



A Profile of Fire in the United States 1992 - 2001

Thirteenth Edition

October 2004



FEMA



U.S. FIRE ADMINISTRATION MISSION STATEMENT

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

On March 1, 2003, FEMA became part of the U.S. Department of Homeland Security. FEMA's continuing mission within the new department is to lead the effort to prepare the Nation for all hazards and effectively manage Federal response and recovery efforts following any national incident. FEMA also initiates proactive mitigation activities, trains first responders, and manages the Citizen Corps, the National Flood Insurance Program, and the U.S. Fire Administration.

Periodically, the U.S. Fire Administration (USFA) publishes a statistical portrait of the fire problem in the United States. This brochure summarizes the Thirteenth Edition of *Fire in the United States, 1992–2001*. The analysis addresses the national fire problem and subsets of this problem, such as residential and non-residential fires. It presents trends over the 10-year period, but focuses on 2001 statistics relating to causes, property types, smoke alarm performance, and casualty characteristics. Firefighter casualties are also presented.

The primary source of data is the National Fire Incident Reporting System (NFIRS). Its data are based on inputs from nearly 13,000 fire departments as of 2001. Other data sources include the National Fire Protection Association (NFPA), National Center for Health Statistics (NCHS), U.S. Census Bureau, the Consumer Price Index, and state fire marshals' offices.

Copies of the full report are available from the U.S. Fire Administration, Publications Center, 16825 South Seton Avenue, Emmitsburg, Maryland 21727. The report may also be ordered on line at <http://www.usfa.fema.gov>. USFA publications are free.

A Profile of FIRE IN THE UNITED STATES 1992-2001

Each year, fire departments respond to nearly 2 million fires that result in thousands of deaths, tens of thousands of injuries, and billions of dollars in property loss. There are huge indirect costs of fire as well—temporary lodging, lost business, medical expenses, psychological damage, pets killed, and others. These indirect costs may be as much as 8 to 10 times higher than the direct costs of fires.

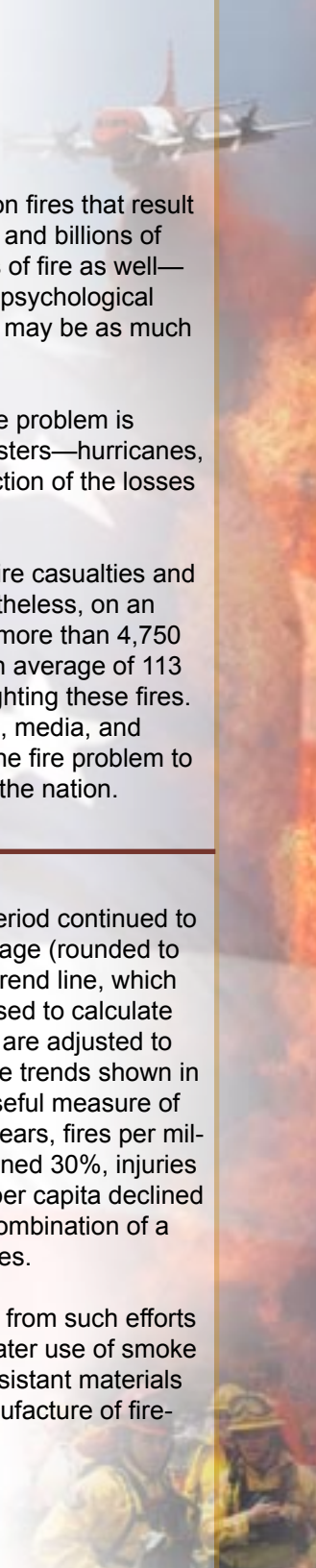
Compared to other industrialized nations, the U.S. fire problem is severe. In fact, combined losses from all natural disasters—hurricanes, tornadoes, floods, earthquakes—represent just a fraction of the losses from fires.

Over the past two decades, the number of fires and fire casualties and the economic losses have decreased steadily. Nevertheless, on an average day in 2001, fire departments responded to more than 4,750 fires, 10 people died, and 56 citizens were injured. An average of 113 firefighters were injured each day responding to or fighting these fires. This report serves to inform and remind the populace, media, and public officials of the magnitude and seriousness of the fire problem to individuals and their families, to communities, and to the nation.

10-YEAR TRENDS

Fire and fire casualty trends over the 1992 to 2001 period continued to decline. The 10-year trends shown on the following page (rounded to the nearest percent) were computed using a best-fit trend line, which smooths the fluctuations in year-to-year data. Data used to calculate trends are from NFPA annual surveys; dollar losses are adjusted to 2001 dollars based on the Consumer Price Index. The trends shown in the chart are based on absolute numbers. Another useful measure of trends is to view them as a per capita rate. Over 10 years, fires per million population declined 24%, deaths per million declined 30%, injuries per million population declined 38%, and dollar loss per capita declined 6%. These per capita improvements are due to the combination of a growing population and decreasing fires and fire losses.

