of these products. In these ways, litigation can lead to safer products and better warning information on products.

In certain industries, such as the appliance industry, manufacturers use NFIRS data proactively, monitoring the involvement of their products in fires. This use of NFIRS is especially encouraging because potential fires may be averted if problems with products are identified early and if products are recalled, redesigned, or both.

Nonprofit Fire-Related Organizations

A number of nonprofit fire-related organizations rely on statistics that are generated from NFIRS data. Among these groups are the National Association of State Fire Marshals, the National Fire Protection Association, the International Association of Fire Chiefs, the International Association of Fire Fighters, and the International Association of Black Professional Fire Fighters.

Of particular concern to firefighter groups is firefighter casualties. If a firefighter is killed or injured in the line of duty, a separate NFIRS form collects the specific information describing the incident. NFIRS data can then be used to generalize about the types of fires that present the greatest risk to firefighters and the types of injuries firefighters most often sustain. (All editions of *Fire in the United States* include a specific section on firefighter casualties (Chapter 4).) NFIRS data can also be used to investigate whether particular pieces of gear are associated with firefighter injuries.

Media

The media represent a uniquely powerful way to get fire and fire safety information to the public. Often reporters and researchers from newspapers, magazines, and television call USFA or other organizations that provide fire data to get information on a particular fire problem as background for a story. When possible, USFA analysts encourage requesters to broaden their stories to show how specific fire incidents relate to overall national or regional fire problems. Within the past few years, NFIRS data have appeared in a number of national publications and broadcast media, including *USA Today, The Wall Street Journal, The New York Times,* NBC–TV, *Redbook, Ladies Home Journal, Fire Chief Magazine*, and *World Book Encyclopedia*.

Recently the process of sharing USFA data with local media outlets has been formalized in an effort called the "Quick Response Unit" (QRU). When a fatal or otherwise serious fire incident occurs in a community, the QRU faxes fire information based on NFIRS and other data sources to the local newspaper, which is encouraged to incorporate this information and relevant fire safety tips into its coverage of the event.

Academic and Research Institutions

NFIRS is a unique and invaluable resource for research in fire protection, and researchers in academic settings are among those using the data. There are several higher education institutions that have research centers specifically devoted to the study of fire issues. Among these are Worcester Polytechnic Institute, in Worcester, Massachusetts, the Fire Protection Engineering program at the University of Maryland, and the Texas A&M Fire Programs.

NFIRS of the Future

NFIRS, like any information system, constantly strives to improve the quantity and quality of the data it collects. In recent years, USFA in cooperation with the National Fire Information Council has been working on a new version of NFIRS. The new version makes several improvements in the data collection process. Recognizing that firefighters are busy with many responsibilities, one of these changes is to make NFIRS forms simpler to fill out.

Everyone associated with NFIRS at the local, state, and national levels should feel proud of the important contribution they have made. No data system such as NFIRS is possible without the ongoing efforts of thousands of individuals. In particular, a message of gratitude goes out to the firefighters who collect NFIRS data on a daily basis. With the continued support of everyone involved, NFIRS will continue to play an important role in informing and guiding fire protection efforts in the United States.

SOCIOECONOMIC FACTORS AND THE INCIDENCE OF FIRE[3]

Over the past 100 years, the risk of fire in America's homes has decreased dramatically. Myriad changes have helped make us safer, including the adoption and enforcement of building codes, changes in the way we heat our homes and cook food, and widespread use of smoke detectors. Still, research indicates that the risk of a fire in the home is not the same for everyone. Climate, building stock characteristics, and human factors importantly influence fire rates. As technology improves the fire safety of buildings and consumer products, human factors become increasingly important for understanding the causes of fire and how they can be prevented. This section provides a brief review of many of building stock characteristics and human factors that are related to increased incidences of fires and their resulting deaths, injuries, and dollar losses.

This presentation is based on research conducted primarily in urban areas and explores the socioeconomic factors associated with increased fire rates at three different levels:

[3] This section summarizes a report published by the U.S. Fire Administration. The report is available in hard copy or online from the U.S. Fire Administration Web site at http://www/usfa.gov/pdf/socio.pdf.

- The level of the neighborhood.
- The level of the household, including housing unit characteristics and characteristics of the household members themselves.
- The level of the individual.

