TOPICAL FIRE REPORT SERIES Volume 14, Issue 3 / May 2013

Fatal Fires in Residential Buildings (2009–2011)

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 National Fire Incident Reporting System. 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 1,600 fatal fires in residential buildings were reported to United States fire departments each year and caused an estimated 2,495 deaths, 625 injuries and $188 million in property loss.
- Fatal fires in residential buildings tended to be larger, caused more damage and had higher injury rates than nonfatal fires in residential buildings.
- "Other unintentional, careless" actions (16 percent) and "smoking" (15 percent) were the leading causes of fatal fires in residential buildings.
- The leading areas of fire origin in fatal fires in residential buildings were bedrooms (26 percent) and common areas such as living and family rooms (23 percent).
- Fatal fires in residential buildings were more prevalent in the cooler months, peaking in January (14 percent).
- Fatal fires in residential buildings were highest between 1 to 2 a.m. and 4 to 5 a.m. The 8-hour peak period (11 p.m. to 7 a.m.) accounted for 48 percent of the fatal fires in residential buildings.
- Seventy-nine percent of fatal fires in residential buildings extended beyond the room of fire origin.

Historically, the fire death rate in the U.S. has been higher than most of the industrialized world. While the U.S. still has one of the highest fire death rates (9.6 deaths per million population) in the industrialized world today, its standing has greatly improved.[1, 2] Falling from among the top three nations in terms of the fire death rate two decades ago, the U.S. now has the 13th highest fire death rate per million people.[3] Nevertheless, civilian fire fatalities are still high. From 2009 to 2011, an estimated 3,045 civilian fire deaths were reported to fire departments across the country each year.[4]

An estimated 1,600 fatal fires in residential buildings occurred annually in recent years (2009 to 2011).[5, 6] These fires resulted in an annual average of approximately 2,495 deaths, 625 injuries and $188 million in property loss.

This report is one of a continuing series of topical reports issued by the U.S. Fire Administration's National Fire Data Center and addresses the characteristics of fatal fires (e.g., fire spread, factors contributing to ignition, alerting/suppression systems, etc.) in residential buildings as opposed to the characteristics of the civilian fire fatalities (e.g., gender, race and age of the victim, activity prior to death, etc.) that resulted from these fatal fires. The characteristics of civilian fire fatalities are discussed in a separate topical fire report titled, "Civilian Fire Fatalities in Residential Buildings (2009-2011)," Volume 14, Issue 2 / April 2013.

Because 82 percent of fire deaths occurred in residential buildings, the fatal fires in this type of building are the focus of this report. The information in this report about fatal residential building fires can be used not only to assess progress but also to understand the nature of the fatal fire problem and its implications for targeting of prevention programs.

The National Fire Incident Reporting System data from 2009 to 2011 are used for the analyses presented throughout the report. For the purpose of this report, the terms "residential fires" and "residential fatal fires" are synonymous with "residential building fires" and "fatal fires in residential buildings," respectively. "Residential fatal fires" is used throughout the body of this report; the findings, tables, charts, headings and endnotes reflect the full category, "fatal fires in residential buildings."

Loss Measures

Although residential fatal fires accounted for less than 1 percent of the overall residential fire profile, they had tremendous and devastating outcomes. Table 1 presents losses, averaged over the 3-year period, for residential fatal and nonfatal fires.[7] In addition to resulting in fatalities, residential fatal fires reported to NFIRS had six times the dollar loss per fire and 11 times the injury rate of residential nonfatal fires. These statistics reflect the destructive nature of residential fatal fires.

Table 1. Loss Measures for Fatal and Nonfatal Fires in Residential Buildings (3-year average, 2009–2011)