These declines reflect very positive results stemming from such efforts as local fire department education programs, the greater use of smoke alarms and sprinkler systems, the use of more fire-resistant materials in new buildings, stricter building codes, and the manufacture of fire-retardant clothing (especially for young children).



10-YEAR TRENDS FOR PROPERTY FIRES AND LOSSES (percent change)

PROPERTY	FIRES	\$LOSS*	DEATHS	INJURIES
All Properties	-16	+5	-22	-31
Residential Properties	-21	+6	-19	-29
One- and Two-Family Dwellings	-23	+4	-16	-27
Apartments	-16	+14	-26	-33
Other Properties	-3	+28	-76	-34
Non-Residential Properties				
Structures	-22	-15	-48	-46
Mobile Property	-17	+19	-32	-42
Outside	-13	-15	-29 [†]	+12 [†]
Other	+5	+95	-	-

*Adjusted to 2007 dollars

†Also includes the "Other" category

Sources: NFPA Annual Surveys and Consumer Price Index

PROPERTY TYPES

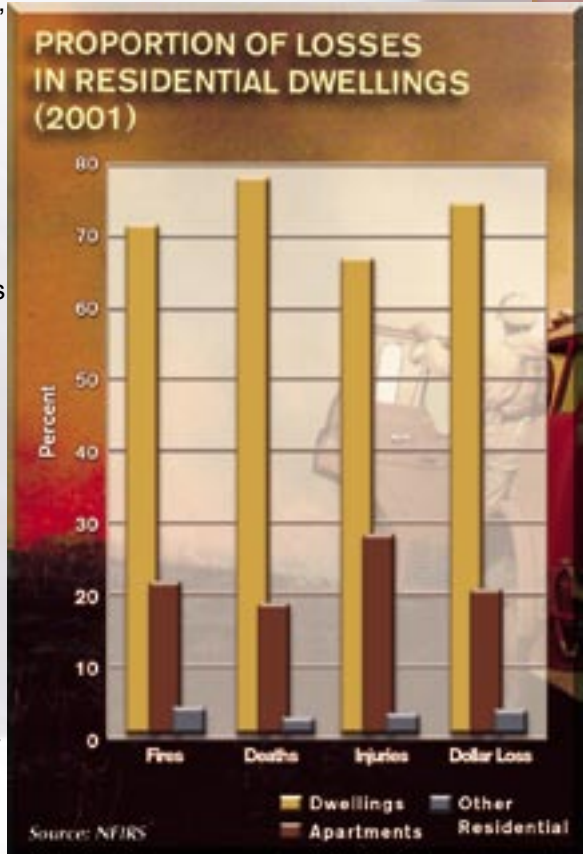
Over the years, there has been little change in the proportion of fires, deaths, injuries, and dollar loss by the type of property involved. NFIRS groups properties by general property type, including residential, non-residential, vehicle, outside, and other properties. In 2001, the largest number of fires continues to be outside (fields, vacant lots, trash) fires (41%). Many of these fires are intentionally set, but they do not cause many casualties or result in large dollar losses. Residential fires result in 77% of fire deaths, 73% of fire injuries, and 54% of dollar loss. One out of every five fires to which fire departments respond involves a vehicle. Non-residential properties account for only 8% of all fires, but 28% of total dollar loss.

Residential Properties

Residential properties include one- and two-family dwellings (including mobile homes used as fixed residences), apartments, and properties where people may live temporarily such as hotels/motels, dormitories, and other transitory housing facilities. Residential properties are where most civilians and firefighters are injured or die from fires. Over 10 years, an average of nearly 420,000 property fires have resulted in a yearly average loss of 3,500 deaths and 18,700 injuries,