Socioeconomic Factors at the Level of the Neighborhood

To understand variations in fire rates across different neighborhoods, it is useful to understand how neighborhood quality is tied to fire rates. Generally speaking, the well-being of a residential neighborhood is tied to the quality of its housing stock. The quality of this stock, however, can be diminished by the interrelated processes of fire and building abandonment. The question is, what makes poor neighborhoods more vulnerable to the threat of fire than other neighborhoods? Several explanations are explored below.

VACANT AND ABANDONED BUILDINGS. Neighborhoods in U.S. cities tend to be segregated by income level. In the poorest neighborhoods, building abandonment is more common than in other residential neighborhoods.[4] Vacant buildings represent a fire hazard for several reasons. First, they are more likely to experience severe fires than other types of buildings. Sternlieb and Burchell found that abandoned buildings were four times more likely than other structures in Newark, New Jersey, to have a severe fire, often as the result of arson.[5] Second, homeless persons or others seeking shelter from the elements or the watchful eyes of neighbors may enter vacant buildings illegally. This situation can be especially dangerous in the winter months, when those seeking shelter may light fires indoors in an effort to keep warm. To the extent that persons seeking refuge in abandoned buildings are under the influence of alcohol or drugs, there is an added risk that careless use of smoking materials will ignite a fire.[6]

NEIGHBORHOOD DECLINE. Building abandonment can become a self-fulfilling prophecy for a neighborhood. The presence of vacant buildings may discourage apartment building owners, who often do not live in the neighborhood, from investing in their buildings. The withdrawal of routine maintenance services soon seriously erodes the quality of the housing units in those buildings, increasing the risk of fire from inadequately maintained heating or electrical systems, for example. In the worst-case scenario, an owner may use arson as a means to force tenants out of a building or to fraudulently collect on an insurance policy, thereby "cashing in" his or her investment from the community. The end result is usually another vacant building in the neighborhood.

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[4] Massey, Douglas and Nancy Denton, *American Apartheid*: *Segregation and the Making of the Underclass,* Cambridge, MA: Harvard University Press, 1993.

[5] Sternlieb, George and Robert Burchell, "Fires in Abandoned Building," *Fire Journal,* Vol. 67, No. 2, 1973.

[6] Norton, Alison, "Fire Risks of the Homeless," *Fire Journal*, Vol. 83, No. 6 (November/December), 1989.

ARSON. Arson is a significant cause of fires and fire casualties in many metropolitan areas. It is also a leading cause of fire deaths in many metropolitan areas. Gunther (1981) specifically addressed the relevance of income for understanding how different neighborhoods are affected by arson. In Toledo he found that among all the fire causes he studied, the relationship between income and incendiary or suspicious fires was the most dramatic. Statistical analysis revealed that the poorest group of census tracts had 14.4 times the number of incendiary or suspicious fires as the wealthiest group of census tracts.[7]

In addition to the problem of arson and other fires in abandoned buildings, the quality of a neighborhood can also affect fire safety in another way. Since crime rates tend to be higher in low income neighborhoods, households in these neighborhoods may seek to make their homes safer by barring access through doors and windows. This may be accomplished by installing iron grilles on windows and doors or by other means, such as using furniture to block doors and passageways. The danger is that in the event of a fire, barred windows and blocked doorways and passageways make it harder for those inside a burning building to get out.[8] As a result, fire-related injuries and deaths are likely to be higher than they would normally be given the nature and severity of a particular fire.

Socioeconomic Factors at the Level of the Household

The proceeding discussion addressed socioeconomic factors relating neighborhood quality to the incidence of fire. This section narrows the scope to focus on the level of the household. Household-level factors relevant to fire rates include the quality of individual housing units, their affordability to residents, and the social structure of the households that reside in them. In the U.S., housing quality and housing affordability are closely related. The cost of a housing unit, whether for sale or to rent, is priced according to the quality of the unit given its location, amenities, etc., with the effect that higher income households can generally afford to live in higher quality units than lower income households.