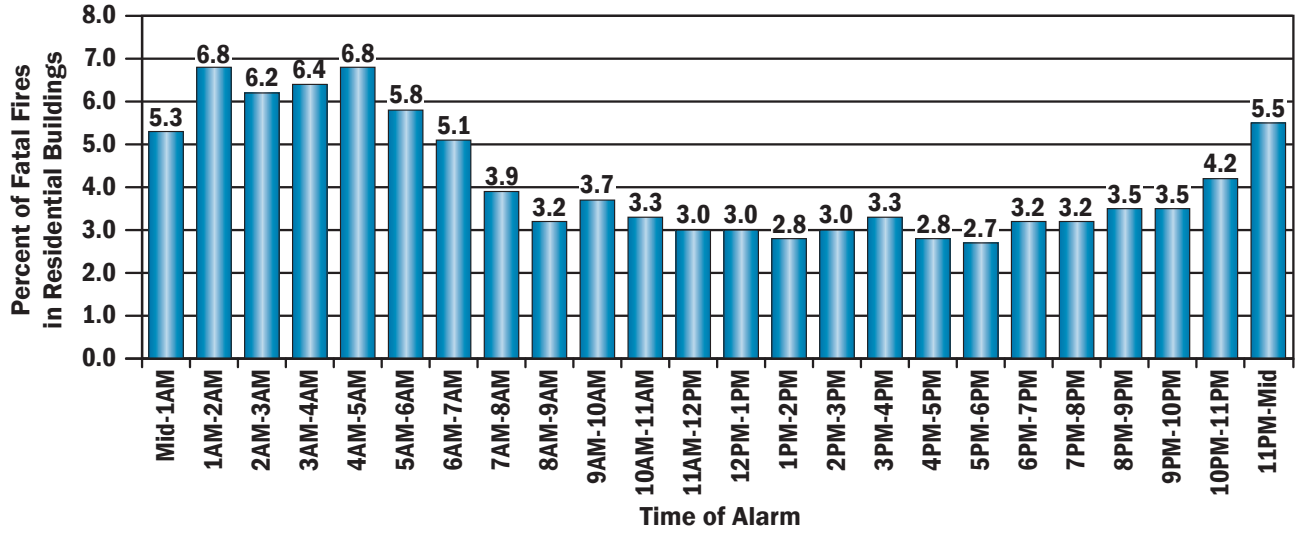
Measure	Fatal Fires in Residential Buildings	Nonfatal Fires in Residential Buildings
Average Loss:		
Fatalities/1,000 fires	1,213.6	0.0
Injuries/1,000 fires	310.7	28.0
Dollar loss/fire	$91,770	$15,080

Source: NFIRS 5.0.
Notes: 1. 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.
2. When calculating the average dollar loss per fire for 2009–2011, the 2009 and 2010 dollar-loss values were adjusted to their equivalent 2011 dollar-loss values to account for inflation.

When Fatal Fires in Residential Buildings Occur

As shown in Figure 1, residential fatal fires occurred most frequently late at night or in the early morning.[8] From 2009 to 2011, residential fatal fires were highest between 1 to 2 a.m. and 4 to 5 a.m. The 8-hour peak period (11 p.m. to 7 a.m.) accounted for 48 percent of residential fatal fires. Fatal fires then declined throughout the day, reaching the lowest point during the early evening. There are several possible reasons for this. First, many people are sleeping and less on guard in the middle of the night. If smoke alarms are not present, these individuals may die before waking up to a fire. Second, cigarette and other smoldering fires started by careless actions before people retire for the night may go unnoticed and grow to rapidly progressing fires while they are sleeping.