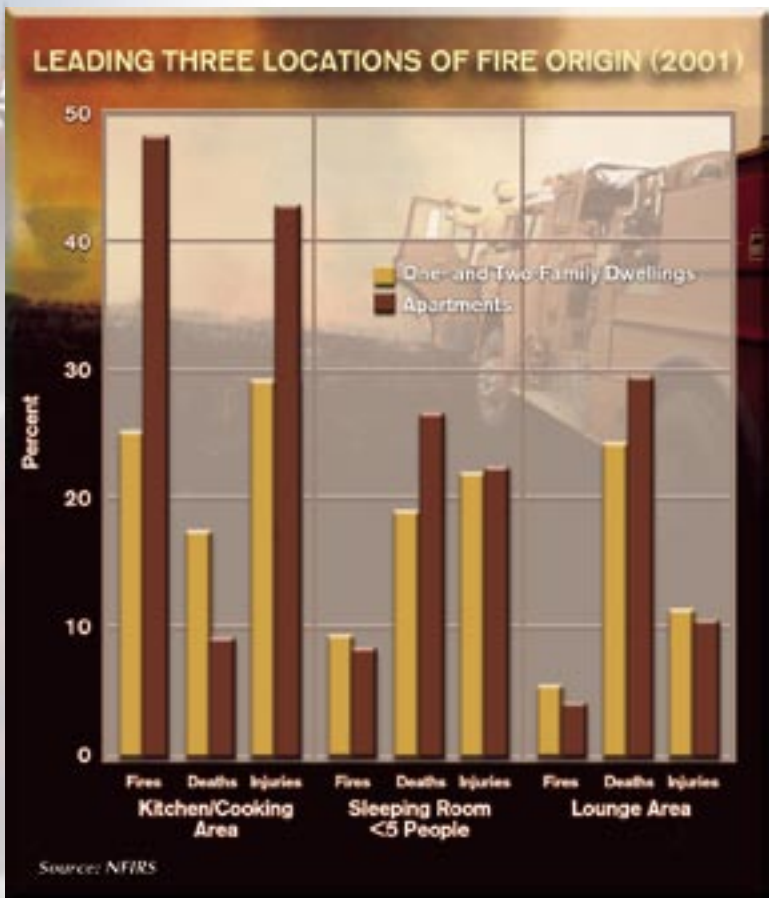
at a cost of more than \$5 billion. In 2001, there were 7 deaths and 36 injuries reported for every thousand residential fires and a dollar loss of \$13,200 per fire.

An estimated 73% of the U.S. population lives in a one- or two-family dwelling, which is mirrored in the 2001 residential statistics—73% of fires, 78% of deaths, 67% of injuries, and 76% of dollar loss. Cooking is the leading cause of fires and injuries in these structures, followed by heating for fires and open flame for injuries. Heating plays a much less prominent role in other dwelling fires, perhaps because fireplaces are not available and because homeowners are not as attentive as apartment management in maintaining their heating systems. Smoking is the leading cause of deaths, followed closely by arson. Arson is the leading cause of property loss. These leading causes remain unchanged from previous 1996 and 1998 reports. Children playing fires and deaths have sharply declined since the 1980s due in large part to public education efforts targeted specifically at this problem.



Apartments represented 23% of residential property fires, 18% of deaths, 29% of injuries, and 20% of dollar loss. Interestingly, the risk of injury per apartment occupant is higher than in one- and two-family dwellings. The reason for this may be that the total space and number of exits in apartment units are considerably less than in one- and two-family homes.

The kitchen is the area of the home where more fires start than any other location. This is consistent with cooking as the major cause of fires. The incidence of kitchen fires is higher in apartments than in



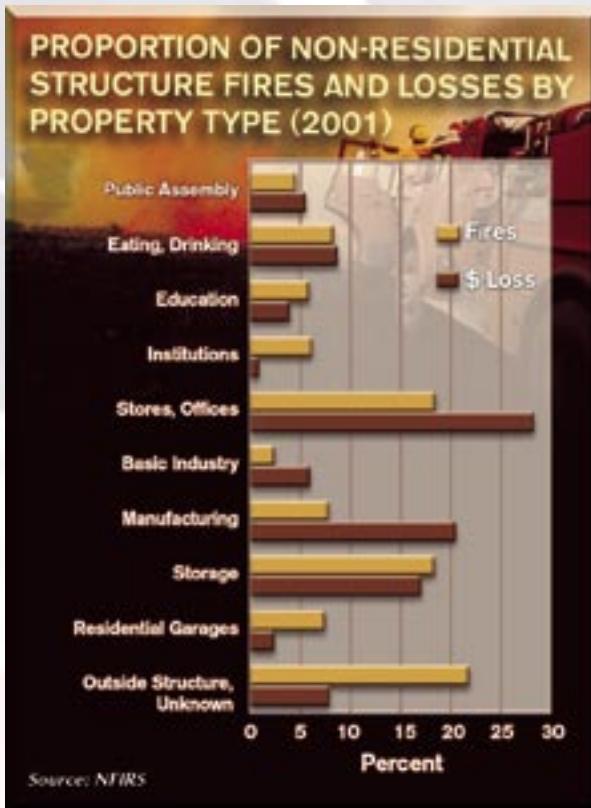
one- and two-family dwellings. In both structures, fires that start in either the bedroom or the living/family room are responsible for the highest number of deaths. This finding is consistent with smoking as the cause, perhaps because people fall asleep smoking in bed or on upholstered furniture.

Fires do not occur uniformly throughout the day. They peak from 5 to 7 p.m. during dinner preparation. Fire incidents drop when people sleep, but deaths are at their highest late at night and in the early morning hours—more than half of all deaths in residences occur between 10 p.m and 6 a.m. A large portion of fires that result in death is attributed to arson or smoking. Fires and deaths are highest in the winter months, probably because heating fires are added to other causes and because seasonal factors such as the presence of dry Christmas trees and the use of holiday candles contribute to the residential fire problem.