HOUSING QUALITY. Income is the primary determinant of the quality of housing for most households. In many urban areas, households with low incomes live in the oldest and most run-down units of the city's housing stock. There are over 2.4 million inadequate, occupied rental housing units in center cities throughout the U.S., and 62 percent of them were built prior to 1950.[9] Two trends suggest that the general condition of much center city housing will continue to deteriorate and the number of households living in inadequate units in these areas will increase. First is the increasing income gap between the well-off and the poor in the U.S., and the other is cutbacks in

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[7] Gunther, Paul, "Fire-Cause Patterns for Different Socioeconomic Neighborhoods in Toledo, OH," *Fire Journal*, Vol. 75 (May), 1981.

[8] Fahy, Rita and Alison Norton, "How Being Poor Affects Fire Risk...," *Fire Journal*, Vol. 83, No. 1 (January/February), 1989.

[9] *Into the 21st Century: The State of the Nation's Housing*, Harvard University Joint Center for Housing Studies, Cambridge, MA, 1996. Units are considered inadequate if they lack any basic plumbing, heating, or other mechanical systems, or if other information regarding inadequate upkeep is available.

income support programs for low income households. Both of these trends, in different ways, undermine the rent-paying ability of low income households and suggest that poor quality housing will continue to be a reality for millions of low income households.

Living in an old, poorly maintained housing unit raises a household's risk of experiencing a fire in several ways. First, older heating, plumbing, and electrical systems need adequate maintenance over their useful lives to ensure their continued safe operation. As discussed earlier, many apartment buildings in center city areas are not being adequately maintained. This increases the risk of mechanical malfunction and the possibility of a fire either due to mechanical malfunction or because residents will turn to alternate, less fire-safe heating devices to keep warm, such as portable space heaters.

Second, the electrical wiring in many older houses and apartments poses a fire risk. Older wiring was not designed to carry the electrical loads placed upon it by modern appliances, such as microwave ovens, televisions, stereo equipment, etc., and excessive loads may lead to electrical fires. Similarly, residents may try to compensate for an older apartment's inadequate electrical system by running extension cords and placing excessive demands on limited electrical outlets, strategies which may also overload a socket or circuit and ignite an electrical fire.[10]

Third, as mentioned above, fire risk increases for households that try to compensate for a building's inadequate heating system using stopgap measures such as space heaters. Space heaters and other types of alternate heating devices can increase fire risk in many ways: if they are older and have not been adequately maintained; if they are used incorrectly, too close to combustibles, or with inadequate ventilation; or if they are used in a household with children, especially very young children, who may interfere with the safe use of a space heater or other alternate heating device.

A notable exception to the relationship between low income status and increased fire risk from old and undermaintained housing stocks is the case of households receiving housing assistance. Public housing is available in most large cities in the U.S., and it is likely that heating and electrical systems in some of these buildings are better maintained and pose less of a fire hazard than those commonly found in older, private market apartment buildings affordable to low income households. Households that receive rental subsidy certificates or vouchers should also be exposed to lower fire risks than other low income households because, at least in the federal Section 8 program, apartment units are inspected on an annual basis, and units that fail inspections are not eligible to participate.

Just as the quality of a household's dwelling unit can affect its fire risk, so does the quality of its furnishings. Considerable improvements have been made in the fire safety of many types of consumer products, particularly home furnishings. Today, mattresses and upholstery are manufactured to be more resistant to ignition than ever before. Unfortunately, lower income households are more

[10] Jennings, Charles R., *Urban Residential Fires: An Empirical Analysis of Building Stock and Socioeconomic Characteristics for Memphis, Tennessee*, Doctoral dissertation, 1996.

likely to have older furnishings that ignite more readily and that increase the risk of fire and fire-related injuries and deaths.

SMOKE DETECTORS. Smoke detectors have contributed significantly to reductions in fire deaths. Between 1980 and 1990, the U.S. experienced a decrease in residential fire deaths of about 25 percent.[11] One reason that smoke detectors are so effective in saving lives is that a high proportion of fatal fires occur at night, and smoke detectors alert residents early enough that they have a better chance of escaping from burning buildings.

The relationship between low income status and the presence of operational smoke detectors has not been firmly established. But it is likely that lower income households are less likely to have operational smoke detectors to the extent that:

- They live in older structures. For households living in dwelling units constructed between 1980 and 1992, 92 percent are estimated to have operational smoke detectors. This percentage drops to 82 percent for households in units built during the 1970s and 74 percent for units built prior to 1970.
- They live in substandard units that are not maintained to building codes.
- Their disposable incomes are very low, so they do not purchase or maintain smoke detectors.

