Smoking-Related Fires in Residential Buildings

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS). Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information. Also included are recent examples of fire incidents that demonstrate some of the issues addressed in the report or that put the report topic in context.

Findings

- An estimated 9,000 smoking-related fires in residential buildings occur each year in the United States.
- While smoking-related fires account for only 2 percent of all residential building fires, they are the leading cause of fire deaths, accounting for 17 percent of fire deaths in residential buildings.
- Nonconfined smoking-related fires account for 94 percent of residential building smoking-related fires.
- Sixty-seven percent of the nonconfined residential building smoking-related fires occur because of abandoned or discarded smoking materials or products, primarily cigarettes.
- The bedroom is the leading area of fire origin for nonconfined residential building smoking-related fires—26 percent of smoking-related residential building fires originate in bedrooms.
- Residential building smoking-related fires peak in the afternoon and early evening between 2 and 7 p.m. with the highest peak between 2 and 3 p.m. This 5-hour period accounts for 27 percent of all residential building smoking-related fires.

Between 2006 and 2008, an estimated annual average of 9,000 smoking-related fires occurred in residential buildings in the United States. These smoking-related fires accounted for 2 percent of residential building fires responded to by fire departments across the Nation and resulted in an average of approximately 450 deaths, 1,025 injuries, and $303 million in property loss each year.[1,2,3]

The term "smoking-related fires" applies to those fires that are caused by cigarettes, cigars, pipes, and heat from undetermined smoking materials.[4] USFA differentiates between smoking as a cause of fires and fires ignited by smoking materials. Smoking (or smoking-related fires) are considered a behavioral cause. Fires ignited by smoking materials are considered as a group of fires where smoking materials were the heat source. The two sets are similar but not identical. A deliberately set fire with smoking materials as the heat of ignition would be considered an "intentional" fire; a fire unintentionally set by someone smoking (cigarettes, cigars, or other smoking materials) would be considered a "smoking-related fire."[5] This report addresses the characteristics of residential building smoking-related fires as reported to the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) between 2006 and 2008.

While smoking-related fires only account for 2 percent of all residential building fires, they pose the highest life safety risk. The fatality rate per 1,000 fires is more than 8 times greater in smoking-related fires than in nonsmoking-related residential building fires. The injury rate per 1,000 fires is more than 3 times greater in smoking-related fires than in nonsmoking-related residential building fires. In addition, 15 percent of smoking-related fires in residential buildings occur in bedrooms when smoking materials ignite mattresses and bedding. The combination of cigarettes and mattress flammability has long been recognized as a serious issue. In 1973, the Federal Mattress Flammability Standard became effective, requiring mattresses to resist ignition from smoldering cigarettes.[6]

Other important measures have been taken to promote fire safety and education about the dangers of smoking-related fires. For example, in the 1980s, grassroots organizations and Congress worked to pass bills that would require cigarettes to pass ignition tests. These efforts culminated in the 1984 Cigarette Safety Act and the Fire Safe Cigarette Act of 1990, both of which stimulated research to make cigarettes more "fire safe" and less likely to prevent future fire tragedies.[7] The years of legislative and research initiatives culminated in the first State-based legislation in New York State

to establish what are called "ignition propensity" standards cigarettes. Since the New York State legislation was enacted in 2003, all 50 States have adopted fire-safe cigarette regulations with the last State passing legislation in March 2010. By mid-2011, all State-based fire-safe cigarette legislation will be implemented.

For the purpose of this report, the term "residential smoking fires" is synonymous with "residential building smoking-related fires" and the term "residential nonsmoking fires" is synonymous with "residential building nonsmoking-related fires." "Residential smoking fires" and "residential nonsmoking fires" are used throughout the body of this report; the findings, tables, charts, headings, and footnotes reflect the full categories, "residential building smoking-related fires" and "residential building nonsmoking-related fires."

Type of Fire

Building fires are divided into two classes of severity in NFIRS: "confined fires," which are those fires confined to certain types of equipment or objects, and "nonconfined fires," which are not. Confined building fires are small fire incidents that are limited in extent, staying within pots or fireplaces or certain other noncombustible containers.[8] Confined fires rarely result in serious injury or large content losses, and are expected to have no significant accompanying property losses due to flame damage.[9] The majority of residential smoking fires are generally larger, nonconfined fires (94 percent) as shown in Table 1. By comparison, 52 percent of all residential building fires are nonconfined fires.

Table 1. Residential Building Smoking-Related Fires by Type of Incident (2006–2008)

Incident Type	Percent
Nonconfined fires	94.2
Confined fires	5.8
Trash or rubbish fire, contained	5.4
Cooking fire, confined to container	0.2
Commercial compactor fire, confined to rubbish	0.1
Total	100.0

Source: NFIRS 5.0.
Note: It is rare that confined smoking-related fires are associated with cooking and heating. Ninety-three percent of the confined smoking-related fires are from fires in trash or garbage bins.

Loss Measures

Table 2 presents losses, averaged over this 3-year period, for residential smoking and nonsmoking fires.[10]

Overall, the fire death rate for residential smoking fires is substantially higher than that for residential nonsmoking fires—27.6 deaths per 1,000 fires versus 3.2 deaths per 1,000 fires. The rate of fire injuries from smoking in residences is more than triple that of residential nonsmoking fires. Even when these smoking fires are confined, the injury rate is considerable at 18.5 injuries per 1,000 fires. Dollar loss from residential smoking fires is also higher than residential nonsmoking fires at nearly twice the loss per fire.