Non-Residential Structures

Non-residential properties include structures such as industrial and commercial establishments, institutions, and educational facilities; mobile properties; and outside properties. Each type has a different profile. In 2001, 1 death and 15 injuries were reported for every thousand non-residential fires and a dollar loss of \$20,600 per fire.

Much of the effort in fire prevention, both public and private, has focused on protecting non-residential structures. The results have been highly effective, especially relative to the residential fire problem. As reported by NFPA, non-residential structures accounted for only 7%–8% of fires, 2%–6% of deaths, and 8%–13% of injuries over the past 10 years. These properties, however, account for a large annual dollar loss, 25%–37%, primarily because non-residential structures generally have higher structural and content value than residential structures.





SEPTEMBER 11, 2001

The attacks on the World Trade Center and the Pentagon resulted in 2,451 civilian and 344 firefighter deaths and caused an estimated \$33 billion in property loss. These non-residential property losses are omitted from the statistics in this report because inclusion of such extreme, one-of-a-kind losses would distort the historical picture over a period of time.

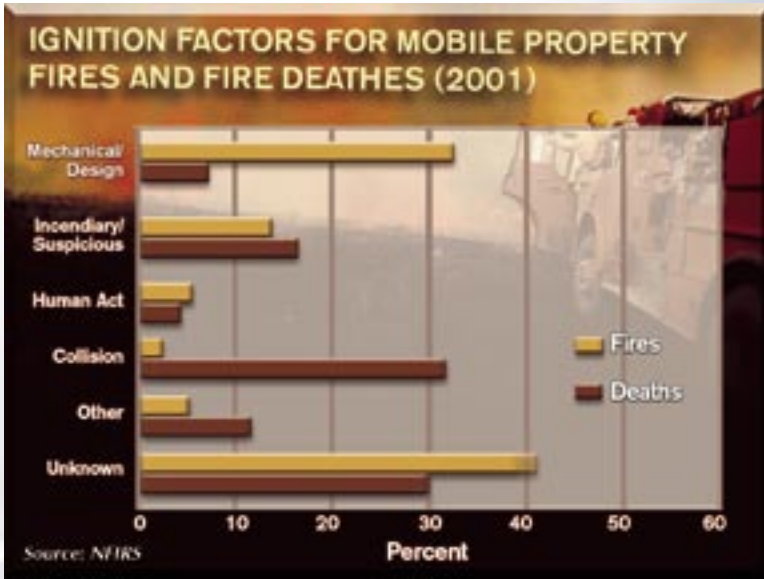
As in all previous years in which data have been collected, arson was the leading cause of all non-residential structure fires and dollar loss in 2001. In fact, dollar loss in arson fires was twice that of the next cause category (open flame), and represents 30% of all dollar losses. As might be expected, cooking was the leading cause of fires at eating/drinking establishments and at institutions where kitchens were used to prepare meals.

Mobile Properties

Mobile properties include highway vehicles (cars, trucks); rail, water, and air transport; and heavy equipment and other vehicles. Cars and trucks dominate this category with 82% of all mobile property fires and 78% of all mobile property deaths. The fire service responds to more vehicle fires than to residential fires. They also respond to tens of thousands of calls to vehicle accidents in which there was no fire and that are not reported to NFIRS.

Highway fires, deaths, and injuries have decreased substantially over 10 years: 19%, 26%, and 44%, respectively. Dollar loss increased 17% over this period due to the higher cost of newer vehicles and of their repair.

Mechanical or design problems (broken fuel lines, faulty catalytic converters, blown tires, overheating) were the cause of 55% of automobile fires. Fire following collision accounted for 47% of deaths. The cause of fatalities associated with a mobile property accident is often difficult to determine (e.g., was it the result of the mechanical forces or the fire that ensued?).



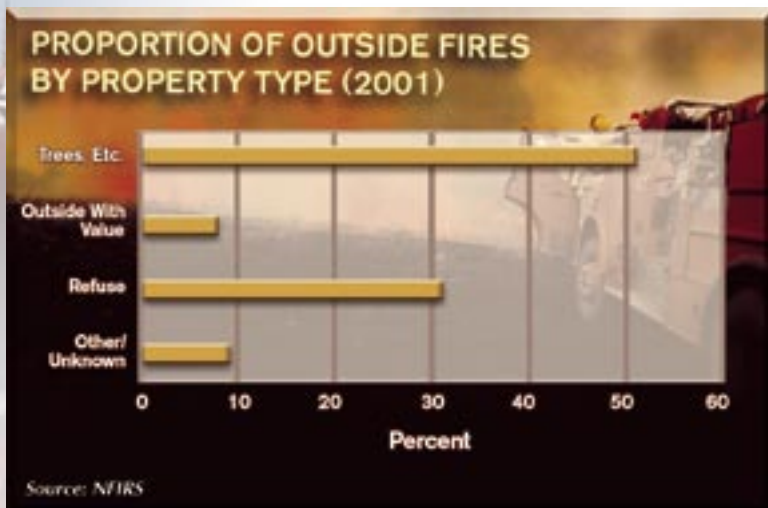
More than a quarter of vehicle fires are attributed to arson, and 30% of deaths. Many vehicle fires are not investigated for arson by the fire service, so these percentages may be understated. Insurance companies do investigate the most obvious arson fires before paying claims, but their findings are not necessarily reflected in the NFIRS database.

