

U.S. SMOKING-MATERIAL FIRE PROBLEM

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Abstract

In 2006, there were an estimated 142,900 smoking-material fires in the U.S., up from 135,100 in 2005. These fires resulted in an estimated 780 civilian deaths, 1,600 civilian injuries and \$606 million in direct property damage. Upholstered furniture and mattresses and bedding are the first items ignited for most home structure fatal fires started by smoking materials. One out of four fatal victims of smoking-materials is not the smoker whose cigarette started the fire. Fewer fatal smoking-material fires started in living rooms, family rooms, and dens than in bedrooms. In recent years, Canada and three out of four U.S. states, with four-fifths of the U.S. population, have passed legislation requiring that all cigarettes sold be “fire safe,” that is, have sharply reduced ignition strength (ability to start fires), as determined by ASTM Standard E2187-04.

Keywords: Smoking, cigarette, fire statistics, fire safe cigarette

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Executive Summary

In 2006, there were an estimated 142,900 smoking-material fires in the U.S., up from 135,100 in 2005. These fires resulted in an estimated 780 civilian deaths, 1,600 civilian injuries and \$606 million in direct property damage, all up from the year before. The long-term trend in smoking-material fires has been down, by 57% from 1980 to 2006, helped by the decline in smoking and by the effect of standards and regulations that have made mattresses and upholstered furniture more resistant to cigarette ignition. (In this analysis, “smoking materials” refer only to lighted tobacco products, not matches or lighters.)

Mattresses and bedding, upholstered furniture, and trash are the items most commonly ignited in smoking-material home fires. These items excluding trash also account for most associated fire deaths. More fatal smoking-material fires start in bedrooms than in living rooms, family rooms, and dens; this is the first study in this series to show this pattern.

One out of four fatal victims of smoking-material fires is not the smoker whose cigarette started the fire.

The risk of dying in a home structure fire caused by smoking materials rises with age. One-third (36%) of fatal home smoking-material-fire victims were age 65 or older, compared to their 12% share of the population. Older adults (age 65 and over) are less likely to smoke than younger adults. Therefore, their high rates of smoking-material fire deaths per million people are even more noteworthy.

A USFA/NFPA study recommended seven educational messages to support the behavioral side of a comprehensive strategy to reduce smoking fires:

- If you smoke, smoke outside.
- Whenever you smoke, use deep, wide, sturdy ashtrays. Ashtrays should be set on something sturdy and hard to ignite, like an end table.
- Before you throw out butts and ashes, make sure they are out. Dowsing in water or sand is the best way to do that.
- Check under furniture cushions and in other places people smoke for cigarette butts that may have fallen out of sight.
- Smoking should not be allowed in a home where oxygen is used.
- To prevent a deadly cigarette fire, you have to be alert. You won't be if you are sleepy, have been drinking, or have taken medicine or other drugs.
- If you smoke, choose fire-safe cigarettes. They are less likely to cause fires.

Since 2003, Canada and three out of four U.S. states, with four-fifths of the U.S. population, have passed laws or other requirements that all cigarettes sold must be “fire safe,” that is, have sharply reduced ignition strength (ability to start fires), as determined by ASTM Standard E2187-04.

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Smoking-Material Fire Problem

U.S. fire departments responded to an estimated 142,900 smoking-material fires in 2006. These fires caused:



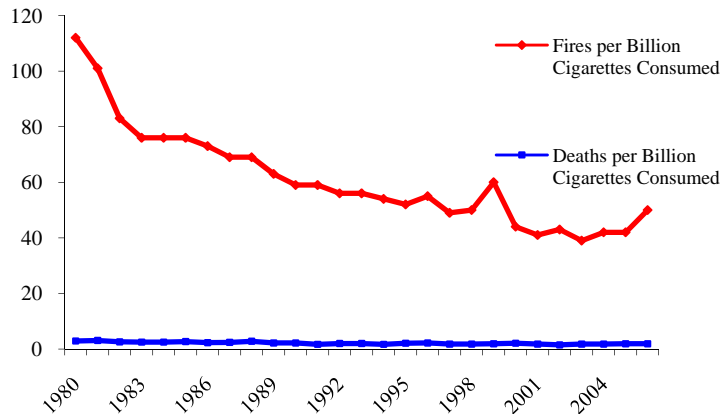
- 780 civilian deaths
- 1,600 civilian injuries, and
- \$606 million in direct property damage.

These estimates are derived from the U.S. Fire Administration National Fire Incident Reporting System (NFIRS) Version 5.0 and NFPA’s annual fire department experience survey.

Trends in the Smoking-Material Fire Problem Fire Loss Rates, 1980-2006

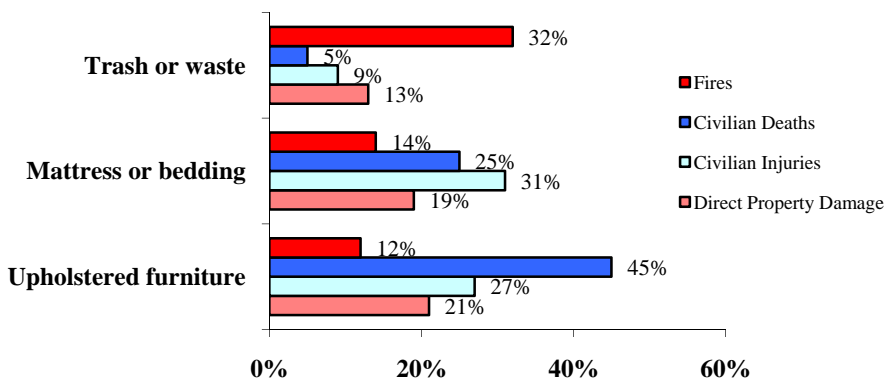


FACT: One out of four fatal victims of smoking-materials is not the smoker whose cigarette started the fire.



In recent years, Canada and three out of four states, with four-fifths of the U.S. population, have required that all cigarettes sold must be “fire safe,” that is, have sharply reduced ignition strength or ability to start fires. When these laws are fully implemented, it is expected they will have an impact on future smoking material fire data. See www.firesafecigarettes.org for more details.

Smoking-Material Fires in Homes by Leading Item First Ignited in 2003-2006 (Including Fires Reported as Confined)



FACT: More fatal smoking-material fires start in bedrooms then in living rooms, family rooms and dens.



FACT: The risk of dying in a home structure fire caused by smoking materials rises with age.

Fires Started by Smoking Materials

In 2006, an estimated 142,900 smoking-material fires caused 780 civilian deaths, 1,600 civilian injuries and \$606 million in direct property damage.

Fires started by smoking materials (i.e., lighted tobacco products but not matches or lighters) were down by 57% from 1980 to 2006 but were up from their low of 101,300 in 2003. Civilian deaths and injuries and associated property damage (adjusted for inflation) were all near their all-time lows and well down from 1980 levels. (See Table 1 and Figures 1-3.)

Deaths per 100 smoking-material structure fires declined for the second year in a row but remains historically high. The average severity in terms of civilian injuries per 100 fires declined in 2002-2006 to the lowest level since 1983-1987. (See Table 1 and Figures 1-5.)

Smoking-related home structure fire deaths have declined faster than smoking itself.

Table 2 shows that cigarette consumption declined by 41% from 1980 to 2006, but smoking-material home structure fire deaths declined 65%, and smoking-material home structure fire civilian deaths per million cigarettes declined by 35%. However, the rate of deaths relative to cigarette consumption have shown no consistent trend since the early 1990s.

One-fourth of all 2006 U.S. structure fire deaths involved smoking materials.

Smoking materials were by far the leading cause of civilian deaths in U.S. structure fires. One of every four civilian structure fire deaths (27%) in the U.S. in 2006 were attributed to smoking materials.

The rate of cigarette structure fires per million cigarette smokers is higher than the rate of cigar or pipe structure fires per million cigar or pipe smokers by more than 10-to-1.

In 2003-2006 home structure fires, excluding fires reported as confined fires, there were 57 cigarette-started structure fires for every one started by a pipe or cigar. By contrast, current cigarette smokers age 12 and over outnumbered current cigar or pipe smokers age 12 and over by only 4- or 5-to-1 in 2004 and 2005.*

Standards have made mattresses and upholstered furniture more resistant to smoking-material ignition.

Mattresses and bedding, upholstered furniture, and trash were the items most often ignited by smoking materials in home fires, and together they accounted for three-fifths of those fires, three-fourths of associated deaths, and two-thirds of associated injuries. (See Table 3.) In 2003-2006, mattress or bedding accounted for the second largest share of fires (18%) and associated deaths (25%). Upholstered furniture accounted for the third largest share of fires (15%) and the largest share of associated deaths (45%). Trash accounted for the largest share of fires (32%), primarily due to confined fires.

Table 4 shows the trend in smoking-material structure fires since 1980 for these three classes of items and for clothing.

**Statistical Abstract of the United States: 2008, Washington: U.S. Census Bureau, 2008, Table 195.*

Smoking-related home fires starting in upholstered furniture and in mattresses and bedding have declined by 91% and 90%, respectively, from 1980 to 2006. A mandatory U.S. Standard for the Flammability of Mattresses (and Mattress Pads), Title 16 CFR 1632, was enacted in 1973. A voluntary standard for upholstered furniture, the so-called "Upholstered Furniture Action Council (UFAC) standard," was introduced in the late 1970s and at that time was judged sufficiently substantial as to remove the need for a mandatory action.

The success of these two standards has been measured by studies of shifts in production toward less ignitable materials.* Composite indices of the susceptibility to smoking-material ignitions for upholstered furniture and mattresses in use declined 18.4% and 36.1%, respectively, from 1980 to 1984, compared to declines of 37.8% and 35.1%, respectively, in the number of residential structure fires per billion cigarettes consumed beginning with ignition of these two types of items. This means the ignitability indices matched the decline in mattress fire rates quite well and the decline in upholstered furniture fire rates less well.

The gradual impact of these standards helps explain why the mattress, bedding and upholstered furniture share of home smoking-related fires has dropped so much (from 64% to 24% of fires, from 85% to 71% of fire deaths). (See Table 4.)

Items other than those targeted fuel sources (e.g., clothing) have seen their smoking material fires decline substantially as well. It is possible that favorable changes affecting all smoking-material fires – the decline in the number of smokers, the growth in the use of smoke alarms – have had more of an impact than those changes that specifically targeted smoking-material-fires involving particular items (such as upholstered furniture and mattresses). It is possible that factors affecting fires of all causes, not just smoking materials, had more of an impact than factors specific to smoking-material fires. It is also possible that the full benefits from the targeted programs have yet to arrive.

Most smoking-material structure fires and losses occur in homes.

In 2003-2006, three-fourths of smoking-material fires (75%), excluding fires reported as confined fires, occurred in homes. These fires accounted for 93% of structure fire civilian deaths due to smoking materials, 87% of structure fire civilian injuries due to smoking materials, and 86% of direct property damage due to smoking-material structure fires. (See Table 5.)

Nearly all home smoking-material fires are unintentional.

Table 6A shows that only 3% of home smoking-material fires were intentional in 2003-2006, and only 1% of associated deaths occur in intentional fires. Table 6B shows that only 1% of home smoking-material fires involved someone playing with the heat source.

The coding available on factor contributing to ignition does not have enough detail on the circumstances leading up to the fire to permit us to estimate even roughly how many smoking-material fires involve specific problems with inadequate ashtrays, poor placement or use of ashtrays, or use of some inappropriate substitute for disposal or storage of burning cigarettes or ashes. All that can be said is that most fires are attributed to some error in control or disposal.

*See, for example, John R. Hall, Jr., *Final Report: Expected Changes in Fire Damages From Reducing Cigarette Ignition Propensity*, prepared for the Technical Study Group of the Cigarette Safety Act of 1984, Quincy: NFPA, July 16, 1987.

Three of the seven educational messages developed in the NFPA/USFA project on behavioral mitigation of smoking fires had to do with safe storage and disposal of burning cigarettes, butts, and ashes:*

Whenever you smoke, use deep, wide, sturdy ashtrays. Ashtrays should be set on something sturdy and hard to ignite, like an end table.

Before you throw out butts and ashes, make sure they are out. Dowsing in water or sand is the best way to do that.

Check under furniture cushions and in other places people smoke for cigarette butts that may have fallen out of sight.

The PowerPoint presentations included with the project report on the U.S. Fire Administration website include many pictures of good vs. bad ashtrays, ashtray locations, and ways of using ashtrays.*

Sleeping is the primary human factor contributing to ignition cited for one-third (32%) of home smoking-material fire deaths.

Possible drug or alcohol impairment was cited for 19% of the deaths. Table 6C indicates that only one-third (33%) of home smoking-material fires cited a human factor in the initiation of the fire (as opposed to a human factor in the injury suffered by a victim, which is discussed later). These are fires that did not say None under human factor. For fire deaths and injuries, roughly two-thirds (61% and 69%, respectively) cited at least one factor.

For the first time since this report series began, bedroom was the leading area of origin for civilian deaths in home structure fires involving smoking materials in 2003-2006.

Table 7 shows that bedrooms together with living rooms, family rooms, and dens account for 70% of smoking-related home structure fire deaths, but the combination of living rooms, family rooms and dens accounted for fewer fire deaths than bedrooms.

Educational messaging has moved away from the injunction not to smoke in bed in favor of a more broadly based message that reflects the diversity of actual fatal fire experience.*

To prevent a deadly cigarette fire, you have to be alert. You won't be if you are sleepy, have been drinking, or have taken medicine or other drugs.

Outside locations – exterior balcony or unenclosed porch; exterior wall surface; courtyard, patio, porch, or terrace (probably including unenclosed decks); exterior stairway; unclassified outside area; and exterior roof surface – collectively account for a substantial share of home smoking-material structure fires (26%) but a small share of associated deaths (4%). This is not surprising, because outside locations have barriers separating them from the rest of the home, thereby preventing the easy spread of fire and fire effects to endanger the occupants. For this reason,

* John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-mitigation.shtm>, 2006.

the first listed educational message in the NFPA/USFA project on behavioral mitigation of smoking fires encouraged smoking outdoors:*

If you smoke, smoke outside.

A 2003 survey by the U.S. Centers for Disease Control and Prevention found that 72% of all U.S. households ban indoor smoking (up from 43% in 1992-1993) and 32% of all households with at least one smoker ban indoor smoking (up from 10% in 1992-1993.** For households with no smokers, the percentage banning indoor smoking was 84% (up from 57% in 1992-1993).