Table 2. Loss Measures for Smoking-Related and Nonsmoking-Related Residential Building Fires (3-year average, 2006–2008)

Measure	Residential Smoking-Related Fires	**Confined** Residential Smoking-Related Fires	**Nonconfined** Residential Smoking-Related Fires	Residential Nonsmoking-Related Fires
Average Loss:				
Fatalities/1,000 Fires	27.6	0.0	29.3	3.2
Injuries/1,000 Fires	90.1	18.5	94.5	25.3
Dollar Loss/Fire	$23,210	$230	$24,620	$12,700

Source: NFIRS 5.0.
Notes: 1) No deaths in a confined fire were reported to NFIRS during 2006-2008; the resulting loss of 0.0 fatalities per 1,000 fires reflects only data reported to NFIRS.
2) Average loss for fatalities and injuries is computed per 1,000 fires; average dollar loss is computed ***per fire*** and is rounded to the nearest $10.
3) Nonsmoking residential building fires do not include fires of unknown cause.

Type of Smoking Material Involved in Residential Building Smoking-Related Fires

Cigarettes are, by far, the leading type of smoking material involved in residential smoking fires and account for 87 percent of these fires (Table 3). Pipes or cigars are involved in the ignition of very few residential smoking fires (2 percent). The type of smoking material was undetermined in approximately 12 percent of residential smoking fires.

Table 3. Sources of Heat in Residential Building Smoking-Related Fires (3-year average, 2006–2008)

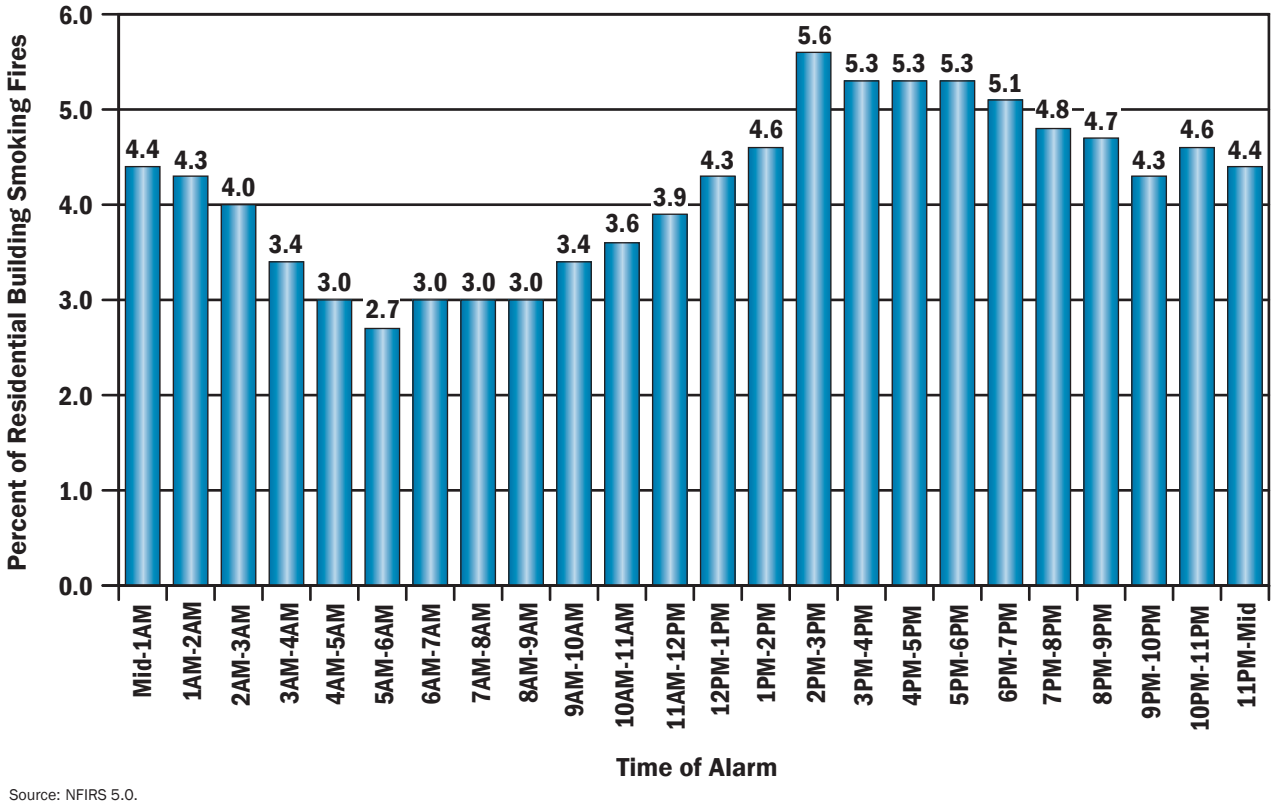
Heat Source	Percent of Residential Smoking-Related Fires
Cigarette	86.6
Heat from undetermined smoking material	11.9
Pipe or cigar	1.5
Total	100.0

Source: NFIRS 5.0.