Human acts (carelessness) include distractions while driving (cell phone use, dropped cigarettes, eating/drinking) and misuse of flammable liquids while servicing the vehicle.

Outside/Other

Outside properties include fires where the type of situation found is outside of the structure, either where the burning material has a value or where the fire is confined to trees, brush, grass, or refuse. A subset of outside fires is wildland fires. Grouped in the "other" category are fires whose situation found is not classified, flammable liquid spills out of doors with ensuing fires, and explosions.

Outside fires represent a substantial portion of the yearly activity by the fire service. Over the past 10 years, outside fires have averaged nearly 776,000 each year, but the trend has decreased 13%. In 2001, 41% of all fires were outside fires. Arson was the cause of 30% of 2001 outside fires with value. Arson is reported as the leading cause of outside fires, although determining the cause of such fires is usually difficult. Many outside arson fires are believed to be caused by children.

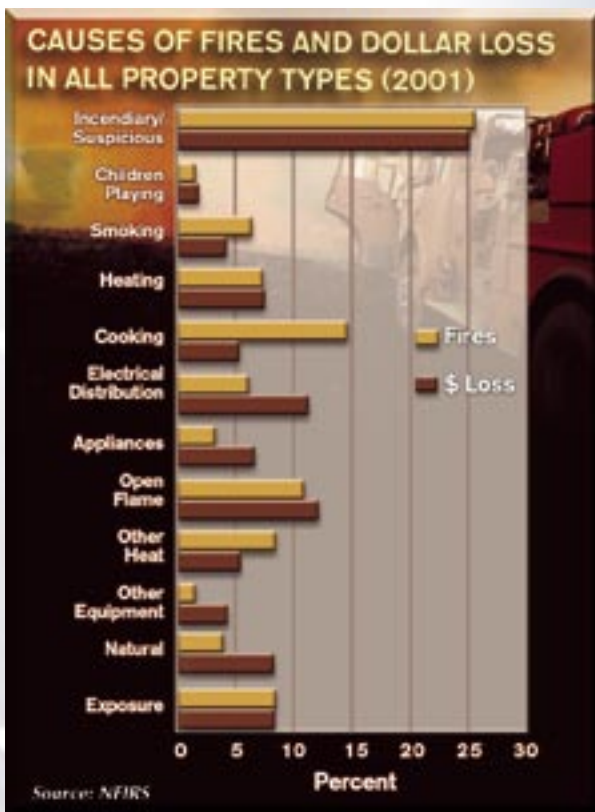


Setting a dollar value to most outside fires is difficult and varies widely from year to year. Outside fires may have considerable indirect costs, such as the financial impact on agricultural communities where a fire destroys crops.

CAUSES

The cause of a fire, death, or injury cannot always be determined with certainty. The cause categories used in NFIRS were designed to reflect the causes of structure fires where the majority of fatal fires occur. These categories have usefulness for other fires as well, but there are limitations. Our present best estimate of fire causes is based on the distribution of fires with known cause across 12 major cause categories. The percentages shown in the following chart reflect these proportional distributions.

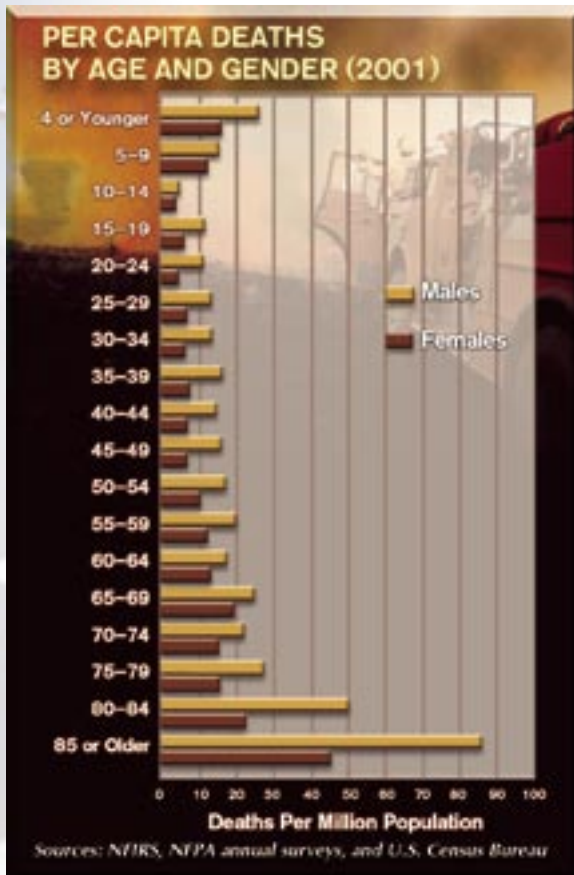
The leading three causes of fire in 2001 for all property types were incendiary/suspicious (arson) (25%), cooking (15%), and open flame (11%). Arson and smoking combined resulted in 45% of deaths. Cooking (23%), open flame (14%), and arson (13%) were the leading three causes of injuries. Cooking fires are often the result of the ignition of loose clothing or other nearby flammable materials and from unattended cooking where grease or oil ignites. One-quarter of all dollar losses were due to arson incidents.