Smoking-related home fires peak in frequency in late afternoon and early evening.

Figure 6A shows these fires peaking during the afternoon and early evening, but associated civilian fire deaths peak in the early morning (during 1:00 to 5:59 a.m.), which may suggest a long smoldering period for unnoticed, discarded cigarettes, which erupt into flames when no one is awake to discover them, and may suggest smoking while less alert due to drowsiness, drinking, or nighttime drugs.

As a share of all home fires, smoking-material fires vary from 5% to 10% by hour of the day. As a share of all home fire deaths, smoking-material fires vary considerably from hour to hour with little consistent variation by time of day. (See Figure 6B.)

Smoking-related home fires and deaths peak during colder months, when people spend proportionally more time indoors and smokers may do much more of their smoking indoors.

Figure 7 shows fires peaking in March and April while deaths peak in January through April. In those four months, cold temperatures are most likely to drive smokers indoors. This is further evidence of the potential benefit of educating smokers to smoke outside at home. January to April (one-third of months) accounted for nearly half (45%) of the deaths. September to December (one-third of months) accounted for one-third (32%) of the deaths, right on the average. May to August (one-third of months), the warmest block of four months, accounted for one-fifth (22%) of the deaths.

Tobacco products are also cited in 9,600 injuries a year reported to U.S. hospital emergency rooms.

The total was 9,600 in 2006, according to the National Electronic Injury Surveillance System (NEISS), maintained by the U.S. Consumer Product Safety Commission (CPSC). Roughly half of the 2006 injuries (49%) were thermal burns, which could come from fire effects or direct contact. The next leading type of injury was poisoning (16%), presumably from swallowing tobacco. Children 4 years old or younger accounted for 22% of the injuries, which suggests educational messages to keep matches and lighters out of sight and out of reach of small children might usefully be expanded to include cigarettes.

*John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-mitigation.shtm>, 2006.

** "State-specific prevalence of smoke-free home rules – United States, 1992-2003," *MMWR Weekly*, May 25, 2007, accessed at <http://www.cdc.gov> on September 11, 2007.

Canada's smoking-material fire problem may be larger proportionally than that of the U.S.

Civilian deaths and injuries and direct property damage in smoking-material fires in U.S. are higher than those in Canada by roughly 3-to-1 to 5-to-1 while the U.S. population is nearly 9 times that of Canada. The proportion of people who smoke is slightly higher in Canada, by 1-4 percentage points, depending on the year and the studies used for comparison. Also, Canada's statistics include matches and lighters when used as smoker's materials. (See Table 8.)

The U.S. population is also slightly more than twice the population of Japan, while U.S. smoking-material fire deaths are more than three times those in Japan. The U.S. population is nearly five times the population of the United Kingdom, while U.S. home smoking-material fire deaths are also about five times the corresponding totals in the U.K.

An important strategy centers on reduced ignition strength cigarettes.

One of the seven educational messages developed in the NFPA/USFA project on behavioral mitigation of smoking fires had to do with reduced ignition strength cigarettes*:

If you smoke, choose fire-safe cigarettes. They are less likely to cause fires.

Since 2003, Canada and three out of four U.S. states, with four-fifths of the U.S. population, have passed laws or other requirements that all cigarettes sold must be "fire safe," that is, have sharply reduced ignition strength (ability to start fires), as determined by ASTM Standard E2187-04.

See the sidebar on the next two pages for more on the fire-safe cigarette.

* John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-migigation.shtm>, 2006.

Sidebar from the Coalition for Fire-Safe Cigarettes
at www.firesafecigarettes.org

What is a fire-safe cigarette?

A fire-safe cigarette has a reduced propensity to burn when left unattended. The most common fire-safe technology used by cigarette manufacturers is to wrap cigarettes with two or three thin bands of less-porous paper that act as “speed bumps” to slow down a burning cigarette. If a fire-safe cigarette is left unattended, the burning tobacco will reach one of these speed bumps and self-extinguish.

Fire-safe cigarettes meet an established cigarette fire safety performance standard (based on ASTM E2187, Standard Test Method for Measuring the Ignition Strength of Cigarettes.)

Is it possible for a “fire-safe” cigarette to ignite furniture or bedding?

All cigarettes have the *potential* to ignite fires, but the use of “fire-safe” technology provides a tremendous reduction in those risks. A fire-safe cigarette cuts off the burning time before most cigarettes are able to ignite things like furniture or bedding material.

MYTH: Fire safe cigarettes are more toxic.

FACT: There is no evidence that reduced ignition propensity cigarettes are any more harmful to health. A report by RJ Reynolds conducted in 1993 compared the tar per cigarette in prototype low-ignition propensity cigarettes. The report concludes: “Ames assay results were not higher for the prototype cigarettes than their respective controls, either on a revertant-per-mg-tar basis or a revertant-per-cigarette basis.”

[A] Harvard School of Public Health study showed there were no substantial differences in toxicity when key indicators were measured for fire-safe cigarettes and their conventional counterparts. The report states, “The majority of smoke toxic compounds (14) tested were not different between New York and Massachusetts brands. Five compounds were slightly higher in New York brands. There is no evidence that these increases affect the already highly toxic nature of cigarette smoke.”

MYTH: People will behave carelessly with these fire-safe cigarettes.

FACT: Even tobacco industry documents show that people will remain careful with the new types. A 1991 report of focus groups prepared for RJ Reynolds on consumer behavior with fire-safe cigarettes concludes, “virtually all respondents said they would not alter their current smoking behavior.”

It goes against common sense to believe that people who have never before been reckless about how they smoke will suddenly become reckless because of a change in what they smoke. The millions of smokers who would like to be safer from fire should be given the tools that exist to save lives.

Sidebar from the Coalition for Fire-Safe Cigarettes (Continued)
at www.firesafecigarettes.org

MYTH: Cigarette sales dropped in New York State because of the new law that requires the sale of only fire-safe cigarettes.

FACT: The January 2005 Harvard School of Public Health study shows that no change in *per capita* cigarette sales occurred in New York when comparing the five months following their regulation compared with the corresponding time period the year before. The report found “New York has experienced no decline in cigarette sales or excise tax payments since the standard went into effect.” A 2.5% drop in cigarette revenue was “found not to be statistically significant when accounting for month-to-month and state-to-state variation.” In addition, because the price was not raised and many consumers have not even noticed the change, any decrease in sales would most likely be attributed to other factors, such as decreased smoking rates.

MYTH: State cigarette tax revenue will evaporate.

FACT: The Harvard School of Public Health researchers reviewed New York tax data for six months after the implementation of the new law. They found the lower ignition strength cigarettes appeared to have no effect on sales of cigarettes in New York. NASFM President and New York State Fire Administrator James A. Burns concurred with the analysis, saying the state has not lost revenue.

MYTH: The law discriminates against “mom and pop” retailers.

FACT: The New York requirement applies in all retail sales in the state, so there is no discrimination on the size of the retailer. The Harvard School of Public Health study found that cigarette sales in New York have not diminished since the new regulation has taken effect.

**Table 1. Fires Involving Smoking Materials, by Major Property Use and Year
Fires Reported to U.S. Fire Departments**

A. Fires

Year	Homes	All Other Structures	Total Structures	Vehicles	Outdoor and Other	Total
1980	70,800	33,500	104,300	23,600	206,400	334,300
1981	64,700	30,900	95,600	20,900	217,600	334,000
1982	52,400	24,700	77,100	16,600	172,000	265,800
1983	45,300	21,500	66,800	14,500	146,500	227,800
1984	45,600	21,100	66,700	14,900	159,000	240,600
1985	44,900	21,600	66,500	14,500	167,300	248,300
1986	42,500	20,100	62,600	12,800	155,900	231,300
1987	39,800	18,900	58,700	13,500	159,800	231,900
1988	38,900	16,700	55,600	12,300	183,800	251,700
1989	34,000	14,600	48,700	10,200	149,000	207,900
1990	30,800	13,200	44,000	9,200	142,500	195,800
1991	29,900	12,700	42,600	8,300	136,200	187,100
1992	28,000	12,100	40,200	7,200	115,700	163,100
1993	27,200	11,400	38,600	6,800	106,500	151,900
1994	26,300	11,200	37,500	6,800	109,900	154,100
1995	25,400	10,100	35,400	7,500	110,400	153,400
1996	26,600	10,900	37,600	8,900	123,100	169,500
1997	23,300	9,800	33,100	6,900	97,000	136,900
1998	23,200	10,100	33,200	6,700	100,900	140,800
1999	26,000 (25,100)	10,600 (7,600)	36,600 (32,600)	6,900	172,900	216,500
2000	18,800 (17,300)	10,200 (5,900)	28,900 (23,200)	7,000	120,500	156,500
2001	17,300 (15,300)	9,500 (5,500)	26,900 (20,800)	5,700	94,400	127,000
2002	17,900 (15,500)	9,800 (5,400)	27,700 (20,900)	5,400	95,200	128,300
2003	15,700 (13,300)	8,000 (4,600)	23,700 (18,000)	5,200	72,300	101,300
2004	16,300 (13,000)	8,300 (4,400)	24,600 (17,400)	4,900	74,800	104,300
2005	15,800 (12,700)	12,200 (4,500)	28,000 (17,200)	5,000	102,000	135,100
2006	18,700 (14,800)	11,700 (4,300)	30,400 (19,100)	5,600	106,900	142,900

Note: Numbers in parentheses exclude fires reported as confined to trash container; these are analyzed separately. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred. Figures include a proportional share of fires with source unknown or unknown between smoking material and open flame. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 1. Fires Involving Smoking Materials, by Major Property Use and Year
Fires Reported to U.S. Fire Departments (Continued)**

B. Civilian Deaths

Year	Homes	All Other Structures	Total Structures	Vehicles	Outdoor or Other	Total
1980	1,820	150	1,960	20	0	1,980
1981	1,980	210	2,190	20	0	2,210
1982	1,680	80	1,760	30	0	1,790
1983	1,510	90	1,600	20	10	1,620
1984	1,480	110	1,590	10	0	1,600
1985	1,580	110	1,690	20	0	1,700
1986	1,350	100	1,460	30	0	1,490
1987	1,380	80	1,460	30	0	1,490
1988	1,570	70	1,640	20	0	1,660
1989	1,190	50	1,240	20	0	1,270
1990	1,150	70	1,220	30	0	1,250
1991	880	60	930	10	0	950
1992	1,000	60	1,060	10	0	1,070
1993	980	40	1,020	10	0	1,030
1994	840	60	900	0	0	910
1995	1,040	70	1,110	10	10	1,120
1996	1,090	60	1,150	30	10	1,180
1997	870	40	900	10	0	920
1998	850	30	880	20	0	900
1999	840 (840)	120 (120)	970 (970)	0	0	970
2000	900 (900)	0 (0)	900 (900)	30	0	930
2001	760 (760)	100 (100)	860 (860)	10	0	860
2002	600 (600)	30 (30)	630 (630)	20	0	640
2003	710 (710)	70 (70)	780 (780)	0	0	780
2004	710 (710)	40 (40)	750 (750)	10	10	770
2005	730 (730)	60 (60)	780 (780)	20	10	800
2006	700 (700)	50 (50)	740 (740)	30	10	780

Note: Numbers in parentheses exclude fires reported as confined to trash container these are analyzed separately. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred. Figures include a proportional share of fires with heat source unknown or unknown between smoking material and open flame. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 1. Fires Involving Smoking Materials, by Major Property Use and Year
Fires Reported to U.S. Fire Departments (Continued)**

C. Civilian Injuries

Year	Homes	All Other Structures	Total Structures	Vehicles	Outdoor or Other	Total	
1980	4,190	870	5,050	160	70	5,280	
1981	4,030	1,140	5,160	160	110	5,430	
1982	3,710	640	4,350	230	120	4,700	
1983	3,680	770	4,450	130	40	4,620	
1984	3,340	540	3,880	150	70	4,100	
1985	3,330	440	3,770	160	60	4,000	
1986	2,980	460	3,440	160	50	3,640	
1987	3,100	520	3,620	150	40	3,810	
1988	3,570	610	4,170	110	70	4,350	
1989	2,970	430	3,400	120	30	3,560	
1990	2,930	430	3,360	120	50	3,530	
1991	2,730	490	3,220	100	60	3,380	
1992	2,740	360	3,100	70	70	3,230	
1993	2,850	470	3,320	50	70	3,450	
1994	2,380	440	2,820	110	60	2,990	
1995	2,230	270	2,500	90	80	2,660	
1996	2,480	300	2,780	70	80	2,930	
1997	1,990	350	2,330	90	60	2,480	
1998	2,010	280	2,290	100	70	2,450	
1999	2,050	(1,910)	510 (510)	2,570 (2,420)	140	90	2,790
2000	1,980	(1,980)	270 (270)	2,260 (2,260)	50	60	2,370
2001	1,380	(1,360)	200 (210)	1,580 (1,560)	50	90	1,720
2002	1,260	(1,250)	220 (210)	1,480 (1,460)	60	70	1,620
2003	1,310	(1,280)	170 (170)	1,480 (1,450)	60	50	1,590
2004	1,200	(1,190)	220 (220)	1,420 (1,410)	30	50	1,510
2005	1,230	(1,180)	220 (210)	1,440 (1,390)	110	60	1,620
2006	1,320	(1,290)	190 (170)	1,510 (1,460)	30	60	1,600

Note: Numbers in parentheses exclude fires reported as confined to trash container; these are analyzed separately. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred. Figures include a proportional share of fires with heat source unknown or unknown between smoking material and open flame. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 1. Fires Involving Smoking Materials, by Major Property Use and Year
Fires Reported to U.S. Fire Departments (Continued)**