When Residential Building Smoking-Related Fires Occur

As shown in Figure 1, residential smoking fires occur most often in the afternoon and early evening hours from 2 to 7 p.m., peaking from 2 to 3 p.m. at 6 percent. They decline throughout the evening and early morning and reach their lowest point during the morning hours (5 to 6 a.m.). While the 5-hour peak period from 2 to 7 p.m. accounts for 27 percent of residential building smoking fires, the smoking fires that occur in the late evening and early morning hours tend to be the most deadly.[11]

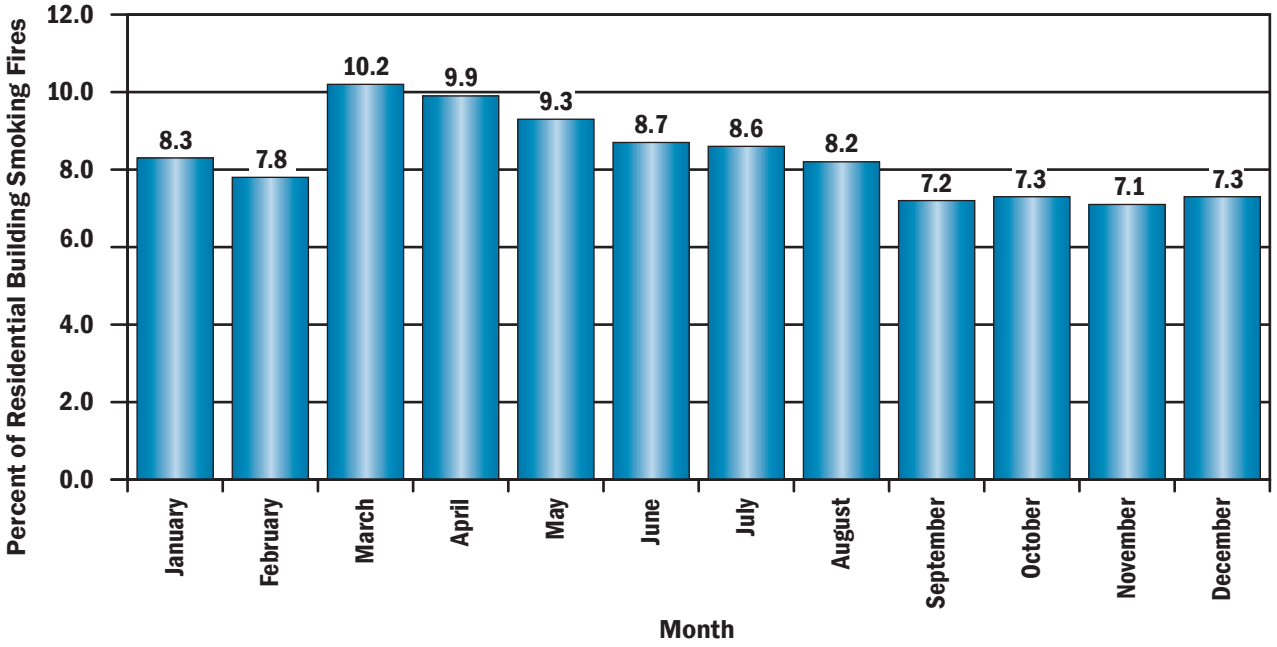
Figure 1. Residential Building Smoking-Related Fires by Time of Alarm (2006–2008)



Source: NFIRS 5.0.

The incidence of residential smoking fires peaks in March at 10 percent and declines throughout the remainder of the year (Figure 2). The percent of fires declines to the lowest point during the months of September to November. Despite fewer numbers of smoking fires in the winter months as compared to the spring peak, more people die in residential smoking fires in the months of December, January, and February—38 percent of smoking fire deaths occur during these months.

Figure 2. Residential Building Smoking-Related Fires by Month (2006–2008)

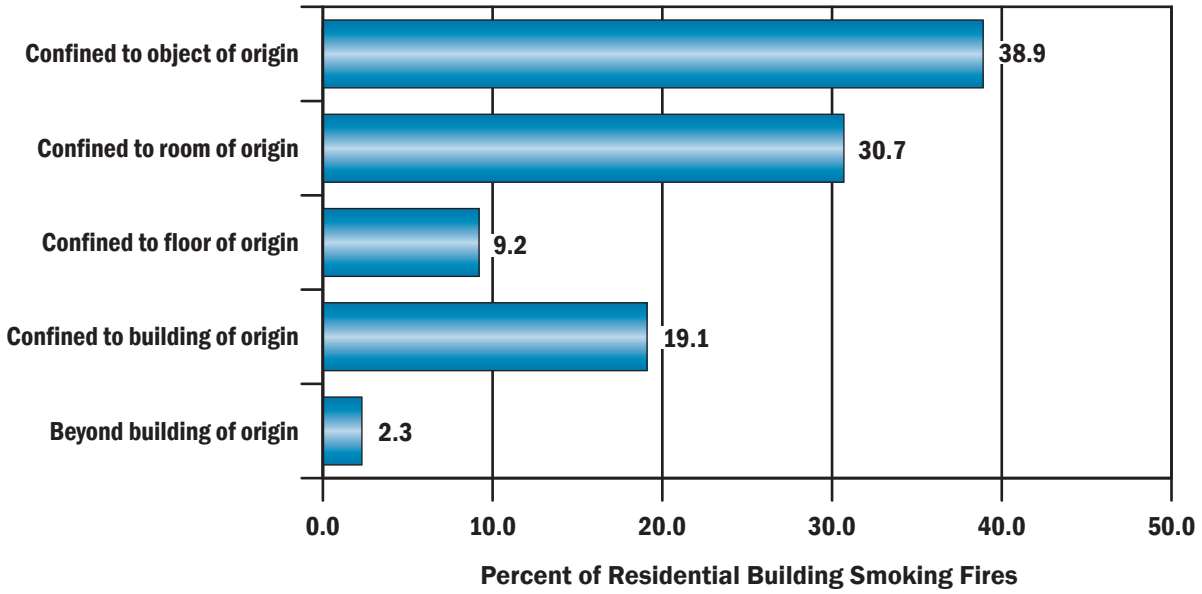


Source: NFIRS 5.0.