Currently, it is known that neighborhoods with high proportions of low income households also have proportionately more fires than neighborhoods with more middle and high income residents, and that households without operational smoke detectors are almost two and a half times more likely to have reported fires than those with operational smoke detectors.[12] Taken together, these facts suggest that low income households may have fewer operational smoke detectors and thus face higher fire risk. This is an important topic for future research, both to establish with greater certainty the relationship between household income and the presence of operational smoke detectors and then to specify the reasons. Are detectors missing completely or are they installed but not operational because they have been disconnected, they are missing batteries, or other reasons?

HOUSEHOLD STRUCTURE. In addition to physical and economic conditions such as the quality and affordability of a housing unit, social factors related to household structure can also affect fire risk. The household characteristics most often included in studies of increased fire risk are the presence of single-parent households (usually headed by females), the presence of children, the presence of elderly persons, and household crowding. The relevance of single-parent households for increased fire risk is tied to the presence of children in the home, so these two topics are addressed together.

[11] Smith, Charles L., *Smoke Detector Operability Survey Report on Findings* (revised). Released by the Consumer Product Safety Commission, October 1994.

[12] Data on smoke detector status in households reporting fires is from 1994 NFIRS data.

Single-Parent Households and the Presence of Children. Single-parent households are related to increased fire risk in two ways. First, single-parent households tend to be less affluent than two-parent households. These households are at greater risk of experiencing a fire for all the reasons associated with lower income households generally.

Second, a single-parent household generally has less flexibility to deal with household and child care contingencies. Children in urban areas are left unattended more often than rural or suburban children. Parents told researchers that they left their children alone because they had no other choices. Under these circumstances, they attempted to make arrangements with neighbors or relatives who their children could turn to in the case of an emergency.[13]

Fahy found that parents left children home alone for a variety of reasons. Whether single-parent or two-parent families, Fahy found that these reasons included:

- Parents went out on a quick errand.
- Parents were out socializing.
- Parents were at work when their child care arrangements fell through.
- Parents went out on an extended errand.
- The babysitter left the home before the parents returned.

The fire risks associated with leaving children home alone also extend to cases where an adult is home but children are unsupervised. In both of these cases, fire risk is higher due to children's curiosity about fire and their propensity to play with matches, lighters, and other fire-related materials. The limited life experiences of children make them unable to comprehend the enormity of careless actions involving fire. Data from 1989 through 1993 reveal that among all fires that resulted in the death of a small child, 37 percent were caused by children playing.[14] Fires can also result from children cooking without supervision.

The risk posed by children playing is even greater in households without operational smoke detectors. In these cases, even if an adult is present in another part of the home, smoke or fire may not alert them until it is too late to escape, particularly if the adult is asleep when the fire breaks out.

Gunther shows that, relatively speaking, children playing fires are an even greater problem in low income neighborhoods than other neighborhoods. In Toledo, he found that the poorest group of neighborhoods had a rate of children playing fires 14.2 times as high as the wealthiest group of neighborhoods. This helps explain the National Fire Protection Association's finding that among black children, who are disproportionately represented in low income households, home fires are the leading cause of injury-related deaths for children between ages 1 and 9.

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[13]Kraizer et al., "Children in Self-Care: A New Perspective,"*Child Welfare,* (November/December), 1990.

[14]National Fire Protection Association. Presentation at the 1996 Fire and Life Safety Symposium, July 11, 1996.

Fire Risks of Elderly Persons. Each year a disproportionately high number of elderly people are killed in residential fires. Beginning at age 70, an individual's risk of dying in a fire rises dramatically. Those between the ages of 70 and 74 have a 50 percent greater chance of being killed in a fire than the population at large. By age 85, the risk of dying is more than 200 percent higher than for the overall population.

The nature of the risk that elderly persons face is twofold. On the one hand, they may be exposed to greater risk than the population at large; on the other hand, they may be less able to escape a fire due to physical or mental limitations. Elderly persons are at greater risk for experiencing fires because everyday activities, especially cooking, can become more dangerous if a person's physical or mental capabilities decline. This risk of fire is compounded for persons who are on medications that make them less alert or for those who smoke and drink alcohol alone. Studies are necessary to determine if low income elderly persons are more at risk than other elderly persons of experiencing or being injured or killed in a residential fire.