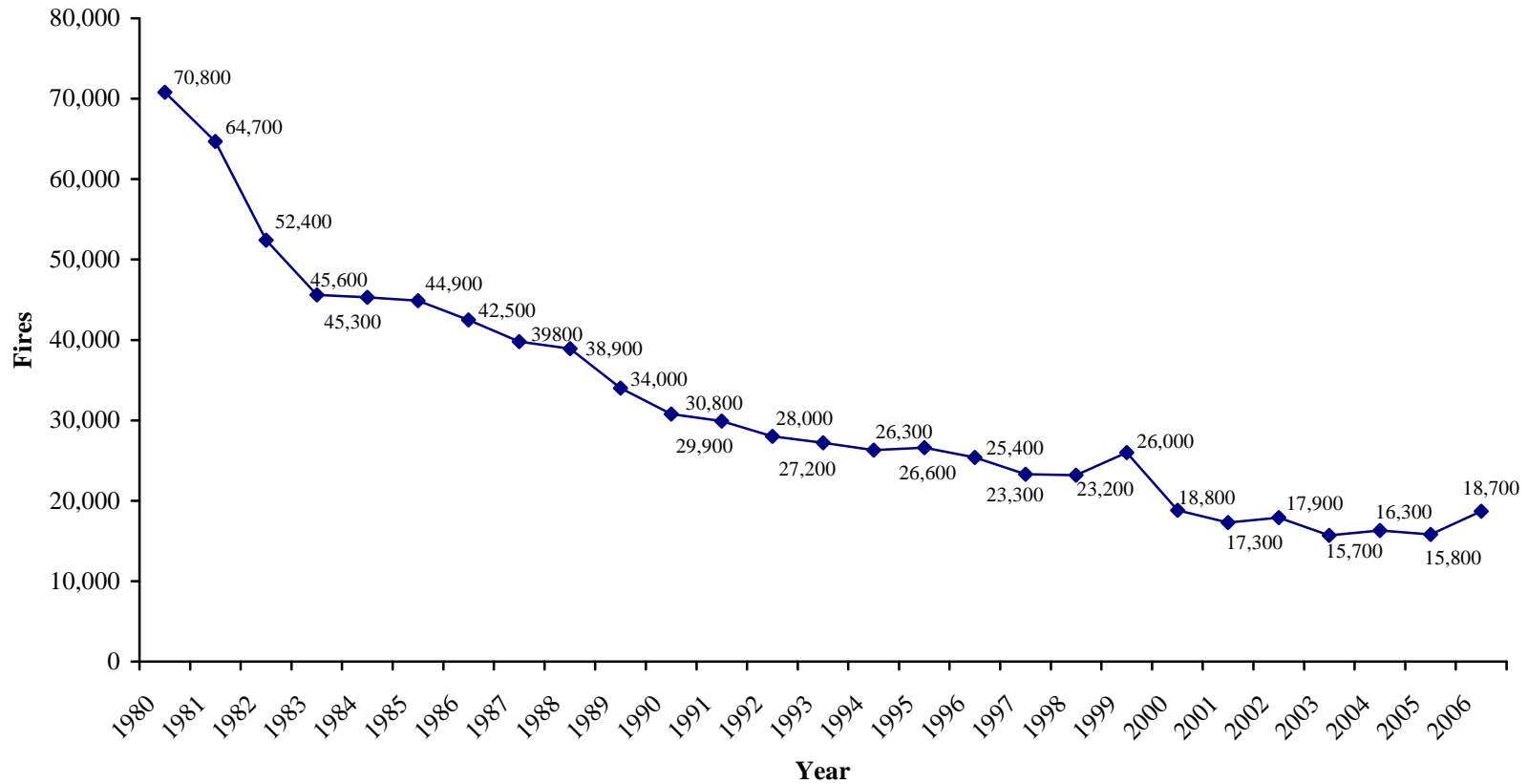
D. Direct Property Damage (in Millions)

Year	Homes	All Other Structures	Structures	Vehicles	Outdoor or Other	Total	Total in 2006 Dollars	
1980	\$314	\$161	\$474	\$20	\$4	\$498	\$1,221	
1981	\$307	\$118	\$424	\$15	\$8	\$447	\$990	
1982	\$332	\$76	\$408	\$20	\$1	\$430	\$897	
1983	\$266	\$90	\$356	\$13	\$3	\$372	\$753	
1984	\$310	\$78	\$388	\$16	\$7	\$410	\$795	
1985	\$304	\$106	\$409	\$9	\$3	\$422	\$790	
1986	\$301	\$87	\$388	\$10	\$2	\$401	\$737	
1987	\$282	\$97	\$379	\$13	\$3	\$395	\$701	
1988	\$300	\$127	\$427	\$13	\$3	\$443	\$756	
1989	\$276	\$187	\$464	\$14	\$3	\$481	\$782	
1990	\$320	\$80	\$400	\$14	\$11	\$425	\$657	
1991	\$398	\$136	\$535	\$16	\$2	\$553	\$818	
1992	\$231	\$72	\$303	\$9	\$6	\$318	\$457	
1993	\$300	\$79	\$379	\$10	\$2	\$391	\$546	
1994	\$294	\$100	\$395	\$13	\$8	\$416	\$566	
1995	\$308	\$176	\$483	\$19	\$4	\$507	\$670	
1996	\$316	\$116	\$432	\$17	\$3	\$452	\$581	
1997	\$320	\$100	\$420	\$12	\$5	\$437	\$548	
1998	\$308	\$69	\$377	\$21	\$13	\$412	\$510	
1999	\$406	(\$405)	\$167 (\$166)	\$572 (\$571)	\$19	\$4	\$596	\$721
2000	\$478	(\$478)	\$187 (\$187)	\$665 (\$665)	\$19	\$7	\$691	\$809
2001	\$366	(\$366)	\$81 (\$81)	\$446 (\$446)	\$16	\$4	\$466	\$531
2002	\$392	(\$390)	\$86 (\$87)	\$478 (\$477)	\$17	\$3	\$498	\$559
2003	\$401	(\$400)	\$70 (\$70)	\$471 (\$470)	\$18	\$12	\$501	\$549
2004	\$370	(\$370)	\$52 (\$52)	\$422 (\$421)	\$19	\$6	\$447	\$478
2005	\$455	(\$454)	\$85 (\$85)	\$540 (\$540)	\$16	\$6	\$562	\$580
2006	\$496	(\$496)	\$86 (\$86)	\$582 (\$581)	\$16	\$8	\$606	\$606

Note: Numbers in parentheses exclude fires reported as confined to trash container; these are analyzed separately. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred. Figures include a proportional share of fires with heat source unknown or unknown between smoking material and open flame. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

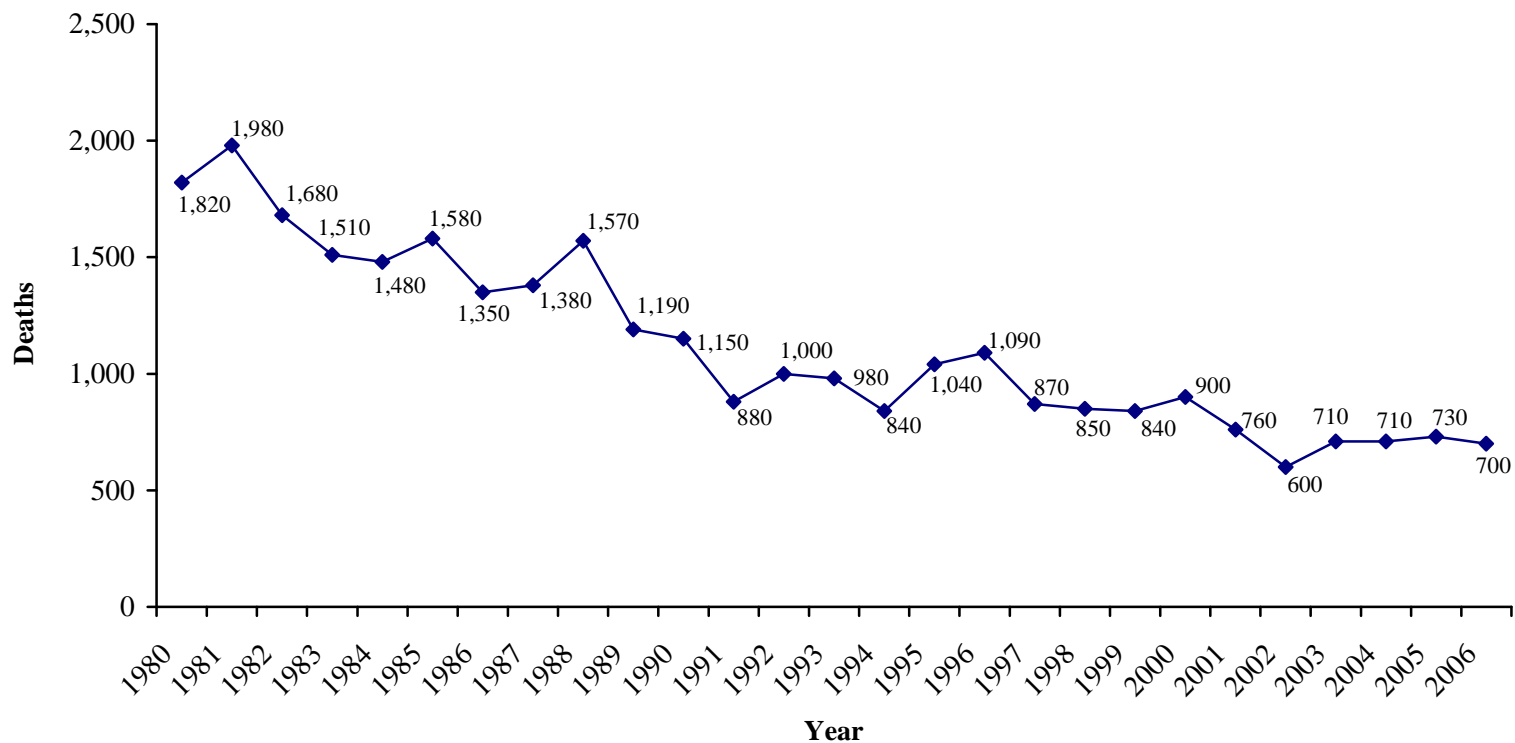
Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Figure 1. Trend in U.S. Smoking-Material Home Fires



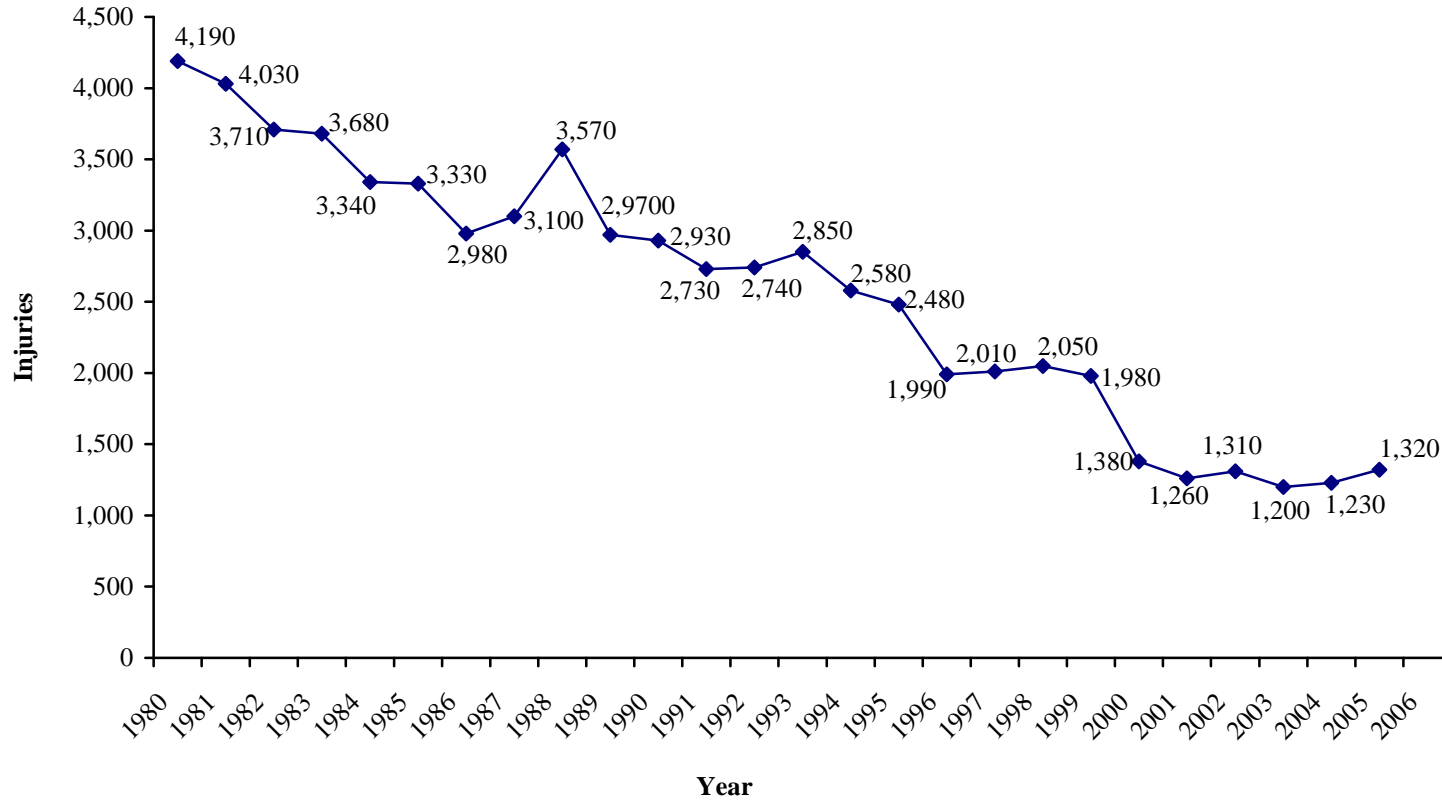
Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Figure 2. Trend in Civilian Deaths in U.S. Smoking Material Home Fire