ETHNIC, GENDER, AND AGE CHARACTERISTICS

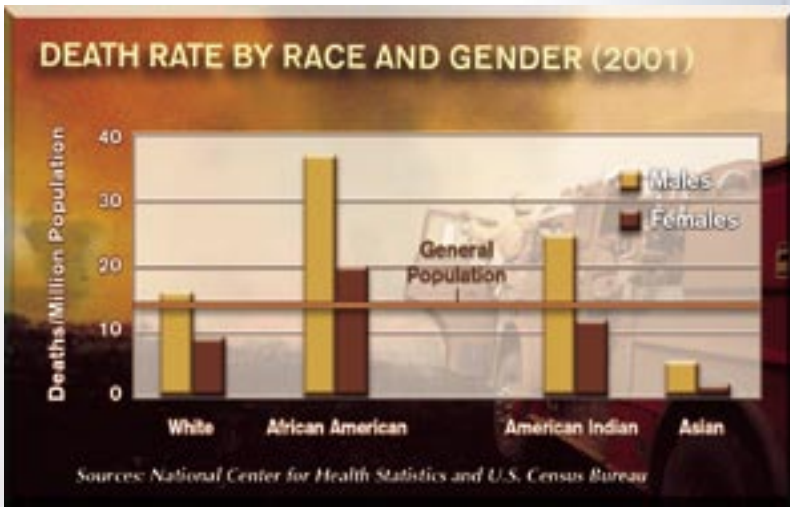
Fire losses affect all groups and races, rich and poor, North and South, urban and rural. But the problem is higher for some groups than for others. African Americans and American Indians have much higher death rates per capita than the national average. African Americans comprise a large and disproportionate share of total fire deaths, accounting for 25% of fire deaths—twice as high as their share of the overall population.

Over the past 10 years, nearly twice as many men have died in fires as women, although the proportion has narrowed slightly in recent years. The reasons for the disparity of fire injuries between men and women may include the greater likelihood of men being intoxicated, the more dangerous occupations of men (most industrial fire fatalities are males), the greater use of flammable liquids by men, and the fact that risk taking is predominately a male attribute. After age 60, more females died in 2001 than did males, but this is because the female-to-male ratio increases (i.e., women live longer than men). Male fire deaths, by contrast, are very much higher in the mid-life years (20–49).



People with limited physical and cognitive abilities, especially the very young and very old, are at a higher risk of death and injury from fire than other groups. In 2001 alone, USFA estimates that 2,900 children under the age of 15 and 2,200 older adults (65 and older) were injured. Fire deaths for children under the age of 15, as reported from death certificates, numbered 599; an additional 1,250 deaths were reported for older adults. These two age groups accounted for 46% of 2001 reported fire deaths and 25% of estimated fire injuries.

Children under age 5 are 40% more likely to die in a fire than the general population. As the age of the child increases, the likelihood of dying in a fire decreases. African American and American Indian children are nearly twice as likely to die in a fire than white or Asian children.



REGIONAL PROFILES

The fire problem varies from region to region and state to state because of variations in climate, socioeconomic status, education, demographics, and other factors. Four states (Alaska, Arkansas, Delaware, and Mississippi) have fire death rates that exceed 25 deaths per million population; this rate is one of the worst among the world's nations. Eleven states, mostly situated in the Southeast, have death rates per million population between 17 and 25.

The foldout at the end of this brochure presents the fire death rate for each of the 50 states and the District of Columbia and compares this rate with the national rate of 13.1 per million population. Twenty-three states have fire death rates below the national rate. There has been great progress by states in lowering both the absolute number of deaths and the deaths per capita. As recently as 1996, 12 states (including the District of Columbia) had 25 or more deaths per million population; in 2001, only 4 states had 25 or more.

Ten states in 2001, mostly large population states, account for 45% of the national total U.S. fire deaths as reported by state fire marshal offices. Unless their fire problems are significantly reduced, the national total will be difficult to lower.