Fire Spread in Residential Building Smoking-Related Fires

About 39 percent of residential smoking fires are confined to the object of origin, either because the incident is an NFIRS-defined confined fire[12] or because the fire was confined to the object, such as an upholstered chair or sofa. Thirty-one percent of residential smoking fires extend beyond the room of origin (Figure 3).

Figure 3. Extent of Fire Spread in Residential Building Smoking-Related Fires (2006–2008)



Source: NFIRS 5.0.

Note: The percent of fires that are confined to the object of origin is not the same as the percent that are defined as "confined fires." The NFIRS definition of "confined fires" is fires confined to a fire-resistant container such as a pot, fireplace, or waste container.

Confined Fires

NFIRS allows abbreviated reporting for confined fires and many reporting details of these fires are not required. As a result, data are often not reported on these fires. Because confined residential smoking fires account for only 6 percent of residential smoking fire incidents, they represent a small portion of the time of alarm profile. Confined fires are greatest during the hours of 7 to 8 p.m. when they account for 10 percent of all fires that occur during this period. Confined residential smoking fires peak in January but do not follow any trend throughout the remainder of the year.

Nonconfined Fires

Nonconfined smoking fires account for 94 percent of all residential smoking fire incidents. The next sections of this Topical Report address nonconfined residential smoking fires, where detailed fire data are available.

Where Nonconfined Residential Building Smoking-Related Fires Start (Area of Fire Origin)

Approximately one quarter of nonconfined residential smoking fires (26 percent) originate in bedrooms. Bedrooms are also the leading area of origin in fatal residential smoking fires (42 percent).

Exterior balconies and unenclosed porches are the second leading areas of origin of smoking fires, at 13 percent. Common rooms, including living rooms, family rooms, dens or lounge areas, (11 percent), exterior wall surfaces (6 percent), and courtyards, patios, and terraces (5 percent) account for 22 percent of all nonconfined smoking fires (Table 4).

Table 4. Leading Areas of Fire Origin in Nonconfined Residential Building Smoking-Related Fires (2006–2008)

Area of Origin	Percent (Unknowns Apportioned)
Bedrooms	25.8
Exterior balconies, unenclosed porches	12.7
Common room, den, family room, living room, lounge	11.4
Exterior wall surfaces	5.7
Courtyards, patios, terraces	5.3

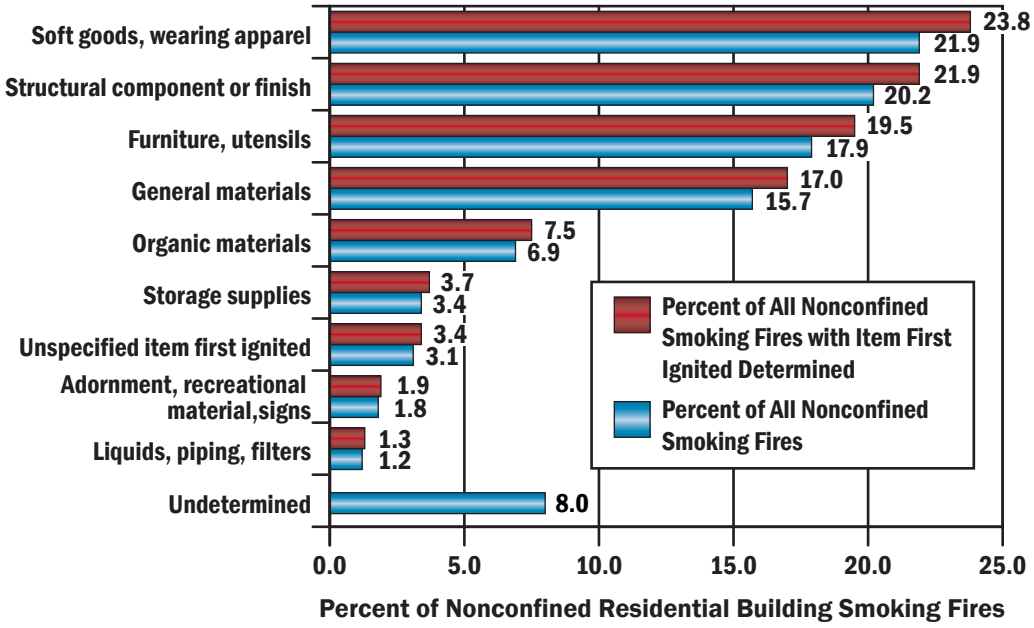
Source: NFIRS 5.0.

What Ignites First in Nonconfined Residential Building Smoking-Related Fires

Twenty-four percent of the items first ignited in nonconfined residential smoking fires fall under the "soft goods, wearing apparel" category (Figure 4). This category includes clothing, mattresses, pillows, and bedding—sheets, blankets, and comforters. At 22 percent, the second leading category of items first ignited, "structural component or finish," includes exterior sidewall coverings, surfaces, and finishes, as well as structural members or framing. "Furniture" is the third leading category (20 percent).

Upholstered sofas and chairs (14 percent) and rubbish, trash, and waste (12 percent) are the specific items most often first ignited in nonconfined residential smoking fires. In bedrooms, the leading area of fire origin for nonconfined residential smoking-related fires, mattresses and pillows (31 percent) and bedding (28 percent) are the items most often first ignited.