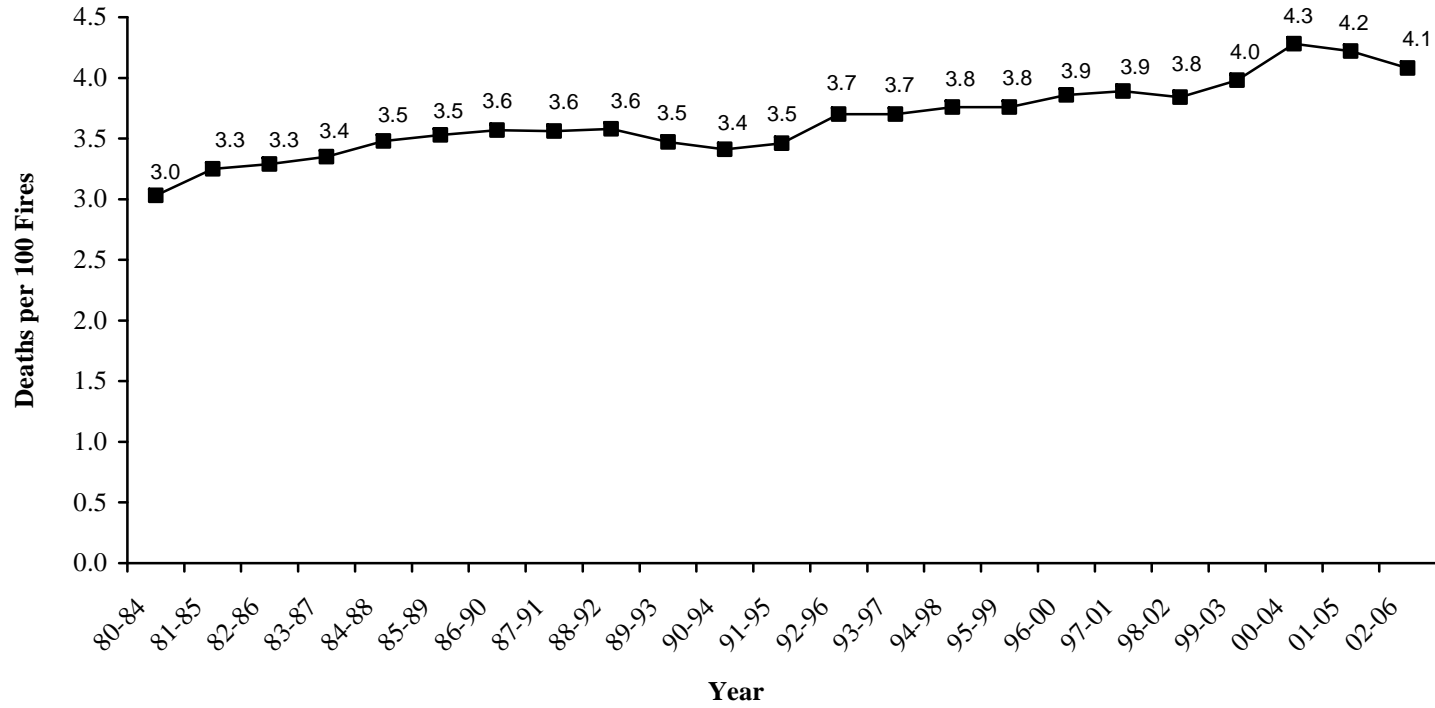
Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Figure 3. Trend in Civilian Injuries in U.S. Smoking-Material Home Fires



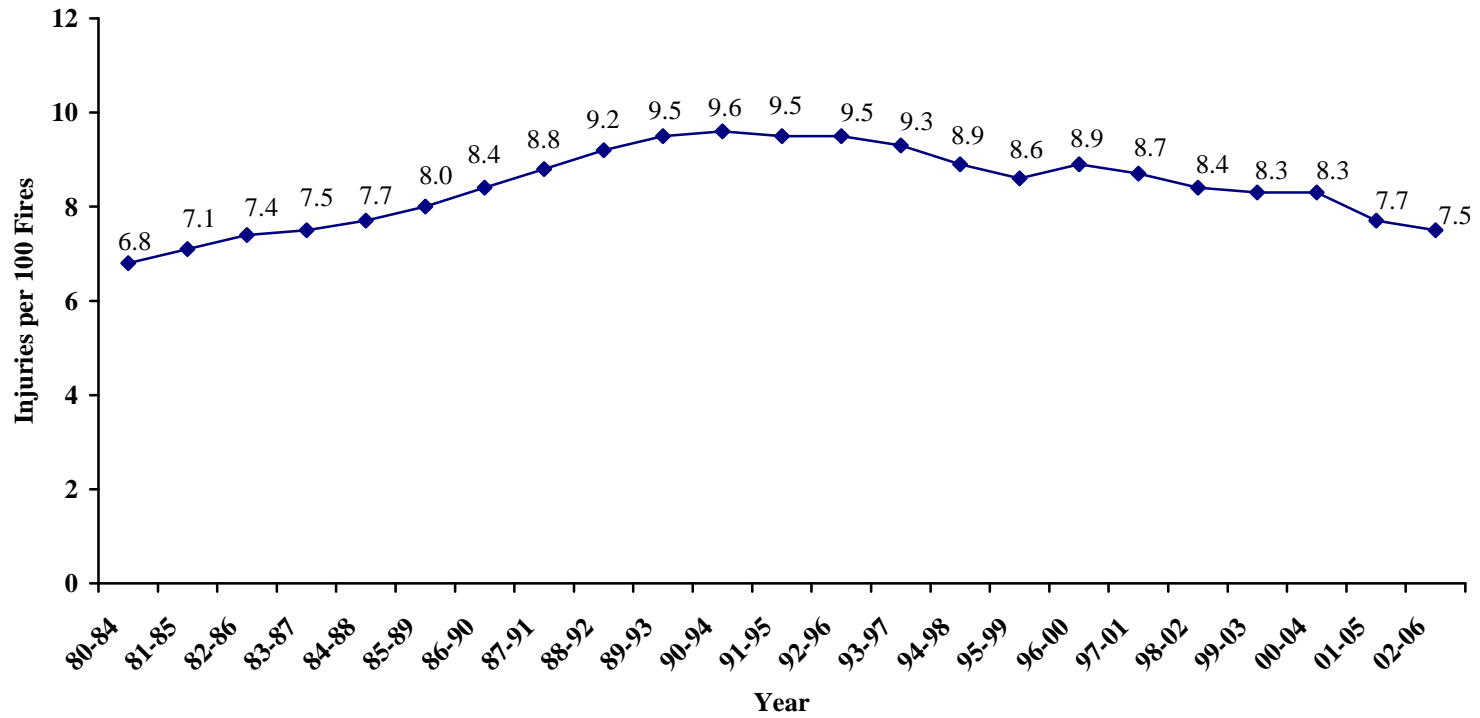
Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Figure 4. Trend in Civilian Deaths per 100 U.S. Smoking-Material Home Fires (Five-Year Rolling Averages)



Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Figure 5. Trend in Civilian Injuries per 100 Smoking-Material Home Fires (Five-Year Rolling Averages)



Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Table 2. Cigarette Consumption and Related Home Fire Loss Rates, by Year

Year	Home Fires	Home Fire Deaths	Cigarettes Consumed (Billions)	Fires per Billion Cigarettes	Deaths per Billion Cigarettes
1980	70,800	1,820	632	112	2.9
1981	64,700	1,980	640	101	3.1
1982	52,400	1,680	634	83	2.6
1983	45,300	1,510	600	76	2.5
1984	45,600	1,480	600	76	2.5
1985	44,900	1,580	594	76	2.7
1986	42,500	1,350	584	73	2.3
1987	39,800	1,380	575	69	2.4
1988	38,900	1,570	563	69	2.8
1989	34,000	1,190	540	63	2.2
1990	30,800	1,150	525	59	2.2
1991	29,900	880	510	59	1.7
1992	28,000	1,000	500	56	2.0
1993	27,200	980	485	56	2.0
1994	26,300	840	486	54	1.7
1995	25,400	1,040	487	52	2.1
1996	26,600	1,090	487	55	2.2
1997	23,300	870	480	49	1.8
1998	23,200	850	465	50	1.8
1999	26,000	840	435	60	1.9
2000	18,800	900	430	44	2.1
2001	17,300	760	425	41	1.8
2002	17,900	600	415	43	1.5
2003	15,700	710	400	39	1.8
2004	16,300	710	388	42	1.8
2005	15,800	730	376	42	1.9
2006	18,700	700	372	50	1.9

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred and civilian deaths to the nearest ten. Fire statistics include a proportional share of fires with heat source unknown or unknown between smoking material and open flame source.

Source: National estimates based on NFIRS and NFPA Survey; "Table 1 – Cigarettes: U.S. output, removals, and consumption," www.ers.usda.gov, accessed October 22, 2008 (publication ended in 2007); and statistics from earlier years from "Consumer Data," www.cdc.gov/tobacco/data_statistics/tables/economics/consumpl.htm.

Table 3. Smoking-Material Fires in Homes, by Item First Ignited
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)

Item	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Trash or waste	5,200	(32%)	30	(5%)	120	(9%)	\$57	(13%)
Mattress or bedding	2,400	(14%)	180	(25%)	390	(31%)	\$81	(19%)
Upholstered furniture	2,000	(12%)	320	(45%)	340	(27%)	\$92	(21%)
Exterior wall covering	800	(5%)	0	(0%)	10	(0%)	\$21	(5%)
Structural member or framing	600	(4%)	0	(1%)	0	(0%)	\$9	(2%)
Unclassified furniture or utensil	600	(4%)	40	(5%)	80	(6%)	\$25	(6%)
Unclassified item first ignited	500	(3%)	10	(1%)	50	(4%)	\$12	(3%)
Floor covering	500	(3%)	20	(3%)	50	(4%)	\$11	(3%)
Clothing	500	(3%)	30	(4%)	40	(3%)	\$7	(2%)
Unclassified organic material	400	(3%)	0	(1%)	10	(1%)	\$21	(5%)
Light vegetation, including grass	400	(2%)	0	(0%)	0	(0%)	\$10	(2%)
Box or bag	400	(3%)	0	(0%)	20	(2%)	\$13	(3%)
Papers	300	(3%)	10	(2%)	30	(2%)	\$13	(3%)
Exterior trim, including doors	300	(2%)	0	(0%)	0	(0%)	\$4	(1%)
Unclassified structural component or finish	300	(2%)	0	(0%)	0	(0%)	\$6	(1%)
Multiple items first ignited	200	(1%)	10	(1%)	10	(1%)	\$10	(2%)
Unclassified soft goods or clothing	200	(1%)	10	(1%)	10	(1%)	\$4	(1%)
Flammable or combustible liquid or gas	200	(1%)	20	(3%)	30	(3%)	\$8	(2%)
Linen other than bedding	100	(1%)	0	(0%)	10	(1%)	\$2	(0%)
Chips, including wood chips	100	(1%)	0	(0%)	0	(0%)	\$2	(1%)
Cabinetry	100	(1%)	10	(1%)	10	(0%)	\$3	(1%)
Other known item first ignited	500	(3%)	10	(2%)	60	(5%)	\$20	(5%)
Total including fires reported as confined fires	16,600	(100%)	710	(100%)	1,260	(100%)	\$430	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries to the nearest ten and direct property damage to the nearest million dollars. Damage has not been adjusted for inflation. Figures include a proportional share of fires with heat source unknown, fires unknown between smoking material and open flame source, and smoking-material fires with unknown item first ignited. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 4. Trend in Leading Materials First Ignited in Home Smoking-Material Fires, 1980-2006
Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)**

A. Fires

Year	Mattress or Bedding	Upholstered Furniture	Trash	Clothing	All Other Items	Percentage That Are Not Mattress or Bedding, or Upholstered Furniture
1980	24,200	21,500	11,100	1,900	12,000	36%
1981	22,100	20,100	10,200	2,000	10,200	35%
1982	17,900	15,800	8,300	1,500	8,900	36%
1983	16,000	13,100	7,100	1,400	7,700	36%
1984	15,500	13,000	7,300	1,200	8,600	37%
1985	15,800	12,000	7,000	1,300	8,800	38%
1986	14,600	11,300	6,700	1,300	8,600	39%
1987	13,300	10,500	6,400	1,200	8,400	40%
1988	12,500	10,100	6,400	1,300	8,600	42%
1989	11,200	8,600	5,400	1,100	7,700	42%
1990	9,500	7,800	5,300	1,100	7,100	44%
1991	9,000	7,300	4,800	1,100	7,600	45%
1992	8,600	6,500	4,500	1,100	7,300	46%
1993	7,900	6,200	4,500	1,100	7,500	48%
1994	7,400	5,900	4,300	1,000	7,800	50%
1995	6,500	5,700	4,100	1,100	8,000	52%
1996	6,600	5,300	4,400	1,100	9,100	55%
1997	5,400	4,700	3,700	1,000	8,400	56%
1998	5,500	4,600	3,700	1,000	8,400	56%
1999	5,100	3,200	5,400	700	11,600	68%
2000	3,100	3,000	4,100	800	7,800	68%
2001	3,000	3,000	4,100	500	6,600	65%
2002	3,000	2,400	4,300	500	7,600	69%
2003	2,400	2,100	4,100	500	6,600	71%
2004	2,400	2,100	4,800	400	6,400	72%
2005	2,300	1,900	4,800	400	6,400	74%
2006	2,400	2,000	5,600	400	8,100	76%

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred. Figures include a proportional share of fires with heat source unknown, fires unknown between smoking material and open flame source, and smoking-material fires with unknown item first ignited. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*
Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 4. Trend in Leading Materials First Ignited in Home Smoking-Material Fires, 1980-2006
Structure Fires Reported to U.S. Fire Departments (Continued)
(Including Fires Reported as Confined Fires)**

B. Civilian Deaths

Year	Mattress or Bedding	Upholstered Furniture	Trash	Clothing	All Other Items	Percentage That Are Not Mattress or Bedding, or Upholstered Furniture
1980	520	1,030	10	70	180	15%
1981	550	1,090	110	80	150	17%
1982	480	960	40	40	150	14%
1983	490	800	50	60	100	14%
1984	380	910	20	30	150	13%
1985	510	740	80	60	180	20%
1986	350	740	30	40	190	20%
1987	370	680	40	70	220	24%
1988	450	820	60	50	180	19%
1989	350	670	20	30	120	15%
1990	320	590	50	40	150	21%
1991	280	450	30	20	90	16%
1992	300	480	30	60	140	22%
1993	340	460	30	20	130	18%
1994	200	400	30	40	160	28%
1995	270	490	50	60	170	27%
1996	350	450	30	70	190	27%
1997	200	440	20	70	130	25%
1998	250	410	20	60	120	23%
1999	200	300	50	0	300	41%
2000	240	310	40	120	200	39%
2001	240	290	30	50	150	30%
2002	190	250	10	30	120	27%
2003	180	330	30	30	140	27%
2004	170	320	40	40	140	31%
2005	190	300	20	30	190	33%
2006	160	330	40	30	130	29%

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian deaths are rounded to the nearest ten. Figures include a proportional share of fires with heat source unknown, fires unknown between smoking material and open flame source, and smoking-material fires with unknown item first ignited. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 4. Trend in Leading Materials First Ignited in Home Smoking-Material Fires, 1980-2006
Structure Fires Reported to U.S. Fire Departments (Continued)
(Including Fires Reported as Confined Fires)**