OVERCROWDED HOUSEHOLDS. Many studies of the relationship between socioeconomic variables and fire rates include a variable for "overcrowding." While overcrowding, which is usually defined as more than one person per room in a dwelling unit, is more of a problem in low income communities, it is not clear how it relates to increased fire rates. Jennings suggests that the more people there are in a household the greater the wear and tear on a dwelling unit's mechanical systems, and this may increase the risk of fire. Another possibility is that "overcrowding" as defined in some studies is another indicator of poverty, one that taps a dimension of poverty not accounted for in other measures.

Although its effects on fire incidence rates are not well established, the impact of overcrowding on fire injury and death rates is more straightforward. One way low income families deal with the lack of affordable housing is by doubling up in homes with extended family members or friends. By increasing the number of people in a given household, the number of potential victims of a fire also rises. Also, the more people there are in a household, the more difficult if can be to get everyone out of a burning unit. This is especially true for households with very young or very old household members who may be unable to escape flames or smoke on their own. In addition, households without operational smoke detectors have less time to escape a fire, and their ability to access all areas in the home to alert or retrieve other household members is diminished.

Socioeconomic Factors at the Individual Level

In the sections above, the socioeconomic factors associated with increased fire risk at the neighborhood and household levels were examined. This section completes the top-down presentation of fire risks by discussing individual-level socioeconomic factors related to fire risk. Factors at the level of the individual include the incidence of careless smoking, the incidence of alcohol and drug abuse, education levels, and type of housing tenure.

CARELESS SMOKING AND ALCOHOL AND DRUG ABUSE. Careless smoking is a leading cause of fire deaths and injuries in the U.S. While careless smoking accounted for only 7 percent of all residential fires in 1990, it was responsible for 26 percent of all fire deaths and 15 percent of all fire injuries.[15] Jennings showed that cigarette smoking is inversely related to income, so low income households are arguably at greater risk from fires caused by careless smoking. In Toledo, Gunther found significant differences in the rates of careless smoking fires among the five groups of neighborhoods he studied. The rate of careless smoking fires for the group with the lowest median income was 8.5 times as high as the rate for the group with the highest median income.

Closely related to the topic of careless smoking is alcohol and drug abuse. Intoxicated persons are at greater risk of falling asleep while smoking, and improperly discarded or dropped cigarettes are a dangerous ignition source. The proximity of the sleeping person to the origin of the fire illustrates why these fires tend to be so deadly, particularly if the victim is too inebriated to recognize the danger or successfully escape.

LOW LEVEL OF EDUCATION. Fahy identifies low levels of education as contributing to fire risk and suggests that those with little education are less likely to "grasp the full import of public fire safety education messages." Low literacy levels may also inhibit the ability to read instruction manuals and warning labels for cooking and heating devices, increasing the chance that they will be used incorrectly and in a manner that increases the risk of fire. There is an important connection between education levels and income levels, especially in the U.S.'s increasingly high-tech workplaces, and people with low levels of education are far more likely than others to have low incomes. Further research is needed to ascertain how important low education levels are in increasing fire risk relative to other factors such as income.

HOUSING TENURE AND FIRE RISK. Another variable that has been studied in association with fire rates is housing tenure. Several studies have found that lower rates of owner-occupation, which are more typical in low income communities, are related to increased fire rates. The difficulty is in specifying the nature of this relationship. Munson and Oates suggest that by virtue of owning their own homes, owner-occupiers may have a tendency to better maintain their homes, thereby reducing the likelihood of mechanically caused fires, and they may be more careful in their everyday routines, reducing the likelihood of cooking, careless smoking, or other types of fires that result from human carelessness. Owner-occupiers may also have more of a vested interest in purchasing and maintaining fire protection devices such as smoke detectors as a means of protecting their equity investments.[16]

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[15] *Fire in the United States,* Eighth Edition, United States Fire Administration, 1990. The percentages given reflect data on fires with known causes.

[16] Munson, Michael J. and Wallace E. Oates, "Community Characteristics and the Incidence of Fire: An Empirical Analysis," *The Social and Economic Consequences of Residential Fires,* Chester Rapkin, Ed., Lexington, MA: D.C. Heath and Co., 1983.