Figure 4. Item First Ignited in Nonconfined Residential Building Smoking-Related Fires by Major Category (2006–2008)



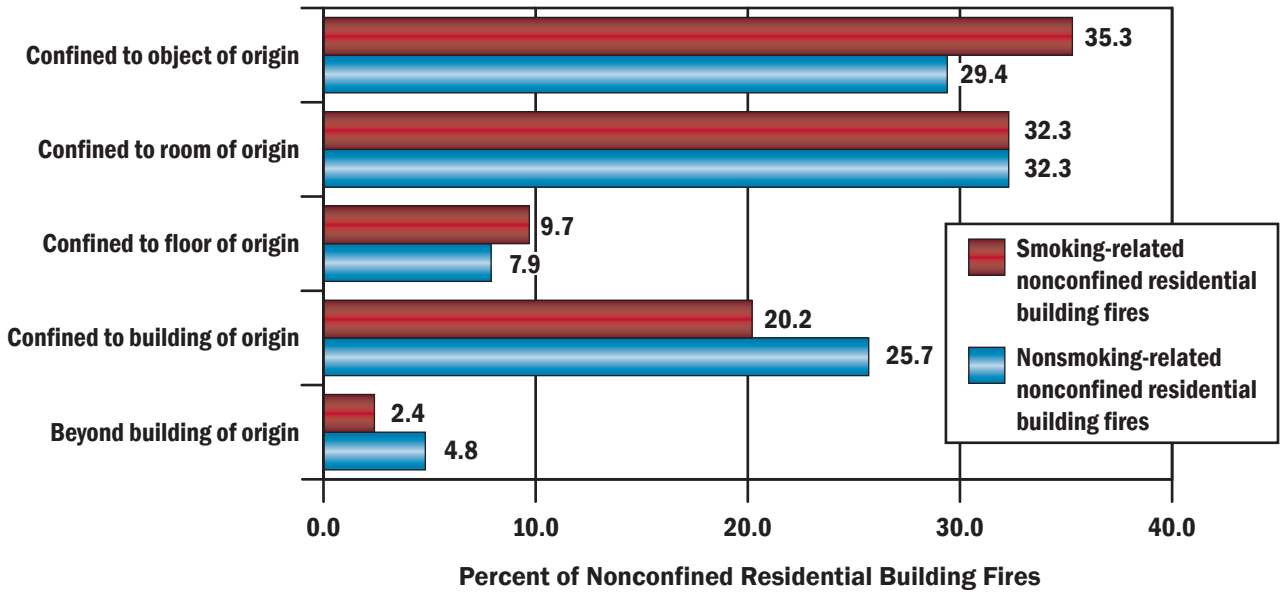
Source: NFIRS 5.0.

Fire Spread in Nonconfined Residential Building Smoking-Related Fires

Nonconfined residential smoking fires tend to remain within the confines of the room of origin, either confined to the object itself or spreading, but staying within the room of origin. The majority of nonconfined residential smoking fires, 68 percent, are limited to the object or room of fire origin (Figure 5). Nonsmoking nonconfined residential fires, by contrast, are limited to the object or room of fire origin less often (62 percent) and tend to be larger spreading—31 percent of nonconfined residential nonsmoking fires spread to the building of origin or beyond while only 23 percent of smoking fires spread to this extent.

While smoking fires tend to be smaller than other causes of residential fires, they are still dangerous. Case in point: 43 percent of fatal nonconfined smoking residential fires never spread beyond the room of origin; only 25 percent of nonconfined nonsmoking fatal fires remain that contained.

Figure 5. Extent of Fire Spread in Nonconfined Residential Building Smoking-Related Fires and Nonconfined Residential Building Nonsmoking-Related Fires (2006–2008)



Source: NFIRS 5.0.

Factors Contributing to Ignition in Nonconfined Residential Building Smoking-Related Fires

Table 5 shows the leading factors contributing to ignition for nonconfined residential smoking fires. These three factors were cited in 93 percent of nonconfined residential smoking fires. "Abandoned or discarded materials or products" was the leading factor contributing to ignition (67 percent) and was cited as a contributing factor more than four times the second leading factor, unspecified misuse of material or product (15 percent). The heat source too close to a combustible item contributes to the ignition of the fire in 11 percent of nonconfined residential smoking fires. Cigarettes are the primary smoking material cited as the heat source in all three factors.

Table 5. Leading Factors Contributing to Ignition for Nonconfined Residential Building Smoking-Related Fires (Where Factor Contributing Specified, 2006–2008)

Factor Contributing to Ignition	Percent of Nonconfined Residential Smoking-Related Fires Where Contributing Factor Specified
Abandoned or discarded materials or products	66.8
Unspecified misuse of material or product	15.2
Heat source too close to combustibles	10.9

Source: NFIRS 5.0.
Notes: 1) Includes only incidents where factors that contributed to the ignition of the fire were specified.
2) Multiple factors contributing to fire ignition may be noted for each incident.

Alerting/Suppression Systems in Residential Building Smoking-Related Fires

Smoke Alarms

Smoke alarm data are available for both confined and nonconfined fires although for confined fires, the data are very limited in scope. Note that the data presented in Tables 6 to 8 are the raw counts from the NFIRS data set and are not scaled to national estimates of smoke alarms in residential smoking fires. In addition, NFIRS does not allow for the determination of the type of smoke alarm—that is, if the smoke alarm was photoelectric or ionization, or the location of the smoke alarm with respect to the area of fire origin.

Overall, smoke alarms were reported as present in 53 percent of nonconfined residential smoking fires (Table 6). By comparison, smoke alarms were present in 47 percent of nonsmoking residential fires. Smoke alarms were known to be absent in 24 percent of the nonconfined residential smoking fires, and firefighters were unable to determine if a smoke alarm was present in another 23 percent of these fires. Thus, smoke alarms were potentially missing in between 24 to 47 percent of fires with the ability to spread or result in fatalities.