C. Civilian Injuries

Year	Mattress or Bedding	Upholstered Furniture	Trash	Clothing	All Other Items	Percentage That Are Not Mattress or Bedding, or Upholstered Furniture
1980	1,410	1,910	190	120	560	21%
1981	1,420	1,810	210	110	470	20%
1982	1,260	1,680	250	80	430	21%
1983	1,370	1,670	200	100	330	17%
1984	1,200	1,420	200	80	440	21%
1985	1,210	1,410	200	90	430	21%
1986	1,110	1,230	220	60	370	22%
1987	1,150	1,270	190	90	390	22%
1988	1,300	1,400	210	120	540	24%
1989	1,070	1,090	200	110	500	27%
1990	1,100	1,170	220	80	370	22%
1991	990	1,020	140	130	460	26%
1992	1,170	810	170	140	450	28%
1993	1,020	990	200	80	570	30%
1994	800	860	250	90	380	31%
1995	720	800	130	60	520	32%
1996	780	880	150	190	470	33%
1997	710	650	150	70	400	32%
1998	660	690	140	60	460	33%
1999	890	200	140	0	820	47%
2000	770	480	100	60	580	37%
2001	440	430	130	70	310	37%
2002	340	270	170	30	440	51%
2003	410	360	130	40	370	41%
2004	410	290	100	20	380	42%
2005	380	340	110	50	360	41%
2006	340	370	120	50	420	46%

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian injuries are rounded to the nearest ten. Figures include a proportional share of fires with heat source unknown, fires unknown between smoking material and open flame source, and smoking-material fires with unknown item first ignited. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*
Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 4. Trend in Leading Materials First Ignited in Home Smoking-Material Fires, 1980-2006
Structure Fires Reported to U.S. Fire Departments (Continued)
(Including Fires Reported as Confined Fires)**

D. Direct Property Damage (in Millions)

Year	Mattress or Bedding	Upholstered Furniture	Trash	Clothing	All Other Items	Percentage That Are Not Mattress or Bedding, or Upholstered Furniture
1980	\$82	\$124	\$27	\$38	\$43	34%
1981	\$87	\$129	\$32	\$10	\$49	30%
1982	\$75	\$185	\$28	\$6	\$38	22%
1983	\$82	\$106	\$27	\$8	\$44	30%
1984	\$86	\$125	\$31	\$15	\$52	32%
1985	\$101	\$119	\$26	\$7	\$51	28%
1986	\$87	\$115	\$31	\$8	\$60	33%
1987	\$71	\$101	\$33	\$6	\$70	39%
1988	\$89	\$109	\$30	\$9	\$63	34%
1989	\$84	\$104	\$28	\$6	\$55	32%
1990	\$78	\$136	\$35	\$8	\$63	33%
1991	\$105	\$116	\$34	\$12	\$130	44%
1992	\$70	\$73	\$24	\$7	\$58	38%
1993	\$93	\$96	\$30	\$7	\$73	37%
1994	\$69	\$101	\$31	\$13	\$81	42%
1995	\$77	\$106	\$32	\$8	\$85	41%
1996	\$76	\$92	\$37	\$10	\$100	47%
1997	\$69	\$84	\$42	\$10	\$115	52%
1998	\$71	\$86	\$32	\$10	\$109	49%
1999	\$82	\$108	\$50	\$4	\$162	53%
2000	\$129	\$100	\$60	\$29	\$160	52%
2001	\$69	\$109	\$44	\$9	\$134	51%
2002	\$89	\$71	\$62	\$5	\$165	59%
2003	\$82	\$78	\$45	\$9	\$187	60%
2004	\$86	\$75	\$39	\$5	\$165	57%
2005	\$70	\$98	\$58	\$6	\$222	63%
2006	\$83	\$118	\$88	\$8	\$200	59%

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Direct property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures include a proportional share of fires with heat source unknown, fires unknown between smoking material and open flame source, and smoking-related material fires with unknown item first ignited. Totals may not equal sums because of rounding. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.*

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

Table 5. Smoking-Material Structure Fires, by Property Use
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
HOMES (including one- or two-family dwellings and apartments)	13,400	(75%)	710	(93%)	1,240	(87%)	\$430	(86%)
One- or two-family dwelling, including manufactured home	8,900	(49%)	520	(68%)	760	(53%)	\$260	(52%)
Apartment	4,600	(26%)	190	(25%)	480	(34%)	\$170	(34%)
Unclassified residential property	400	(2%)	20	(2%)	20	(2%)	\$8	(2%)
Eating or drinking place	400	(2%)	0	(0%)	0	(0%)	\$8	(2%)
Outbuilding or shed	300	(2%)	0	(0%)	10	(0%)	\$1	(0%)
Hotel or motel	300	(2%)	10	(1%)	40	(3%)	\$5	(1%)
Boarding house or residential hotel	200	(1%)	10	(2%)	30	(2%)	\$5	(1%)
Business office	200	(1%)	0	(0%)	0	(0%)	\$7	(1%)
Parking garage	200	(1%)	0	(0%)	10	(1%)	\$3	(1%)
Unclassified mercantile property	100	(1%)	0	(0%)	0	(0%)	\$3	(1%)
Nursing home	100	(1%)	0	(0%)	20	(1%)	\$1	(0%)
Manufacturing facility	100	(1%)	0	(0%)	0	(0%)	\$3	(1%)
Other known property use	1,900	(11%)	10	(1%)	60	(4%)	\$28	(6%)
None or unknown	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Total excluding fires reported as confined fires	17,900	(100%)	760	(100%)	1,430	(100%)	\$503	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars. Property damage figures have not been adjusted for inflation. Fire statistics include a proportional share of fires with heat source unknown and fires unknown between smoking material and open flame source. Totals may not equal sums because of rounding. Home and non-home statistics calculated separately.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 6. Cause-Related Factors in Smoking-Material Home Fires
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

A. Cause

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage	
							(in Millions)	
Unintentional	12,700	(94%)	690	(97%)	1,220	(98%)	\$406	(94%)
Intentional	400	(3%)	10	(1%)	10	(1%)	\$16	(4%)
Unclassified cause	300	(2%)	10	(1%)	10	(1%)	\$6	(1%)
Failure of equipment or heat source	100	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Act of nature	0	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total excluding fires reported as confined fire	13,400	(100%)	710	(100%)	1,240	(100%)	\$430	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures include a proportional share of fires with heat source unknown, or unknown between smoking material and open flame, and smoking-material fires with cause unknown or under investigation. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

B. Factor Contributing to Ignition

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage	
							(in Millions)	
Abandoned or discarded material	8,900	(66%)	370	(52%)	700	(57%)	\$295	(69%)
Unclassified misuse of material	2,200	(16%)	180	(25%)	190	(16%)	\$62	(14%)
Heat source too close to combustibles	1,200	(9%)	110	(16%)	200	(16%)	\$40	(9%)
Unclassified factor contributed to ignition	800	(6%)	50	(7%)	110	(9%)	\$24	(6%)
Improper container or storage	300	(2%)	0	(1%)	10	(0%)	\$6	(2%)
Playing with heat source	100	(1%)	0	(0%)	10	(0%)	\$2	(0%)
High wind	100	(1%)	0	(0%)	0	(0%)	\$7	(2%)
Exposure fire	100	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Other known factor contributing to ignition	500	(3%)	20	(3%)	90	(7%)	\$18	(4%)
Total fires excluding confined fires	13,400	(100%)	710	(100%)	1,240	(100%)	\$430	(100%)
Total factor entries	14,000	(104%)	750	(105%)	1,310	(106%)	\$455	(106%)

Note: Multiple factor entries are allowed, which is why the number of factor entries is greater than the number of fires. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures include a proportional share of fires with heat source unknown, or unknown between smoking material and open flame source, and smoking material fires with factor contributing to ignition unknown, blank, none, or not reported. Multiple entries are possible, which is why there are more total entries than total fires. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 6. Cause-Related Factors in Smoking-Material Home Fires
Annual Average of 2003-2006 Structure Fires Reported to U.S Fire Departments (Continued)
(Excluding Fires Reported as Confined Fires)**

C. Human Factor Contributing to Ignition

Human Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage	
							(in Millions)	
Asleep	1,900	(14%)	230	(32%)	430	(35%)	\$79	(18%)
Unattended or unsupervised person	1,200	(9%)	40	(6%)	70	(5%)	\$40	(9%)
Possibly impaired by alcohol or drugs	1,000	(8%)	140	(19%)	320	(26%)	\$44	(10%)
Age was a factor	400	(3%)	50	(7%)	140	(11%)	\$19	(4%)
Possibly mentally disabled	300	(2%)	20	(3%)	40	(4%)	\$7	(2%)
Physically disabled	200	(2%)	50	(7%)	210	(17%)	\$13	(3%)
Multiple persons involved	200	(1%)	10	(2%)	30	(2%)	\$7	(2%)
None	8,900	(67%)	280	(39%)	380	(31%)	\$267	(62%)
Total excluding fires reported as confined fires	13,400	(100%)	710	(100%)	1,240	(100%)	\$430	(100%)
Total factor entries	14,100	(105%)	820	(115%)	1,620	(130%)	\$476	(111%)

Note: Multiple factor entries are allowed, which is why the number of factor entries is greater than the number of fires. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures include a proportional share of fires with heat source unknown, fires unknown between smoking material and open flame, and smoking-material fires with human factor unknown or not reported. Multiple entries are possible, which is why there are more total entries than total fires. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

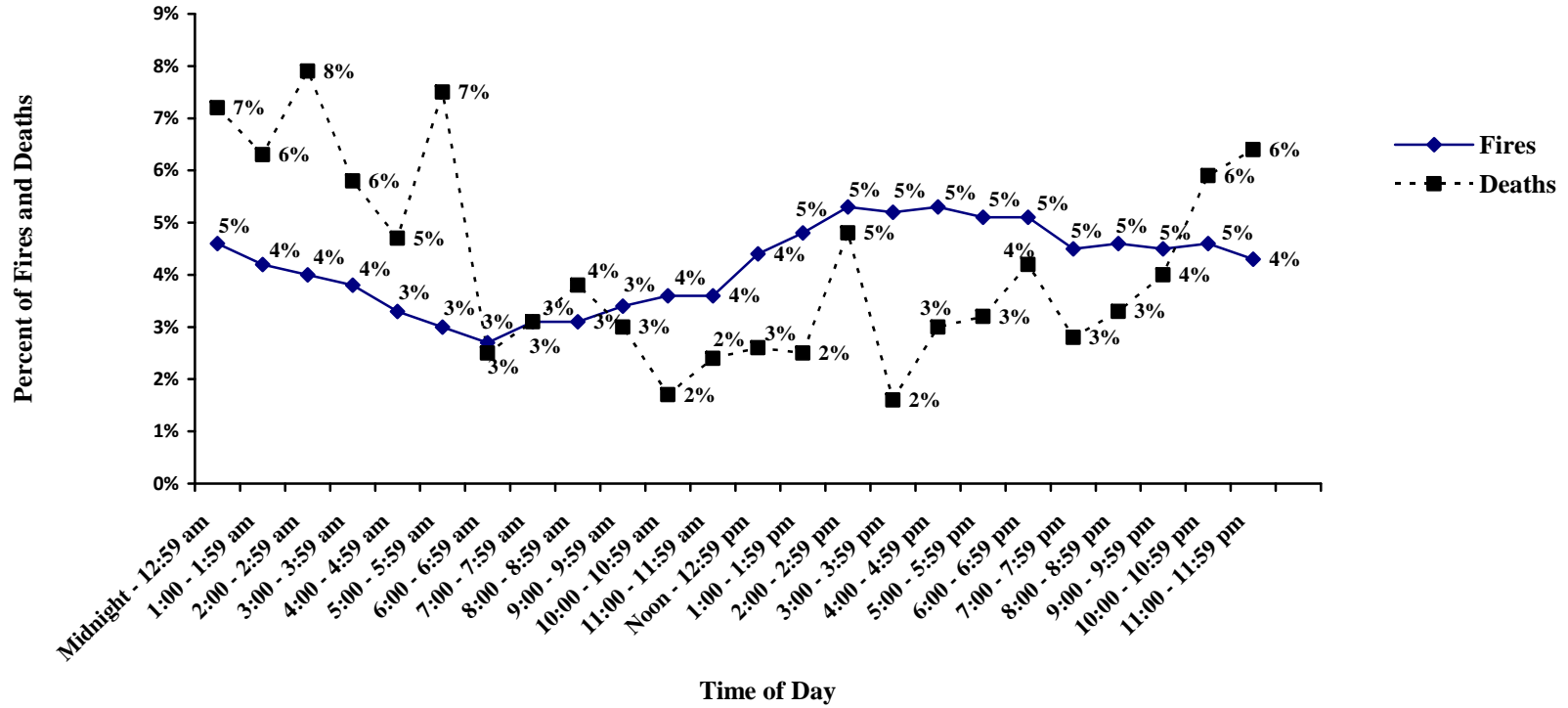
Table 7. Smoking-Material Fires in Homes, by Area of Fire Origin
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian		Civilian		Direct Property	
			Deaths	Injuries	Damage (in Millions)			
Bedroom	3,500	(26%)	320	(45%)	360	(29%)	\$114	(27%)
Living room, family room or den	1,600	(12%)	180	(25%)	440	(36%)	\$65	(15%)
Exterior balcony or unenclosed porch	1,500	(11%)	20	(2%)	0	(0%)	\$63	(15%)
Unclassified function area	800	(6%)	70	(10%)	190	(15%)	\$37	(9%)
Kitchen	600	(5%)	20	(3%)	70	(5%)	\$17	(4%)
Exterior wall surface	600	(5%)	10	(1%)	0	(0%)	\$15	(4%)
Courtyard, patio, porch, or terrace	600	(4%)	10	(1%)	10	(1%)	\$28	(6%)
Bathroom	600	(4%)	10	(2%)	20	(1%)	\$7	(2%)
Garage	500	(4%)	10	(2%)	0	(0%)	\$22	(5%)
Exterior stairway, ramp or fire escape	400	(3%)	0	(0%)	0	(0%)	\$7	(2%)
Unclassified outside area	300	(2%)	0	(0%)	0	(0%)	\$9	(2%)
Unclassified structural area	300	(2%)	10	(1%)	50	(4%)	\$7	(2%)
Unclassified means of egress	200	(1%)	0	(0%)	10	(1%)	\$2	(0%)
Unclassified area of origin	200	(1%)	0	(0%)	20	(2%)	\$3	(1%)
Substructure area or crawl space	200	(1%)	0	(0%)	10	(1%)	\$4	(1%)
Laundry area	200	(1%)	10	(1%)	0	(0%)	\$3	(1%)
Entrance way or lobby	100	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Wall assembly or concealed space	100	(1%)	0	(0%)	10	(1%)	\$2	(0%)
Closet	100	(1%)	10	(1%)	0	(0%)	\$2	(1%)
Interior stairway or ramp	100	(1%)	0	(0%)	10	(0%)	\$4	(1%)
Trash chute or container	100	(1%)	0	(0%)	0	(0%)	\$2	(0%)
Ceiling/floor assembly or concealed space	100	(1%)	0	(0%)	20	(2%)	\$2	(1%)
Unclassified storage area	100	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Exterior roof surface	100	(1%)	0	(0%)	0	(0%)	\$1	(0%)
Hallway or corridor	100	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Other known area of origin	500	(4%)	10	(2%)	20	(1%)	\$10	(2%)
Total excluding fires reported as confined fires	13,400	(100%)	710	(100%)	1,240	(100%)	\$430	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and direct property damage is rounded to the nearest million dollars. Damage has not been adjusted for inflation. Figures include a proportional share of fires with heat source unknown, or unknown between smoking material and open flame, and smoking-material fires with unknown area of origin. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