SOCIAL PATHOLOGY AND FIRE RISK. Another area that needs further study is ways in which arson fires are related to the stresses associated with living in socially and economically depressed inner city neighborhoods. Fahy suggests that higher rates of incendiary and suspicious fires may be manifestations of the complex and often overwhelming problems people are more likely to experience in these neighborhoods. Recent increases in the rate of residential arsons may be evidence of this phenomena. As discussed in the Eighth Edition of *Fire in the United States*, the increase may indicate that an increasing proportion of arson fires are targeted at individuals rather than motivated by profit. Fahy also suggests that the stresses of living in disadvantaged communities may lead to higher rates of child playing fires and fires set by juveniles. These areas are all in need of further study.

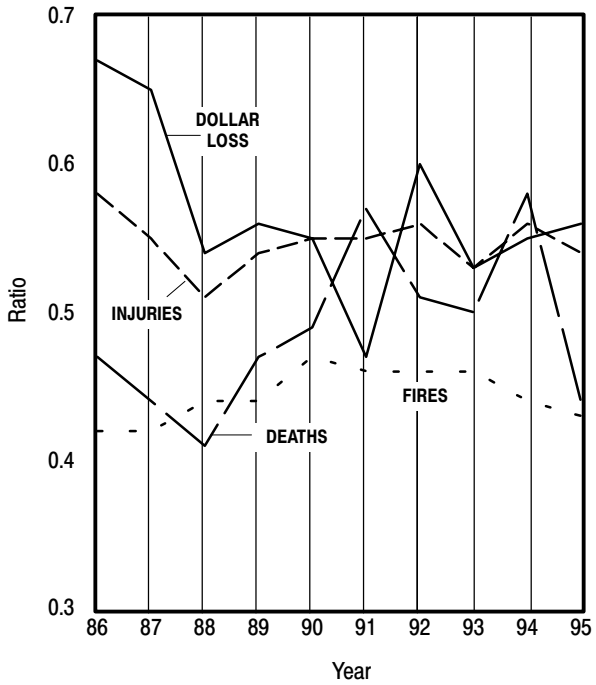
The Need To Understand Socioeconomic Factors Related to Fire

While it is not possible to prevent all residential fires, information about the socioeconomic characteristics associated with increased fire risk can help the fire service design effective public education programs. With materials designed with specific audiences in mind, the fire service can embark on targeted prevention campaigns to help prevent fires in the communities and neighborhoods most at risk.

Appendix A

DIFFERENCES BETWEEN NFPA AND NFIRS ESTIMATES

The National Fire Incident Reporting System collects data from over 13,000 fire departments. The National Fire Protection Association annual survey of fire departments collects data from more than 3,000 fire departments. Neither is a perfect random sample; not all fire departments asked to participate do so. As one might expect, 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. Not surprisingly, therefore, there are differences between the NFPA annual survey results and the NFIRS results. In 9 of the 10 years examined (1986–95), the deaths reported to NFIRS represent a larger fraction of the NFPA national estimate of deaths than the NFIRS number of fires is of the NFPA estimate of fires. NFIRS injuries and dollar loss are even larger fractions of the NFPA totals than are deaths or fires (Figure A–1).



	Dollar Loss	Injuries	Deaths	Fires
1986	0.67	0.58	0.47	0.42
1987	0.65	0.55	0.44	0.42
1988	0.54	0.51	0.41	0.44
1989	0.56	0.54	0.47	0.44
1990	0.55	0.55	0.49	0.47
1991	0.47	0.55	0.57	0.46
1992	0.60	0.56	0.51	0.46
1993	0.53	0.53	0.50	0.46
1994	0.55	0.56	0.58	0.44
1995	0.56	0.54	0.44	0.43

Sources: NFPA Annual Surveys and NFIRS

Figure A–1. Ratio of Raw NFIRS Sample to NFPA National Estimates

Looking at the problem another way, Figure A–2 shows the number of deaths per fire, injuries per fire, and dollar loss per fire from NFIRS and NFPA from 1985 to 1994. Deaths per fire are similar for NFIRS and NFPA, with an average difference of 10 percent and a maximum difference of 32 percent in 1994. Injuries and dollar loss per fire are consistently lower in the NFPA sample than in the NFIRS sample.