The progress in reducing fatalities throughout the country is due in part to the fire prevention programs, outreach programs, and other fire-related initiatives instituted at local, county, and state levels. These programs include the distribution of free smoke alarms, development of fire education information on children's Web pages, provision of instructional materials for educators on juvenile firesetting, and many



others. Most state fire marshal offices have Web sites that are very informative and include current programs.

DETECTION AND EXTINGUISHMENT SYSTEMS

Structures equipped with smoke alarms or automatic extinguishing systems (AESS)—most often sprinkler systems—are thought to account for a large portion of the decrease in reported fires and deaths over the past two decades.

Over 90% of U.S. households now have at least one smoke alarm. Households with no installed alarms have a greater incidence of reported fires than those with functioning smoke alarms. Either people with alarms are more safety conscious or the alarms allow early detection and extinguishment so that fires are not reported. Anecdotal information suggests that reported fires are more prevalent in older, less well cared for homes, and these are less likely to be equipped with a smoke alarm. Only 67% of households that had fires were reported to be equipped with a smoke alarm, slightly below the national average. Only 60% of households where a fire death occurred were equipped with smoke alarms; of those, 39% did not operate. These results clearly indicate that smoke alarms do contribute to saving lives.



SMOKE ALARM PRESENCE IN RESIDENCES (2001)

	Alarm Present, Operated		Alarm Present, Did Not Operate		No Alarm	
	No. Fires	% Deaths	No. Fires	% Deaths	No. Fires	% Deaths
All Residences	30	26	9	14	19	26
1- and 2-Family Dwellings	26	22	9	13	22	30
Apartments	45	61	9	20	9	5

Source: NFIRS 2.0 data only

One- and two-family homes in which fires occur have, proportionally, fewer alarms installed than in apartments that experience fires. This may be because apartment smoke alarms are often provided by landlords and are more often required by law than one- and two-family dwellings.

The fact that a large portion of fatalities occurred in apartments in which a smoke alarm was working is troublesome. Explanations include the possibility that hallway or apartment alarms operated after the victims were overcome or that there were fewer ways to escape, especially on higher floors. This situation suggests the need to provide sprinklers in apartments and to emphasize fire prevention to occupants. Additionally, multiple false alarms may occur in apartments due to smoke from burning food or pots. Because of these repetitive incidents, tenants may be more inclined to ignore the fire alarm.

Another surprising fact is that in residences where a death occurred, a higher percentage of smoke alarms did not operate in apartments than in one- and two-family homes. This result is unexpected as apartment alarms are more likely to be hardwired into the electrical system and professionally maintained than alarms in dwellings.

Residential sprinklers were found in fewer than 3% of homes that had reported fires in 2001. The actual number of sprinklers installed in residences may be underestimated since an operating sprinkler could have extinguished a fire and no call was made to the fire department. A higher percentage of apartments were equipped with sprinklers than one- or two-family dwellings (8% vs. 1%). Use of sprinklers in apartments appears to be growing.

Sprinklers and other AESs are more prevalent in non-residential structures (15%). This is not unexpected since commercial properties and public assembly sites tend to occupy large structures that have been built to strict construction codes. Also, owners and proprietors of such sites have a great need to protect their property.

FIREFIGHTER CASUALTIES

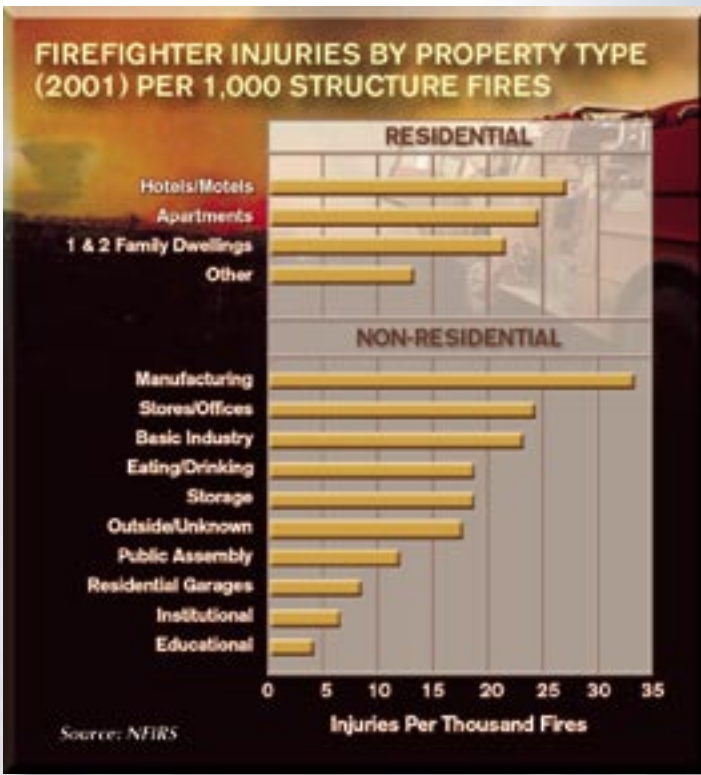
The U.S. Fire Administration currently reports that a total of 449 firefighters perished in 2001, 344 of whom were victims of the World Trade Center (WTC) attacks. Excluding the WTC deaths, 66 of the 102 firefighters who died were engaged in emergency services, and 38 of these occurred directly during fireground operations. The fatalities included 27 career firefighters and 75 volunteers; 5 were women. Unlike the previous four editions of this document in which the firefighter fatality trend decreased, the 10-year trend from 1992 to 2001 increased 30%. Although this jump appears acute, the total deaths are small enough that a change of even a few deaths in a year may dramatically impact the 10-year trend line.