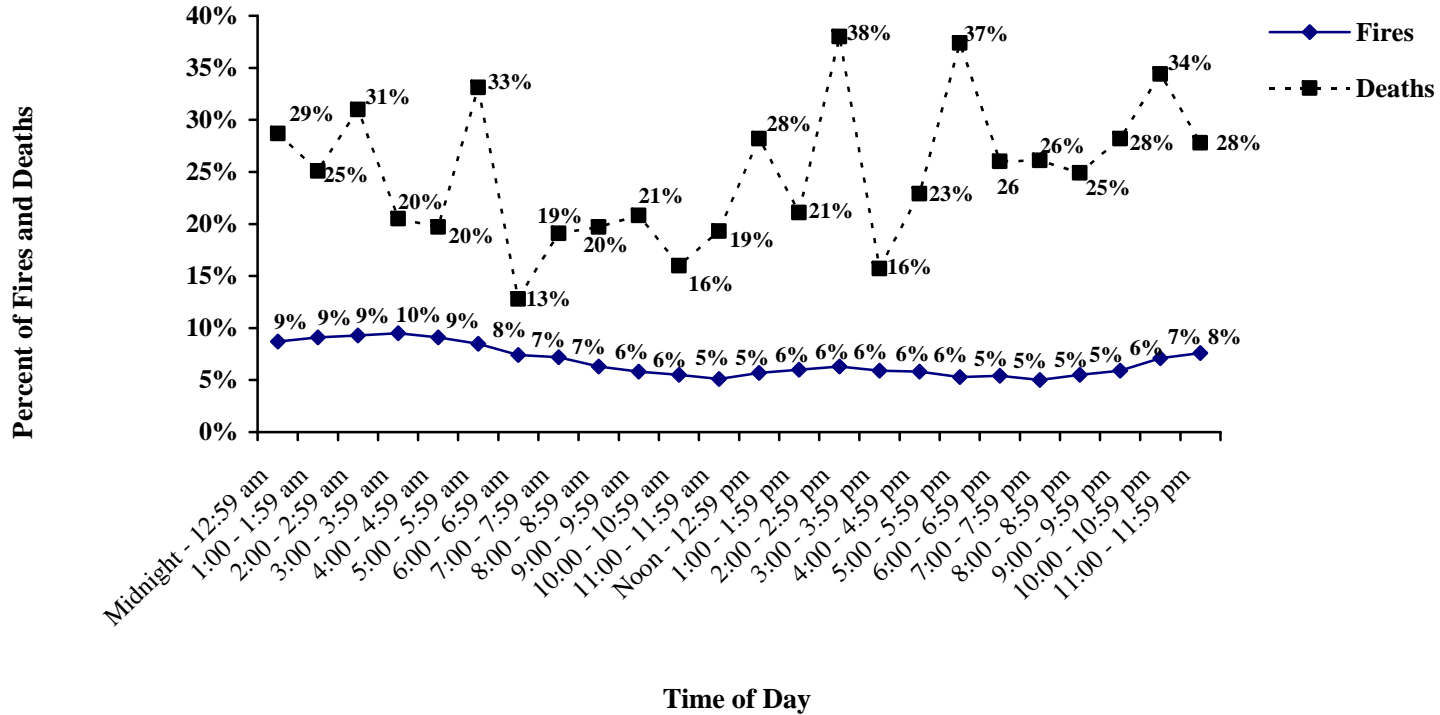
Figure 6A. Smoking-Material Home Structure Fires and Deaths, by Time of Day, 2003-2006



Note: Time refers to alarm time to fire department, not ignition time.

Source: Data from NFIRS Version 5.0 and NFPA survey.

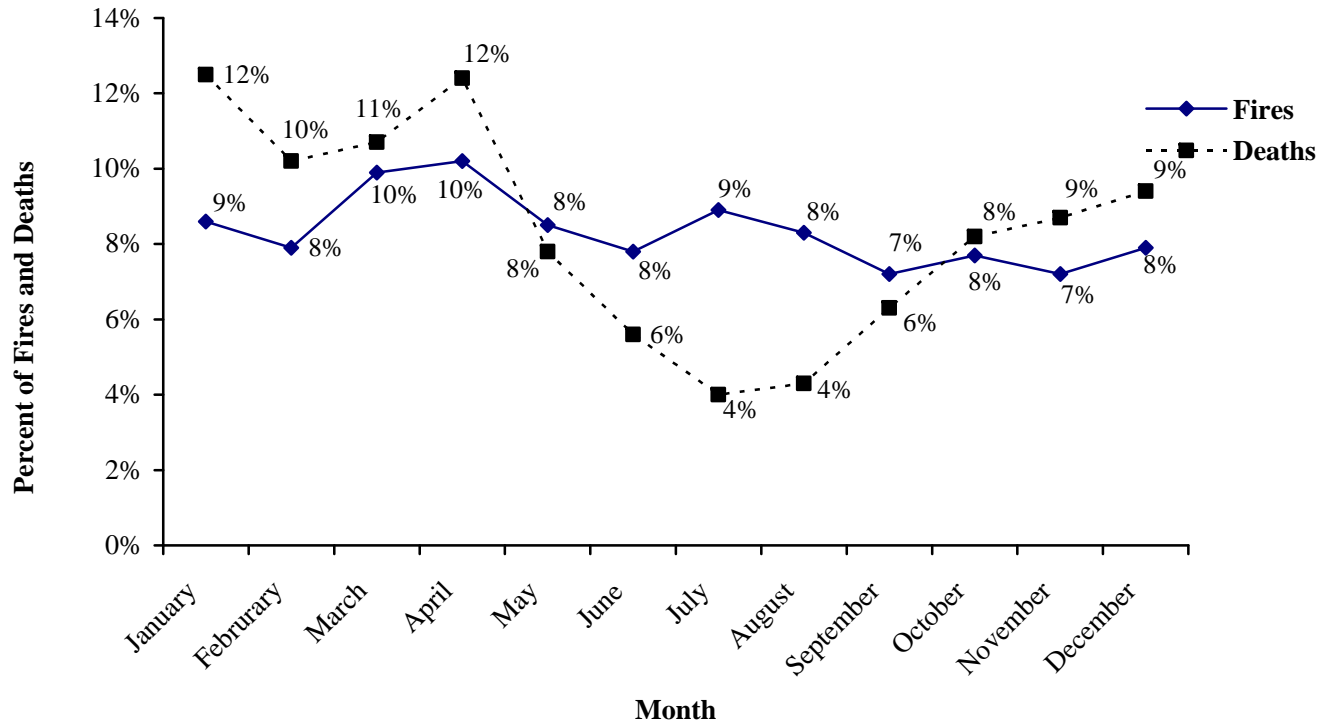
Figure 6B. Smoking-Material Home Structure Fires and Deaths as Percentage of Total Home Fires and Deaths, by Time of Day, 2003-2006



Note: Time refers to alarm time to fire department, not ignition time.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Figure 7. Smoking-Material Home Structure Fires and Deaths, by Month, 2003-2006



Source: NFIRS and NFPA survey.

Table 8. Trends in the Smoking-Material Fire Problem in Other Countries

A. Canada, 1990-2002 (all properties; statistics include matches and lighters when used as smoking materials)

Year	Fires	Civilian Deaths	Civilian Injuries	<u>Direct Property Damage (in Millions)</u>		
				In Canadian Dollars	In U.S. Dollars	in 2006 U.S. Dollars*
1990	7,300	170	510	\$130	\$112	\$172
1991	5,900	130	340	\$95	\$83	\$123
1992	6,300	110	450	\$96	\$80	\$114
1993	5,300	130	390	\$87	\$68	\$95
1994	6,400	90	450	\$91	\$66	\$90
1995	8,000	140	470	\$105	\$76	\$101
1996	7,300	170	420	\$115	\$84	\$108
1997	6,600	180	390	\$126	\$91	\$114
1998	6,600	140	320	\$101	\$68	\$84
1999	6,100	160	310	\$93	\$63	\$76
2000	8,300	160	560	\$118	\$80	\$93
2001	8,900	150	450	\$134	\$87	\$99
2002	7,700	140	470	\$132	\$84	\$94

*Converted using the Consumer Price Index.

Note: Canada statistics include proportional shares of fires with cause unknown or unknown between smoking materials and open flame. After 1999, unknowns are combined with miscellaneous; they are split based on the split in 1999. After 2000, smoking materials are combined with open flame; they are split based on the split in 2000.

Source: Canadian provincial fire commissioners annual reports.

B. United Kingdom, 1993-2006 (dwellings)

Year	Fires	Civilian Deaths	Civilian Injuries
1993	5,500	200	1,730
1994	5,400	180	1,660
1995	5,100	190	1,660
1996	5,200	200	1,740
1997	5,000	200	1,820
1998	4,900	200	1,670
1999	4,900	150	1,620
2000	4,000	170	1,560
2001	4,400	160	1,540
2002	3,900	150	1,450
2003	4,300	160	1,440
2004	3,600	140	1,290
2005	3,200	140	1,100
2006	3,200	120	1,180

*Converted using the Consumer Price Index.

Source: *Fire Statistics United Kingdom* series (which has published statistics for lighted tobacco products separate from lighters only since 1993).

Table 8. Trends in the Smoking-Material Fire Problem in Other Countries (Continued)

C. Japan, 1990-2004 (all structures)

Year	Fires	Deaths	Direct Property Damage		
			In Japanese Yen (Billions)	in U.S.Dollars (Millions)	in 2006 U.S. Dollars (Million)
1990	3,500	160	12.152	\$84	\$130
1991	3,600	170	13.201	\$98	\$145
1992	3,700	180	12.312	\$97	\$140
1993	3,600	220	14.807	\$133	\$186
1994	3,800	210	14.804	\$145	\$197
1995	3,700	210	14.915	\$159	\$210
1996	3,800	210	15.069	\$139	\$178
1997	3,800	230	14.120	\$117	\$147
1998	3,600	210	11.568	\$88	\$109
1999	3,700	230	13.084	\$115	\$139
2000	3,800	220	12.833	\$119	\$139
2001	3,700	230	11.798	\$97	\$111
2002	3,600	250	11.873	\$95	\$106
2003	3,300	230	10.302	\$89	\$97
2004	3,500	NA	9.733	\$90	\$96

*Converted using the Consumer Price Index.

NA – Not available at press time.

Source: Analysis of Japanese fire statistics by Dr. Ai Sekizawa.

Victim Patterns for Smoking-Material Fires

The decline in smoking-material fires is partly due to a decline in the number of smokers.

Table 9 shows a substantial decline in the fraction of the adult population who smoke. Even though the population grows every year, the number of smokers has declined. From 1985 to 2005, the combined percentage of adults who smoke (working from the percents by gender) declined from 31% to 21%. Applying these percentages to the adult populations for those years, the number of smokers declined by about 5 million, from 51 million to 46 million. Combining those results with the cigarette consumption statistics from Table 2, the daily consumption per smoker has declined from 1.6 packs per smoker per day in 1985 to 1.1 packs per smoker per day in 2005.

Older adults are at highest risk of death or injury from home smoking-material fires, even though they are less likely to smoke than younger adults.

Children and youths under age 18 have the lowest home smoking-material fire death risks. Among those under 18, the highest smoking material fire death risk is for children under age 5, whose risk is nearly as high as for young adults aged 18 to 29. For adults, death rates rise with age, but people age 75 to 84 have the highest rates, higher than the rate for people age 85 and over. (See Table 10.)

The child victims of smoking-material fires reflect children who smoke but even more reflect children living in households with adults who smoke.

The NFPA/USFA study cited earlier conducted a special study of well-documented fatal home smoking-material fires and found that the smoker whose smoking materials ignited the fires is the only person present in just over half of fatal cigarette fires.* Even for these 54% of cases, smokers may not live alone and may be influenced by others in the behaviors that led to ignition. In the 46% of cases where someone else is present, it was not known whether those others had characteristics that would affect their ability to exert such influence effectively.

The same special study of well-documented fatal home smoking-material fires found that one fatal victim in four (24%) is **not** the smoker whose cigarette started the fire.* Therefore, if others are present, they have both a direct and an indirect stake in taking action to prevent hostile fires from taking place.

The relationships of these victims to the smokers is useful to know because it may bear on the willingness and ability of these others to serve as “watchers” for the smokers, as well as the willingness of the smokers to accept help or advice from these others.

Of the fatal victims who were not the smokers whose smoking materials ignited the fires:

- 34% were children of the smokers (that is, the smokers were the parents of the victims, but some of these victims were themselves adults).

*John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-mitigation.shtm>, 2006.

- 25% were neighbors (often from other apartment units in the same building) or friends of the smokers.
- 14% were spouses or partners of the smokers.
- 13% were parents of the smokers.
- 14% had other relationships (e.g., sibling, niece or nephew, uncle or aunt, roommate, passerby).

The high risk of death for older adult smokers may be even higher than Table 10 indicates, because the percentage of people over age 65 who are current smokers is less than half of the percentage for 18- to 64-year-olds. (See Table 9B.) While one cannot assume that all victims of smoking-material fires are themselves smokers, this large disparity in the likelihood of being a smoker, running counter to the risk of dying in a smoking-material fire, suggests that the risk of death for older smokers may be much higher than Table 10 indicates.

Male death and injury rates from home smoking-material fires are much higher than female rates – and by more than the difference in smoking propensity.