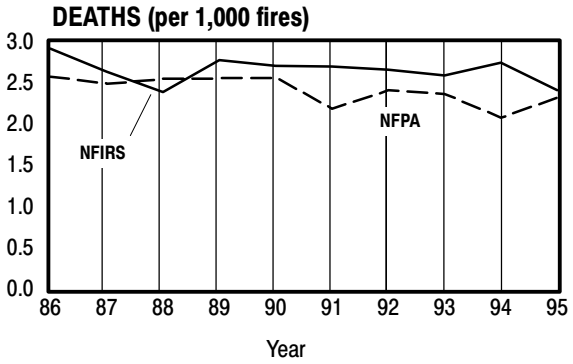
The reasons for these differences are not known. One possibility is that some departments that report summary data to NFPA may undercount their casualties and losses when reporting on the NFPA survey forms. Another possibility is that there are data entry errors in NFIRS, with larger numbers of deaths, injuries, and dollar loss 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 fire departments might not report some minor fires to NFIRS that they include in their own totals that are reported to NFPA. We know that some departments do not fill out NFIRS forms for minor fires such as food on stove or chimney fires, but we are unsure whether these fires are or are not included in the department's report to NFPA nor the extent of the problem.

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

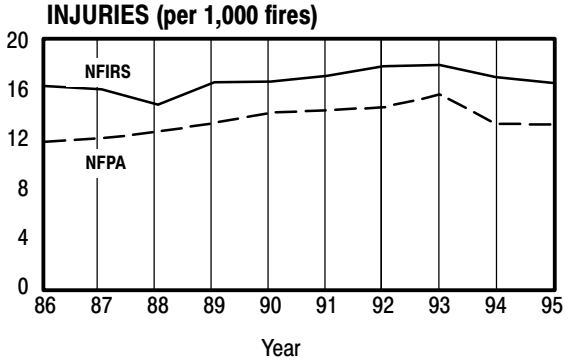
Resolving the differences between the two major sources of fire statistics in the United States is important to prevent confusion among the users of the data. With the new NFIRS, more complete data on the population protected by participating departments will be possible, and the NFIRS estimates will be able to be made independent of other sources. This should improve consistency.

Figure A–3 represents the NFPA survey trends for non-residential property fires and dollar loss.



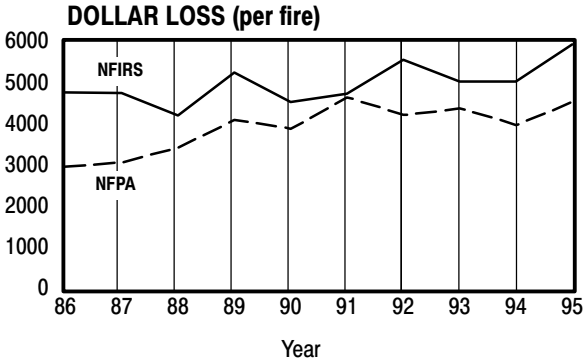
	NFIRS	NFPA
1986	2.92	2.58
1987	2.64	2.49
1988	2.39	2.55
1989	2.78	2.56
1990	2.71	2.57
1991	2.70	2.19
1992	2.66	2.41
1993	2.59	2.37
1994	2.75	2.08
1995	2.41	2.33

10-Year NFIRS Trend = -6.3%
10-Year NFPA Trend = -14.3%



	NFIRS	NFPA
1986	16.29	11.81
1987	16.02	12.11
1988	14.77	12.64
1989	16.62	13.36
1990	16.68	14.17
1991	17.12	14.39
1992	17.92	14.61
1993	18.01	15.61
1994	17.02	13.26
1995	16.57	13.11