As in all previous years, the most frequent cause of deaths was stress or over-exertion. Of the 102 firefighter deaths in 2001, 44 died from heart attacks or strokes. Of these, 33 were over the age of 40, and 24 were over the age of 50. In fact, from 1996 through 2001, 256 firefighters have died as a result of heart attacks and strokes. Recognizing this danger, the USFA has outlined programs, procedures, and activities that encourage firefighters to improve their health regimen.



More firefighters died (14) in 2001 during training exercises than in any of the previous 10 years; 9 were from heart attacks.

In 2001, 82,250 firefighters were injured on duty, half of which were at the fireground. When compared to the 20,300 civilian injuries during this period, firefighters are at considerable risk. Sixty-nine percent of these injuries occurred in residential dwelling fires and 19% in non-residential structures. The total number of firefighter injuries in 2001, however, dipped to their lowest point in 10 years, and the overall 10-year injury




trend declined 17%. Twenty-one firefighters were injured for every 1,000 structure fires in 2001.

The percentages of injuries by firefighter age have not changed much over the past 10 years. More than one-third of injuries occurred to firefighters aged 30–39. The leading cause of injury among younger firefighters relates to smoke inhalation, and among older firefighters strains and sprains are more common injuries. These results relate to physical fitness variations with age, to the effect of age on assignments, and perhaps to the bravado of younger firefighters. Nearly all (96%) of the injuries occurred at the fire scene, and 78% were injured extinguishing the fire, neutralizing the incident, or providing suppression support.

CONCLUSIONS

This report clearly shows that the fire problem in the United States is improving. Ten-year trends are down. Deaths and injuries to civilians and firefighters are down. Per capita rates are down. Several factors have likely contributed to these trends:

- ◆ Firefighter equipment and training, which have improved.
- ◆ Fire codes, which have been strengthened.

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- ◆ Smoke alarms, whose usage has become nearly universal over the past two decades.
 - ◆ Sprinklers, which quickly combat incipient fires, especially in non-residential structures and recently in apartments. Public education programs could better inform homeowners of their value in residences.
 - ◆ Construction techniques and materials, which have been specifically targeted to fire prevention.
 - ◆ Public education at the community, county, state, and federal levels, which seems to be increasing.

Areas of continuing concern include:

- ◆ The very young and very old continue to be at high risk.
- ◆ Certain ethnic groups are at enormous risk to fire injuries and death.
- ◆ Contiguous states often have similar fire profiles. A study to determine reasons for this could uncover severe problem areas or, conversely, reveal best practices.
- ◆ A large number of fatalities occurred in residential fires where a smoke alarm was installed and operated. Further study is recommended to understand the reasons for this occurrence.
- ◆ Arson is an enormous problem in the United States, especially to outside and non-residential structure properties. Economically, arson accounts for 25% of property loss from all fires, double that of the next leading cause.
- ◆ The true effectiveness of automatic extinguishment systems needs to be examined.
- ◆ Heating is the second leading cause of fire in one- and two-family dwellings. Public awareness programs alerting residents to potential dangers from heating sources should prove effective.
- ◆ Aggressive policies need to continue in order to lessen the high proportion of firefighter deaths due to heart attacks.
- ◆ Twenty-one firefighters are injured per 1,000 structure fires. Programs to reduce this rate should be developed.
- ◆ A review of international fire prevention programs that have proved effective could lead to similar improvements in the United States.

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

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The USFA's National Fire Data Center has published hundreds of analytical and statistical reports that address a wide range of subjects relating to fire and fire prevention in the United States. These reports are free to the public and may be ordered or, in most cases, downloaded at <http://usfa.fema.gov/usfapubs>.

FIRE DEATH RATE IN THE UNITED STATES (per million population)



Source: State fire marshal offices or equivalents and the U.S. Fire Administration; fire death data for Arkansas, Colorado, Pennsylvania, and Virginia are from NCHS

NOTE: This chart does not include state deaths incurred during the September 11, 2001 attacks on the World Trade Center and the Pentagon.

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