The 2003-2005 differences between the percentages of U.S. men and women who smoke range from 4.3 to 5.1 percentage points, or higher by 22-28%. (See Table 9A.) In 2003-2006, male death rates from smoking material home fires were higher than female rates by 29%, and male injury rates were higher by 33%. (See Table 11.) Again, even allowing for the fact that not all victims of smoking-material fires are themselves the smokers who caused the fire, it appears that male smokers have a risk of death and injury due to smoking material fires that is higher than the risk for female smokers.

Most fatal victims of home smoking-material fires are located in the area or room of fire origin when fire begins.

Three-fourths (72%) of fatal victims of home smoking-material fires are in the same area or room as the fire when the fire started. (See Table 12.)

Smoke alarms, sprinklers, and compartmentation barriers all require time after ignition to be effective. For a victim recorded as “involved with ignition and in the area of origin,” the fire begins so close to him or her that it is very difficult to survive long enough for active or passive fire protection to save him or her.

The same NFPA/USFA study cited earlier found that, from 1994 through 1998, smoking-material home fire deaths were almost three times as likely as other-cause home fire deaths to involve a victim intimate with ignition (29% versus 11%).* NFIRS Version 5.0 does not distinguish intimate with ignition as a victim location, which means it is not possible to update these statistics.

Two-fifths of fatal home smoking-material fire victims were sleeping when injured, but one-third were taking protective action.

Fatal victims who were sleeping were 40% of the total, while fatal victims who were attempting to escape, to fight fire, or to rescue (the three activities here labeled “protective activities”)

*John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-mitigation.shtm>, 2006.

totaled 34%. For non-fatal victims, those taking protective action totaled 56% of total injuries (25% attempting to escape, 22% attempting to fight fire, and 9% attempting rescue), compared to 26% for those who were sleeping. (See Table 13.)

Most fatal home smoking-material fire victims had some condition that reduced their ability to respond effectively to fire, with sleeping the primary such condition.

Most fatal victims of home smoking-material fires were either asleep or slowed by alcohol or other drug impairment or disability prior to the fire. (See Table 14.) Impairment is much more likely with smoking-material fires than with other fires. The percentage of fatal victims with possible alcohol impairment was 26% for smoking-material home fires in 2003-2006, compared to 14% for all other home structure fires. The percentage with possible drug impairment was 11% for smoking-material home fires in 2003-2006, compared to 5% for all other home structure fires.

Alcohol impairment is historically under-reported, as indicated by the few state and local studies that have focused on this issue, many of which have had access to autopsy tests on blood alcohol levels. Alcohol was said to be a factor in almost half of the Tallahassee area smoking fire deaths and in 62% of Minnesota's 1996-2002 smoking fire deaths. *

The NFPA/USFA study cited earlier examined smoker vs. non-smoker health-related characteristics, using a survey of risk characteristics conducted periodically by the U.S. Centers for Disease Control and Prevention (CDC).** The survey showed smokers drank more or more often than do non-smokers, by three of the four measures analyzed:

- According to the CDC, smokers defined as those who have smoked at least 100 cigarettes in their lifetimes were more likely than nonsmokers to have consumed five or more alcoholic drinks at one occasion (29% versus 19%). These smokers also averaged one more drink per occasion than non-smokers (3.7 versus 2.8 drinks per occasion). These statistics indicate that smokers are more likely than non-smokers to have alcohol-impaired judgment and ability when they drink.

Alcohol use is one of several conditions, including use of legal medications or illegal drugs and ordinary drowsiness, that can lead to a loss of control of a burning tobacco product. This danger was the subject of one of the seven educational messages recommended by the project:

To prevent a deadly cigarette fire, you have to be alert. You won't be if you are sleepy, have been drinking, or have taken medicine or other drugs.

Here are more CDC survey findings, cited in the NFPA/USFA study, regarding physical disabilities and limitations for which the gap between smokers and non-smokers is largest.

* Thomas C. Quillen, *An Analysis of Civilian Fire Deaths in Tallahassee (Leon County), Florida, 1983-1994: Strategic Analysis of Community Risk Reduction*, report of research for National Fire Academy Executive Fire Officer program, January 1995; and *Case Study: Contribution of Alcohol to Fire Fatalities in Minnesota*, Topical Fire Research Series, Vol. 3, Issue 4, U.S. Fire Administration, July 2003.

**John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-mitigation.shtm>, 2006.

- According to the CDC, smokers defined as those who have smoked at least 100 cigarettes in their lifetimes were more likely than nonsmokers to have the following physical handicaps or limitations:

Handicap/Limitation	Smoker	Nonsmoker
Ever told you have arthritis	35%	28%
Activity limitation due to physical, mental, or emotional problems	21%	14%
Limitations due to arthritis or other joint symptoms	30%	26%
Never exercised in the past month	28%	23%

- According to the CDC, smokers defined as everyday or someday smokers were more likely than nonsmokers to have the following physical handicaps or limitations:

Handicap/Limitation	Smoker	Nonsmoker
Ever told you have arthritis	31%	27%
Activity limitation due to physical, mental, or emotional problems	21%	18%
Limitations due to arthritis or other joint symptoms	32%	30%
Never exercised in the past month	35%	23%

One of the measures of disability for which smokers differed very little from non-smokers was health problems that require the use of special equipment, such as canes or wheel chairs.

Here are survey findings regarding pre-existing physical conditions for which the gap between smokers and non-smokers is largest:

- According to the CDC, smokers defined as those who have smoked at least 100 cigarettes in their lifetimes were more likely than nonsmokers to have the following physical conditions that could make them more susceptible to harm from a defined exposure to fire effects:

Physical Condition	Smoker	Nonsmoker
High blood cholesterol	37%	31%
High blood pressure	30%	27%

- According to the CDC, smokers defined as everyday or someday smokers were more likely than nonsmokers to have the following physical conditions that could make them more susceptible to harm from a defined exposure to fire effects:

Physical Condition	Smoker	Nonsmoker
High blood cholesterol	32%	28%
High blood pressure	23%	21%

Smokers differed little from non-smokers for asthma and diabetes.

The NFPA/USFA project cited earlier also included a study of fatal fires from NFPA's Fire Incident Data Organization (FIDO) from a year in which FIDO captured most fatal fires.* This study found that 7% of fatal victims of smoking-material fires who were themselves the smokers whose smoking materials started the fires were under treatment with medical oxygen. The combination of smoking and use of medical oxygen is so dangerous that it became the subject of one of the seven recommended educational messages from the project:

Smoking should not be allowed in a home where oxygen is used.

Fewer people smoke, proportionally, in the U.S. than in most other countries of at least one million population, and this is even more true for males.

Among countries of at least one million population, the proportion of the population that smokes ranges from a high of 52% to a low of 4%, with the U.S., at 24%, having a higher smoking rate than roughly one-third of the countries. (See Table 15.) Smoking rates for men range from a high of 68% to a low of 7%, with the U.S., at 26%, higher than only 13 countries with lower male smoking rates. These rates are taken mostly from the late 1990s.

Bearing in mind the earlier finding that the fire risk to male smokers appears to be considerably greater than to female smokers, it is notable that, in most countries, smoking rates are not as similar for the two sexes as they are in the U.S. and Canada. There is a four percentage point gap in the U.S. (26% of males smoke vs. 22% of females), and in Canada, as shown in Table 15. Only 12 countries have male and female smoker rates that are closer. The highest female smoker rates are in Guinea (44% vs. 60% for men and the highest overall smoking rate of 52%), Yugoslavia (42% vs. 52% for men), and Venezuela (39% vs. a fairly similar 42% for men). Norway is the only country known to have a higher female smoking rate than male (by only 1 percentage point, 32% and 31%, respectively), and Sweden and New Zealand are the only countries where rates are known to be the same for both sexes (19% and 25%, respectively).

Japan has a lower smoking fire death rate than the U.S., even though they have a much higher smoking rate, and even more so for high-risk males. This is a reminder that smoking behavior is only one of the factors driving smoking fire rates.

*John R. Hall, Jr., Marty Ahrens, Kimberly Rohr, Sharon Gamache, and Judy Comoletti, Behavioral Mitigation of Smoking Fires Through Strategies Based on Statistical Analysis, EME-2003-CA-0310, available from the U.S. Fire Administration at <http://www.usfa.dhs.gov/research/other/smoking-mitigation.shtm>, 2006.

Table 9. Percent of U.S. Population Who Are Currently Smoking

A. Trends by Age or Sex

Sex	1970	1985	1990	1995	1997	1998
Male	44.3%	33.2%	28.0%	26.5%	25.5%	25.9%
Female	30.8%	28.0%	22.9%	22.9%	21.3%	22.1%
Sex	1999	2000	2001	2002	2003	2004
Male	24.2%	25.2%	24.7%	24.8%	23.7%	23.0%
Female	20.9%	21.1%	20.8%	20.1%	19.4%	18.7%
Sex	2005					
Male	23.4%					
Female	18.3%					

Note: 1970 populations include 17 years old and over, 1985 populations include 20 years old and over, and 1990 and after include 18 years old and over. Tables 9A and 9B are based on different databases and have slightly different totals for all male and all female smokers. Neither database has figures for all ages and all sexes combined.

Sources: For 1970 and 1985, U.S. Centers for Disease Control, Office of Smoking and Health, *Reducing the Health Consequences of Smoking, 1989*. For 1990-2004 *Statistical Abstract of the United States, 2001, 2003, 2004-2005, 2006, 2007 and 2008*. From 1992 on, the definition of current smoker changed to add people who smoke “some days” to the previous definition of people who have smoked at least 100 cigarettes and now smoke.

Table 9. Percent of U.S. Population Who Are Currently Smoking (Continued)

B. Trends by Age and Sex

Male	1995	2000	2001	2002	2003	2004	2005
18 - 24	27.8%	28.5%	30.4%	32.4%	26.3%	25.6%	28.0%
25 - 34	29.5%	29.0%	27.2%	27.5%	28.7%	26.1%	27.7%
35 - 44	31.5%	30.2%	27.4%	29.7%	28.1%	26.5%	26.0%
45 - 64	27.1%	26.4%	26.4%	24.5%	23.9%	25.0%	25.2%
65 or older	14.3%	10.2%	11.5%	10.1%	10.1%	9.8%	8.9%
All age groups over 18	27.0%	25.7%	25.2%	25.2%	24.1%	23.4%	23.9%
Female	1995	2000	2001	2002	2003	2004	2005
18 - 24	21.8%	25.1%	23.4%	24.6%	21.5%	21.5%	20.7%
25 - 34	26.4%	22.5%	23.0%	21.6%	21.3%	21.0%	21.5%
35 - 44	27.1%	26.2%	25.7%	23.7%	24.2%	21.6%	21.3%
45 - 64	24.0%	21.6%	21.4%	21.1%	20.2%	19.8%	18.8%
65 or older	11.5%	9.3%	9.2%	8.6%	8.3%	8.1%	8.3%
All age groups over 18	22.6%	21.0%	20.7%	20.0%	19.2%	18.5%	18.1%

Note: Tables 9A and 9B are based on different databases and have slightly different totals for all male and all female smokers. Neither database has figures for all ages and all sexes combined.

Sources: *Statistical Abstract of the United States, 2001, 2003, 2004-2005, 2006, 2007, and 2008.* From 1992 on, the definition of current smoker changed to add people who smoke "some days" to the previous definition of people who have smoked at least 100 cigarettes and now smoke.

**Table 10. Casualties in Home Structure Fires Involving Smoking Materials, by Age of Victim
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Age	Average 2004-2005		Annual Average		Death Rate per Million Persons	Annual Average		Injury Rate per Million People
	Population (in Millions)		Civilian Deaths			Civilian Injuries		
4 and under	20.2	(7%)	10	(2%)	0.6	30	(2%)	1.5
5 to 9	19.6	(7%)	10	(1%)	0.4	10	(1%)	0.6
10 to 14	21.0	(7%)	0	(0%)	0.1	20	(1%)	0.8
15 to 17	12.6	(4%)	0	(0%)	0.2	20	(2%)	1.8
18 to 29	49.1	(17%)	40	(6%)	0.8	200	(16%)	4.0
30 to 49	86.6	(29%)	150	(21%)	1.7	390	(31%)	4.5
50 to 64	49.5	(17%)	240	(34%)	4.9	280	(23%)	5.7
65 to 74	18.6	(6%)	110	(16%)	6.2	150	(12%)	8.3
75 to 84	13.0	(4%)	110	(16%)	8.5	110	(9%)	8.6
85 and over	5.0	(2%)	30	(5%)	6.5	20	(2%)	4.2
Total	295.0	(100%)	710	(100%)	2.4	1,240	(100%)	4.2
14 and under	60.8	(21%)	20	(3%)	0.3	60	(5%)	1.0
65 and over	36.5	(12%)	260	(36%)	7.0	290	(23%)	7.8
75 and over	18.0	(6%)	140	(20%)	7.9	130	(11%)	7.3

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies, industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian deaths and injuries are rounded to the nearest ten and include a proportional share of fires where the heat source was unknown or unknown between smoking material and open flame source, and home smoking-fire casualties where victim age was unknown. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey, *Statistical Abstract of the United States*, Washington: U.S. Department of Commerce, Bureau of the Census, 2006-2007.