Table 6. Presence of Smoke Alarms in Nonconfined Residential Building Smoking-Related and Nonsmoking-Related Fires (2006–2008)

Presence of Smoke Alarms	Residential Smoking-Related Fires (Percent)	Residential Nonsmoking-Related Fires (Percent)
Present	52.7	47.2
None present	24.3	25.0
Undetermined	23.0	27.9

Source: NFIRS 5.0.

Of concern are fires in residential buildings that are **not** currently or routinely occupied. While these fires are a small portion of residential smoking fires (8 percent), these occupancies—buildings under construction, undergoing major renovation, vacant, and the like—are also unlikely to have alerting and suppression systems that are in place and, if in place, that operate. Only 9 percent of smoking fires in residential buildings that are not routinely occupied were reported as having operating smoke alarms.

Smoke Alarms in Occupied Housing

One of the most important values of smoke alarms is detecting smoldering fires before they break into open flame or produce large volumes of smoke. Smoke alarms are especially useful in early detection of fires caused by cigarettes, which fit this pattern and produce sufficient smoke to be detected before they become deadly. For fatal residential smoking fires that occur at night, often after a smoker

has dropped a cigarette onto upholstered furniture or bedding, having a working smoke alarm can be the difference between life and death.

Smoke alarms were reported as present in 54 percent of nonconfined residential smoking fires in occupied housing (Table 7). Smoke alarms are known to have operated in 28 percent of nonconfined smoking fires in occupied housing and were known to be absent in 23 percent. Firefighters were unable to determine if a smoke alarm was present in another 23 percent of these fires. Thus, smoke alarms were potentially missing in between 23 to 46 percent of nonconfined residential smoking fires in occupied housing with the ability to spread or result in fatalities.

When operational status is considered for nonconfined residential smoking fires in occupied housing, the percentage of smoke alarms reported as present (54 percent) consists of:

- smoke alarms present and operated—28 percent;
- present, but did not operate—18 percent (fire too small, 10 percent; alarm did not operate, 8 percent); and
- present, but operational status unknown—8 percent.

When the subset of incidents where smoke alarms were reported as present is analyzed separately, smoke alarms were reported to have operated in 53 percent of the incidents. The alarms failed to operate, however, in 15 percent of the incidents. In 19 percent of this subset, the fire was too small to activate the alarm. The operational status of the alarm was undetermined in an additional 14 percent of the incidents. (Total percentage does not add to 100 due to rounding.)

Because smoking fires result in more fire deaths than any other residential fire cause, these statistics suggest the need to pay special attention to smoke alarm maintenance in smoker households. For this reason, in several prevention initiatives involving door-to-door checks on smoke alarm presence and maintenance, a smoker living in the residence is noted.[13,14]

Table 7. NFIRS Smoke Alarm Data for Nonconfined Residential Building Smoking-Related Fires in Occupied Housing (NFIRS, 2006–2008)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		1,215	10.1
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	2,498	20.7
		Smoke alarm alerted occupants, occupants failed to respond	194	1.6
		No occupants	286	2.4
		Smoke alarm failed to alert occupants	134	1.1
		Undetermined	310	2.6
	Smoke alarm failed to operate		949	7.9
	Undetermined		932	7.7
None present			2,761	22.9
Undetermined			2,790	23.1
Total Incidents			12,069	100.0

Source: NFIRS 5.0.

Notes: The data presented in this table are raw data counts from the NFIRS data set. They do not represent national estimates of smoke alarms in nonconfined residential building smoking-related fires in occupied housing. They are presented for informational purposes. Total may not add to 100 percent due to rounding.

Smoke Alarms in Confined Fires

Less information about smoke alarm status is collected for confined fires, but the data still give important insights. Smoke alarms operated and alerted occupants in 32 percent of confined smoking fires (Table 8). The analyses presented here do not differentiate between occupied and nonoccupied housing, as this data detail is not part of the confined fires reporting requirement (only 21 percent of confined residential smoking incidents reported this additional data).

In addition, the analyses assume that confined fires are fires in occupied structures—by definition, confined fires (small fires confined to a noncombustible container) appear to imply an occupied structure as they are unlikely to be reported otherwise.

Occupants were not alerted by the smoke alarm in 30 percent of confined residential smoking fires.[15] Smoke alarm effectiveness was unknown in 38 percent of confined residential smoking fires.

Table 8. NFIRS Smoke Alarm Data for Confined Residential Building Smoking-Related Fires (NFIRS, 2006–2008)

Smoke Alarm Effectiveness	Count	Percent
Smoke alarm alerted occupants	256	31.5
Smoke alarm did not alert occupants	247	30.4
Unknown	310	38.1
Total Incidents	813	100.0

Source: NFIRS 5.0.

Notes: The data presented in this table are raw data counts from the NFIRS data set. They do not represent national estimates of smoke alarms in confined residential building smoking-related fires. They are presented for informational purposes. Total may not add to 100 percent due to rounding.

Automatic Extinguishment Systems

The analyses presented do not differentiate between occupied and nonoccupied housing, as few reported fires in nonoccupied housing have automatic extinguishment systems (AES) present (occupied housing accounted for 93 percent of reported residential smoking incidents with AESs). AESs were reported as present in only 3 percent of residential smoking fires in buildings not routinely occupied.

Full or partial AESs were present in 6 percent of nonconfined residential smoking fires (Table 9). The lack of an AES is not unexpected as only 3 percent of all nonconfined residential building fires have an AES present. Eighty-one percent of residential smoking fires with AES present were confined to the object or the room of origin—an important consideration for containing smoking fires as they are the leading cause of residential fatal fires. Sixty-four percent of AESs in residential smoking fires were in multifamily occupancies.