10-Year NFIRS Trend = +10.3%
10-Year NFPA Trend = +16.9%

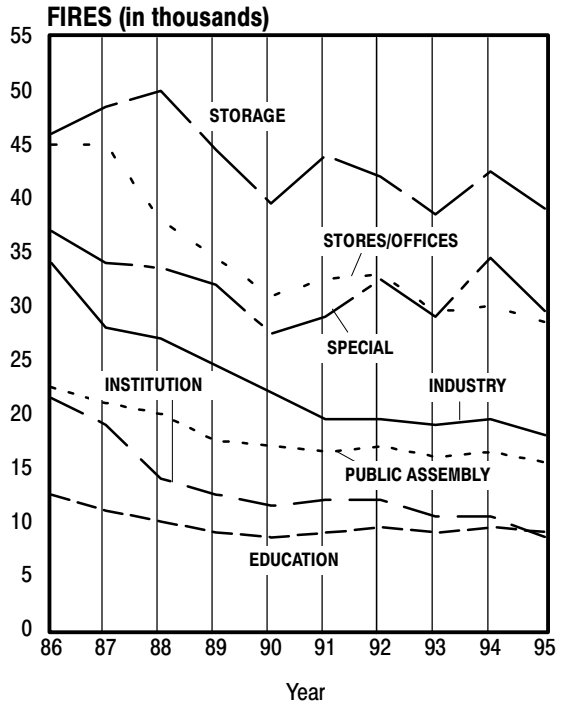


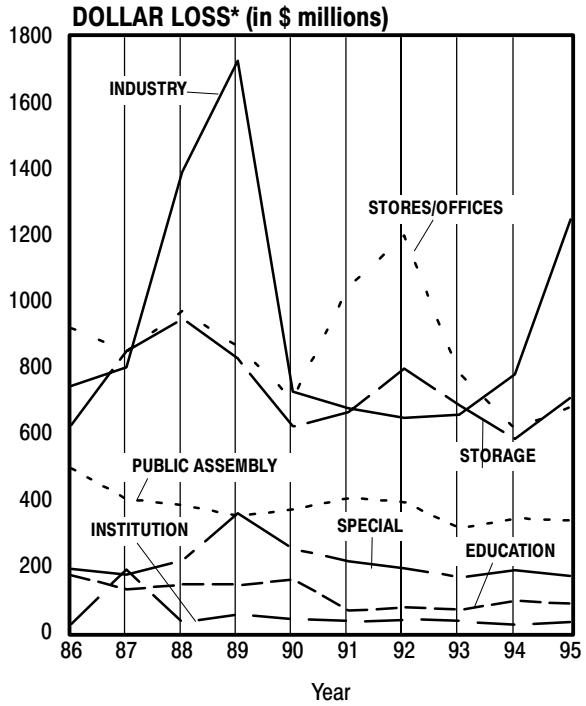
	NFIRS	NFPA
1986	$4,762	$2,954
1987	4,744	3,073
1988	4,211	3,428
1989	5,247	4,092
1990	4,532	3,872
1991	4,734	4,637
1992	5,560	4,222
1993	5,035	4,377
1994	5,031	3,967
1995	5,931	4,538

10-Year NFIRS Trend = +21.8%
10-Year NFPA Trend = +45.1%

Sources: NFPA Annual Surveys and NFIRS

Figure A-2. NFIRS vs. NFPA Survey: Severity of Losses





Year	Public Assembly	Education	Institution	Stores/Offices	Industry	Storage	Special
Fires							
1986	22,500	12,500	21,500	45,000	34,000	46,000	37,000
1987	21,000	11,000	19,000	45,000	28,000	48,500	34,000
1988	20,000	10,000	14,000	38,000	27,000	50,000	33,500
1989	17,500	9,000	12,500	34,500	24,500	44,500	32,000
1990	17,000	8,500	11,500	31,000	22,000	39,500	27,500
1991	16,500	9,000	12,000	32,500	19,500	44,000	29,000
1992	17,000	9,500	12,000	33,000	19,500	42,000	32,500
1993	16,000	9,000	10,500	29,500	19,000	38,500	29,000
1994	16,500	9,500	10,500	30,000	19,500	42,500	34,500
1995	15,000	9,000	8,500	28,500	18,000	39,000	29,500
Dollar Loss* ($ millions)							
1986	$495	$171	$25	$919	$745	$626	$191
1987	402	129	189	848	800	849	173
1988	383	144	30	971	1,390	947	216
1989	352	143	53	864	1,728	827	360
1990	370	159	38	703	726	623	250
1991	405	65	31	1,042	677	665	213
1992	392	74	38	1,200	648	797	192
1993	314	67	32	782	657	687	165
1994	343	94	21	615	779	584	186
1995	336	84	31	681	1,248	710	167

* Adjusted to 1995 dollars.

Source: NFPA Annual Surveys

Figure A-3. Trends in NFPA Non-Residential Structure Fires and Dollar Loss by Property Type

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