Table 11.
Casualties in Home Structure Fires Involving Smoking Materials, by Age and Sex of Victim
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Age	Average 2004-2005 Population (in Millions)		Annual Average Civilian Deaths		Death Rate per Million People	Annual Average Civilian Injuries		Injury Rate per Million People
Male								
4 and under	10.3	(7%)	10	(1%)	0.5	20	(2%)	1.5
5 to 9	10.0	(7%)	10	(2%)	0.7	10	(1%)	0.5
10 to 14	10.8	(7%)	0	(0%)	0.2	10	(1%)	0.6
15 to 17	6.5	(4%)	0	(0%)	0.2	10	(2%)	2.1
18 to 29	25.2	(17%)	30	(7%)	1.1	120	(18%)	4.6
30 to 49	43.2	(30%)	90	(21%)	2.0	230	(35%)	5.3
50 to 64	24.0	(17%)	160	(39%)	6.6	150	(23%)	6.4
65 to 74	8.5	(6%)	50	(12%)	5.5	70	(11%)	8.6
75 to 84	5.2	(4%)	50	(13%)	9.7	40	(6%)	7.8
85 and over	1.6	(1%)	20	(4%)	10.8	10	(1%)	3.9
Total	145.3	(100%)	400	(100%)	2.8	660	(100%)	4.5
14 and under	31.1	(21%)	10	(3%)	0.5	30	(4%)	0.9
65 and over	15.3	(11%)	110	(29%)	7.5	120	(18%)	7.8
75 and over	6.8	(5%)	70	(17%)	10.0	50	(7%)	6.9
Female								
4 and under	9.9	(7%)	10	(2%)	0.7	10	(3%)	1.5
5 to 9	9.6	(6%)	0	(0%)	0.0	10	(1%)	0.8
10 to 14	10.2	(7%)	0	(0%)	0.0	10	(2%)	1.0
15 to 17	6.2	(4%)	0	(1%)	0.3	10	(2%)	1.5
18 to 29	23.9	(16%)	10	(4%)	0.5	80	(14%)	3.4
30 to 49	43.3	(29%)	60	(20%)	1.4	160	(27%)	3.7
50 to 64	25.5	(17%)	80	(27%)	3.3	130	(22%)	5.1
65 to 74	10.1	(7%)	70	(22%)	6.7	80	(14%)	8.1
75 to 84	7.8	(5%)	60	(19%)	7.7	70	(12%)	9.1
85 and over	3.4	(2%)	20	(5%)	4.5	10	(3%)	4.3
Total	149.8	(100%)	310	(100%)	2.1	580	(100%)	3.9
14 and under	29.7	(20%)	10	(2%)	0.2	30	(6%)	1.1
65 and over	21.3	(14%)	140	(46%)	6.7	170	(29%)	7.8
75 and over	11.2	(7%)	80	(24%)	6.7	90	(15%)	7.6

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian deaths and civilian injuries are rounded to the nearest ten and include a proportional share of home fire casualties where the heat source was unknown or unknown between smoking material and open flame, and home smoking-fire casualties where victim age or sex was unknown. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey, *Statistical Abstract of the United States*, Washington: U.S. Department of Commerce, Bureau of the Census, 2006-2007.

**Table 12. Casualties in Home Structure Fires, Involving Smoking Materials,
by Location of Victim at Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Location	Civilian Deaths		Civilian Injuries	
In area of origin	510	(72%)	850	(69%)
In area of origin and involved*	440	(62%)	600	(49%)
In area of origin and not involved	70	(10%)	240	(20%)
Not in area of origin	190	(27%)	390	(31%)
Unclassified location	0	(0%)	10	(0%)
Total	710	(100%)	1,240	(100%)

* Includes intimately involved with ignition.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian deaths and injuries are rounded to the nearest ten and include a proportional share of home fire casualties where the heat source was unknown or unknown between smoking material and open flame source and home smoking-fire casualties where victim location was unknown. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 13. Casualties in Home Structure Fires Involving Smoking Materials,
by Activity of Victim When Injured
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires as Confined Fires)**

Activity	Civilian Deaths		Civilian Injuries	
Sleeping	290	(40%)	320	(26%)
Attempting to escape	210	(30%)	300	(25%)
Unable to act	100	(14%)	50	(4%)
Unclassified activity	40	(6%)	70	(6%)
Returning to vicinity of fire	20	(3%)	60	(5%)
Acting irrationally	20	(2%)	40	(3%)
Attempting to fight fire	20	(2%)	270	(22%)
Attempting rescue	10	(2%)	110	(9%)
Total	710	(100%)	1,240	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian deaths and injuries are rounded to the nearest ten and include a proportional share of fires with heat source unknown or unknown between smoking material and open flame, and home smoking-material fire casualties with victim activity unknown. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey

**Table 14. Casualties in Home Structure Fires Involving Smoking Materials,
by Human Factor Before Injury of Victim
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Civilian Deaths		Civilian Injuries	
Asleep	300	(43%)	460	(37%)
Possibly impaired by alcohol	180	(26%)	190	(15%)
Physically disabled	150	(21%)	100	(8%)
Possibly impaired by other drug or chemical	80	(11%)	60	(5%)
Possibly mentally disabled	40	(5%)	40	(3%)
Unattended or unsupervised person	40	(5%)	30	(3%)
Unconscious	30	(4%)	10	(1%)
Physically restrained	0	(0%)	0	(0%)
None	170	(23%)	550	(44%)
Total fires excluding confined fires	710	(100%)	1,240	(100%)
Total factor entries	990	(139%)	1,440	(116%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Civilian deaths and injuries are rounded to the nearest ten and include a proportional share of fires with heat source unknown or unknown between smoking material and open flame, and home smoking-material fire casualties with human factor before injury listed as unknown, blank or not reported. Totals may not equal sums because of rounding.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 15. Smoking Rates in Selected Countries

Country	Percentage Who Smoke		
	Total	Male	Female
Guinea	52%	60%	44%
Namibia	50%	65%	35%
Kenya	49%	67%	32%
Bosnia and Herzegovina	48%	NA	NA
Yugoslavia	47%	52%	42%
Mongolia	47%	68%	26%
Yemen	45%	60%	29%
Turkey	44%	60-65%	20-24%
Romania	44%	62%	25%
Slovakia	43%	55%	30%
Lebanon	41%	46%	35%
Venezuela	41%	42%	39%
Argentina	40%	47%	34%
Albania	39%	60%	18%
Bangladesh	39%	64%	24%
Nepal	39%	48%	29%
Panama	38%	56%	20%
Greece	38%	47%	29%
Laos	38%	41%	15%
Kyrgyzstan	38%	60%	16%
Georgia	38%	61%	15%
Cuba	37%	48%	26%
Benin	37%	NA	NA
Cambodia	37%	66%	8%
Papua	37%	46%	28%
Russian Federation	37%	63%	10%
Bulgaria	37%	49%	24%
Macedonia	36%	40%	32%
Cameroon	36%	NA	NA
China	36%	67%	4%
Hungary	36%	44%	27%
Ukraine	35%	51%	19%
Republic of (South) Korea	35%	65%	5%
Germany	35%	39%	31%
Tunisia	35%	62%	8%

Table 15. Smoking Rates in Selected Countries (Continued)

Country	Percentage Who Smoke		
	Total	Male	Female
Mexico	35%	51%	18%
Uganda	35%	52%	17%
Poland	35%	44%	25%
France	35%	39%	30%
Brazil	34%	38%	29%
Kazakhstan	34%	60%	7%
Switzerland	34%	39%	28%
Lithuania	33%	51%	16%
Spain	33%	42%	25%
Japan	33%	53%	13%
Netherlands	33%	37%	29%
Croatia	33%	34%	32%
Myanmar	33%	44%	22%
Armenia	33%	64%	1%
Philippines	32%	54%	11%
Moldova	32%	46%	18%
Estonia	32%	44%	20%
Ecuador	32%	46%	17%
Ireland	32%	32%	31%
Norway	32%	31%	32%
Indonesia	31%	59%	4%
Tanzania	31%	50%	12%
Latvia	31%	49%	13%
Denmark	31%	32%	29%
Bolivia	30%	43%	18%
Syria	30%	51%	10%
Belarus	30%	55%	5%
Uzbekistan	29%	49%	9%
Jordan	29%	48%	10%
Czech Republic	29%	36%	22%
Peru	29%	42%	16%
Israel	29%	33%	24%
Belgium	28%	30%	26%
Guatemala	28%	38%	18%
Viet Nam	27%	51%	4%

Table 15. Smoking Rates in Selected Countries (Continued)

Country	Percentage Who Smoke		
	Total	Male	Female
South Africa	27%	42%	11%
United Kingdom	27%	27%	26%
Malaysia	26%	49%	4%
Algeria	25%	44%	7%
Slovenia	25%	30%	20%
Trinidad and Tobago	25%	42%	8%
El Salvador	25%	38%	12%
Canada	25%	27%	23%
New Zealand	25%	25%	25%
Italy	25%	32%	17%
Austria	25%	30%	19%
Mauritius	24%	45%	3%
United States of America	24%	26%	22%
Honduras	24%	36%	11%
Finland	24%	27%	20%
Thailand	23%	44%	3%
Uruguay	23%	32%	14%
Iraq	23%	40%	5%
Pakistan	23%	36%	9%
Zambia	23%	35%	10%
Columbia	22%	24%	21%
Chile	22%	26%	18%
Ivory Coast	22%	42%	2%
Botswana	21%	NA	NA
Dominican Republic	21%	24%	17%
Lesotho	20%	39%	1%
Australia	20%	21%	18%
Sweden	19%	19%	19%
Portugal	19%	30%	7%
Sierra Leone	19%	NA	NA
Egypt	18%	35%	2%
Morocco	18%	35%	2%
Zimbabwe	18%	34%	1%
Gambia	18%	34%	2%
Costa Rica	18%	29%	7%

Table 15. Smoking Rates in Selected Countries (Continued)

Country	Percentage Who Smoke		
	Total	Male	Female
India	16%	29%	3%
Ghana	16%	28%	4%
Ethiopia	16%	NA	NA
Azerbaijan	16%	30%	1%
Kuwait	16%	30%	2%
Iran	15%	27%	3%
Singapore	15%	27%	3%
Paraguay	15%	24%	6%
Jamaica	15%	NA	NA
Malawi	15%	20%	9%
Turkmenistan	14%	27%	1%
Sri Lanka	14%	26%	2%
Sudan	13%	24%	1%
Saudi Arabia	12%	22%	1%
Haiti	10%	11%	9%
United Arab Emirates	9%	18%	<1%
Nigeria	9%	15%	2%
Oman	9%	16%	2%
Rwanda	6%	7%	4%
Senegal	5%	NA	NA
Libya	4%	NA	NA

NA: Not available

Note: Percentages are based on some definition of adulthood and some definition of smoking frequency and recency; definitions may vary between countries. Countries shown in bold are those for which fire statistics are given in this report.

Source: Dr. Judith MacKay and Dr. Michael Eriksen, the Tobacco Atlas, World Health Organization, Brighton, UK, 2002, Table A. Actual year of data varies but is usually late 1990's.

Appendix A. How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from <http://www.nfirs.fema.gov/download/nfirspaperforms2007.pdf>.

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by **community size**, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; and (3) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

Projecting NFIRS to National Estimates

As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database - the NFPA survey - is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission have developed the specific analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others.

Figure 1.

Fires Originally Collected in NFIRS 5.0 by Year

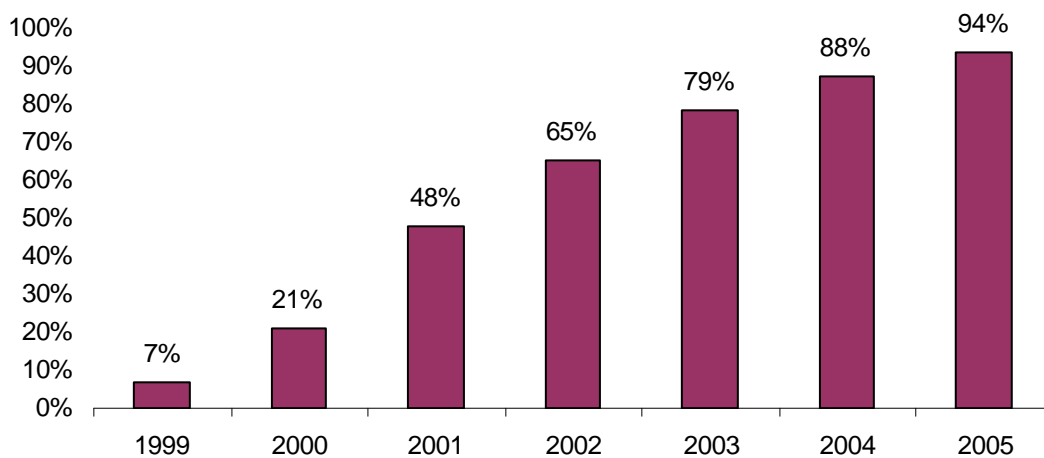


Figure 1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

For 2002 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

NFPA survey projections
NFIRS totals (Version 5.0)

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed with extreme caution.

A second option is to omit year estimates for 1999-2001 from year tables.

NFIRS 5.0 has six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. In order for that limited detail to be used to characterize the confined fires, they must be analyzed separately from non-confined fires. Otherwise, the patterns in a factor for the more numerous non-confined fires with factor known will dominate the allocation of the unknown factor fires for both non-confined and confined fires. If the pattern is different for confined fires, which is often the case, that fact will be lost unless analysis is done separately.

For most fields other than Property Use, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields.

For Factor Contributing to Ignition, the code "none" is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for "not reported" when no factors are recorded. "Not reported" is treated as an unknown, but the code "none" is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Groupings for this field show all category headings and specific factors if they account for a rounded value of at least 1%.

Type of Material First Ignited (TMI). This field is required only if the Item First Ignited falls within the code range of 00-69. NFPA has created a new code "not required" for this field that is applied when Item First Ignited is in code 70-99 (organic materials, including cooking materials and vegetation, and general materials, such as electrical wire, cable insulation, transformers,

tires, books, newspaper, dust, rubbish, etc..) and TMI is blank. The ratio for allocation of unknown data is:

$$\frac{(\text{All fires} - \text{TMI Not required})}{(\text{All fires} - \text{TMI Not Required} - \text{Undetermined} - \text{Blank})}$$

Heat Source. In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: “Heat from open flame or smoking material, other.” NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range, shown below.

- 61. Cigarette,
- 62. Pipe or cigar,
- 63. Heat from undetermined smoking material,
- 64. Match,
- 65. Lighter: cigarette lighter, cigar lighter,
- 66. Candle,
- 67. Warning or road flare, fusee,
- 68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11)
- 69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping “smoking materials” includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

Equipment Involved in Ignition (EII). NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to “the piece of equipment that provided the principal heat source to cause ignition.” However, the 2006 data is not yet available and a large portion of the fires coded as no equipment involved (NNN) have heat sources in the operating equipment category. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

$$\frac{\text{All fires}}{(\text{All fires} - \text{blank} - \text{undetermined} - [\text{fires in which EII} = \text{NNN and heat source} <> 40-99])}$$

Additional allocations may be used in specific analyses. For example, NFPA's report about home heating fires treats Equipment Involved in Ignition Code 120, fireplace, chimney, other" as a partial unknown (like Heat Source 60) and allocates it over its related decade of 121-127, which includes codes for fireplaces (121-122) and chimneys (126-127) but also includes codes for fireplace insert or stove, heating stove, and chimney or vent connector. More general analyses of specific occupancies may not perform as many allocations of partial allocations. Notes at the end of each table describe what was allocated.

Rounding and percentages. The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100%, even if the rounded number entry is zero. Values that appear identical may be associated with different percentages, and identical percentages may be associated with slightly different values.