Note that the data presented in Table 9 are the raw counts from the NFIRS data set and are not scaled to national estimates of AESs in residential smoking fires.

Table 9. NFIRS Automatic Extinguishing System (AES) Data for Nonconfined Residential Building Smoking-Related Fires (2006–2008)

AES Presence	Count	Percent
AES present	810	6.1
Partial system present	22	0.2
AES not present	11,755	89.1
Unknown	603	4.6
Total Incidents	13,190	100.0

Source: NFIRS 5.0.

Notes: The data presented in this table are raw data counts from the NFIRS data set. They do not represent national estimates of AESs in nonconfined residential building smoking-related fires. They are presented for informational purposes. Totals may not add to 100 percent due to rounding.

Examples

The following are some examples of residential smoking fires reported by the media:

- August 2008: A 78-year-old woman was killed in a fire that was caused by smoking materials, probably a cigarette, left on a sofa in a home in Potomac, MD. The home had at least three smoke alarms; however, one had no battery, another had faulty wiring, and the firefighters could not tell if the third one activated. Firefighters were able to control the blaze, rescuing the woman's son and transporting him to a local hospital to recover.[16]
- April 2009: A fire started by a discarded cigarette displaced 70 residents in an apartment complex in Newport News, VA. More than 60 firefighters from Newport News and neighboring town fire departments fought to control the fire. Several apartments were heavily damaged or not suitable for occupancy. The fire was deemed to be accidental and no one was hurt.[17]
- May 2009: A three-alarm blaze was started by a cigarette left in the bedroom of a multifamily house in Pawtucket, RI. Firefighters responded to the fire and attempted to pull a man from the burning building. Unfortunately, the fire claimed the 47-year-old man's life. The building did not have smoke alarms. Nearby residents were temporarily evacuated. A few family members and firefighters had minor injuries which were treated at the local hospital.[18]
- January 2010: An accidental house fire that killed a 37-year-old woman and injured 2 others in Hillcrest Heights, MD, was started by a lit cigarette. The fire started in the second-story bedroom and spread to the attic. Firefighters were able to extinguish the fire in 10 minutes.[19]

Resources

Many local and State fire departments have created successful fire safety and prevention programs geared toward reducing smoking fires. It is likely that these prevention programs, the widespread use of smoke alarms, the use of residential sprinkler systems, and safer smoking materials such as fire-safe cigarettes, have decreased the incidence of residential smoking fires. However, when residential smoking fires occur, they result in more fire fatalities than any other residential fire cause. The U.S. Fire Administration (USFA) has addressed this important issue in its public education campaign, "Smoking and Home Fires—How You Can Prevent Home Fires Caused by Smoking." Details and information on this effort can be found at http://www.usfa.dhs.gov/campaigns/smoking/.

For additional smoking fire safety information, please visit http://www.usfa.fema.gov/citizens/all_citizens/home_fire_prev/smoking.shtm.

NFIRS Data Specifications for Residential Building Smoking-Related Fires

Data for this report were extracted from the NFIRS annual Public Data Release (PDR) files for 2006, 2007, and 2008. Only version 5.0 data were extracted.

Residential building smoking-related fires were defined as:

- Incident Types 111-123:

Incident Type	Description
111	Building fire
112	Fires in structure other than in a building
113	Cooking fire, confined to container
114	Chimney or flue fire, confined to chimney or flue
115	Incinerator overload or malfunction, fire confined
116	Fuel burner/boiler malfunction, fire confined
117	Commercial compactor fire, confined to rubbish
118	Trash or rubbish fire, contained
120	Fire in mobile property used as a fixed structure, other
121	Fire in mobile home used as fixed residence
122	Fire in motor home, camper, recreational vehicle
123	Fire in portable building, fixed location

  Note that Incident Types 113 to 118 do not specify if the structure is a building.

  Incident Type 112 is included as previous analyses have shown that Incident Types 111 and 112 are used interchangeably.

- Structure Type:
  - For Incident Types 113 to 118:
    - 1—Enclosed building,
    - 2—Fixed portable or mobile structure, and
    - Structure Type not specified (null entry).
  - For Incident Types 111,112, and 120 to 123:
    - 1—Enclosed building, and
    - 2—Fixed portable or mobile structure.
- Aid Types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid double counting of incidents.

- Property Use 400 to 464:

Property Use	Description
400	Residential, other
419	One- or two-family dwelling
429	Multifamily dwelling
439	Boarding/Rooming house, residential hotels
449	Hotel/Motel, commercial
459	Residential board and care
460	Dormitory-type residence, other
462	Sorority house, fraternity house
464	Barracks, dormitory

- The USFA cause hierarchy was used to determine residential building smoking fire incidents.[20]

The analyses contained in this report reflect the current methodologies used by the USFA. The USFA is committed to providing the best information on the United States' fire problem and continually examines its data and methodology to fulfill this goal. Because of this commitment, data collection strategies and methodological changes are possible and do occur. As a result, analyses and estimates of the fire problem may change slightly over time. Previous analyses and estimates on specific issues (or similar issues) may have used different methodologies or data definitions and may not be directly comparable to the current ones.

To request additional information or to comment on this report, visit http://www.usfa.fema.gov/applications/feedback/index.jsp.

Notes:

[1] National estimates are based on 2006-2008 native version 5.0 data from the National Fire Incident Reporting System (NFIRS) and residential structure fire loss estimates from the National Fire Protection Association's (NFPA) annual surveys of fire loss. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest $million.

[2] In NFIRS, version 5.0, a structure is a constructed item of which a building is one type. In previous versions of NFIRS, the term "residential structure" commonly referred to buildings where people live. To coincide with this concept, the definition of a residential structure fire for NFIRS 5.0 has, therefore, changed to include only those fires where the NFIRS 5.0 Structure Type is 1 or 2 (enclosed building and fixed portable or mobile structure) with a residential property use. Such fires are referred to as "residential buildings" to distinguish these buildings from other structures on residential properties that may include fences, sheds, and other uninhabitable structures. Confined fire incidents that have a residential property use, but do not have a structure type specified are presumed to be buildings. Nonconfined fire incidents without a structure type specified are considered to be invalid incidents (structure type is a required field) and are not included.

[3] Residential buildings include, but are not limited to, one- or two-family dwellings, multifamily dwellings, boarding houses or residential hotels, commercial hotels, college dormitories, and sorority/fraternity houses.

[4] For purposes of this analysis, residential building smoking-related fires are defined as those residential buildings for which the cause of the fire was determined to be smoking under the U.S. Fire Administration (USFA) cause hierarchy. It does not include intentional fires where the heat of ignition was smoking materials. The cause hierarchy can be found at http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.

[5] For comparison, USFA estimates that approximately 15,500 residential building fires with smoking materials as the heat source occurred annually between 2006 and 2008.

[6] There are two Federal flammability standards that apply to mattresses. The first, the Federal Mattress Flammability Standard (37 Fed. Reg. 11,363 (June 7, 1972)) was effective in 1973 and codified as 16 Code of Federal Regulations (CFR) Part 1632, requires that a mattress resist ignition from a smoldering heat source, specifically a cigarette. The second, Standard for the Flammability (Open Flame) of Mattress Sets (71 Fed. Reg. 13,472 (March 15, 2006)) was effective in 2007 and codified in 16 CFR Part 1633, requires that a mattress resist ignition from small-flame heat sources, such as a match, lighter, or candle.

[7] The 1984 Cigarette Safety Act funded a 3-year study under the auspices of the Consumer Product Safety Commission (CPSC). "The Final Report of the Technical Study Group on Cigarette and Little Cigar Fire Safety: Toward a Less Fire-Prone Cigarette" (1987) reported to the U.S. Congress in 1987 "it is technically feasible and may be commercially feasible to develop a cigarette that will have a significantly reduced propensity to ignite furniture and mattresses." The Fire Safe Cigarette Act of 1990 funded an additional 3-year research program and directed the CPSC and the Center for Fire Research at the National Institute of Standards and Technology (NIST) to assess the feasibility to develop a method for testing cigarette fire safety performance. In 1993, the Technical Advisory Group overseeing the research reported to Congress that such a performance standard could be developed. It further noted that the development of such a standard was beyond the jurisdiction and technical capability of the CPSC.

[8] In NFIRS, confined fires are defined by Incident Type codes 113 to 118.

[9] NFIRS distinguishes between "content" and "property" loss. Content loss includes loss to the contents of a structure due to damage by fire, smoke, water, and overhaul. Property loss includes losses to the structure itself or to the property itself. Total loss is the sum of the content loss and the property loss. For confined fires, the expectation is that the fire did not spread beyond the container (or rubbish for Incident Type 118) and hence, there was no property damage (damage to the structure itself) from the flames. There could be, however, property damage as a result of smoke, water, and overhaul.

[10] The average fire death and fire injury loss rates computed from the national estimates above will not agree with average fire death and fire injury loss rates computed from NFIRS data alone. The fire death rate computed from national estimates would be (1,000*(450/9,000)) = 50 deaths per 1,000 residential building smoking-related fires and the fire injury rate would be (1,000*(1,025/9,000)) =113.9 injuries per 1,000 residential building smoking-related fires.

[11] For the purposes of this report, the time of the fire alarm is used as an approximation for the general time the fire started. However, in NFIRS, it is the time the fire was reported to the fire department.

[12] NFIRS-defined confined fires are those incidents coded with Incident Type codes 113 to 118.

[13] Assistance to Firefighters Grants, Grant # EMW-2009-FP-0119, Institution of Fire Engineers, Alexandria, VA.

[14] Assistance to Firefighters Grants, Grant # EMW-2008-FP-01846, Washington State Association of Fire Marshals, Olympia, WA.

[15] In confined fires, the entry "smoke alarm did not alert occupants" can mean: no smoke alarm was present, the smoke alarm was present but did not operate, or the smoke alarm was present and operated but the occupant was already aware of the fire.

[16] Dan Morse, "Cigarette on sofa might have caused fatal fire," www.washingtonpost.com, August 30, 2008. http://www.washingtonpost.com/wp-dyn/content/article/2008/08/29/AR2008082901209.html (accessed January 29, 2010).

[17] Alicia P. Q. Wittmeyer, "Fire that displaced 70 in Newport News caused by cigarette," hamptonroads.com, April 13, 2009. http://hamptonroads.com/2009/04/fire-displaced-70-newport-news-caused-cigarette (accessed January 29, 2010).

[18] Philip Marcelo and C. Eugene Emery Jr., "Cigarette blamed in deadly Pawtucket house fire," newsblog.projo.com, May 8, 2009. http://newsblog.projo.com/2009/03/update-cigarett.html (accessed January 29, 2010).

[19] Andrea Noble, "Fatal Hillcrest Heights house fire caused by cigarette," gazette.net, January 19, 2010. http://gazette.net/stories/01192010/prinnew164110_32601.php (accessed January 29, 2010).

[20] The USFA cause hierarchy is designed for structure fires. Buildings are a subset of structures. The cause hierarchy can be found at http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.