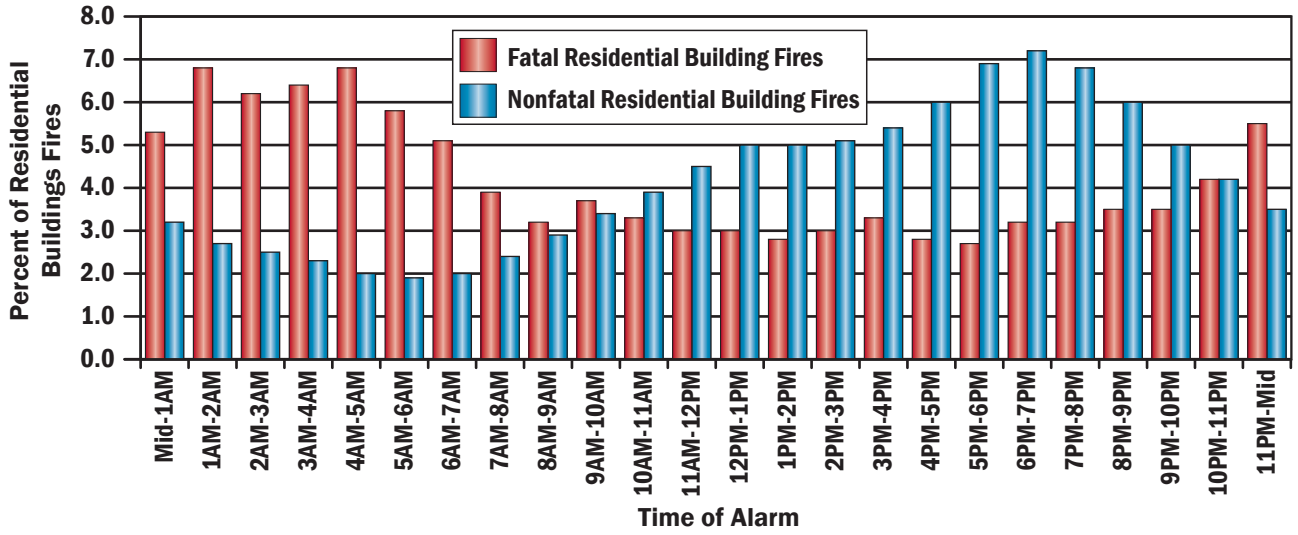
Figure 1. Fatal Fires in Residential Buildings by Time of Alarm (2009–2011)



Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

The time of alarm profile for residential fatal fires was in contrast to the alarm time profile for residential nonfatal fires as shown in Figure 2. Nonfatal fires had the reverse daily cycle, with fires, predominantly caused by cooking, occurring during the late afternoon and evening.[9]

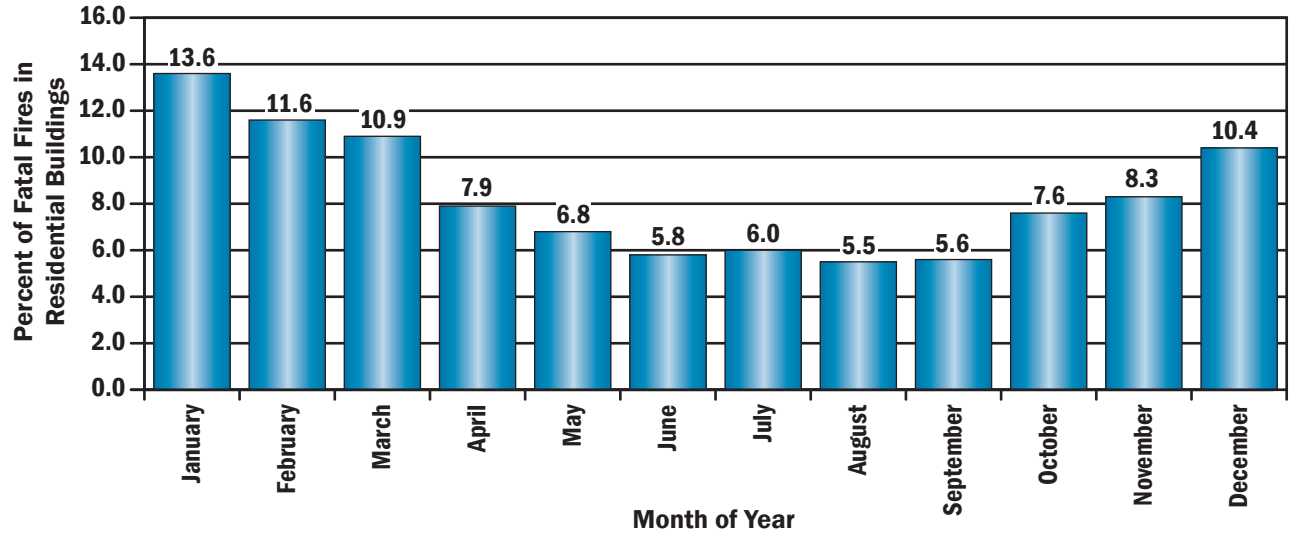
Figure 2. Time of Alarm for Fatal and Nonfatal Fires in Residential Buildings (2009–2011)



Source: NFIRS 5.0.

There was a much higher incidence of residential fatal fires in the cooler months — twice that of the summer months, perhaps as a result of increased activities indoors. Residential fatal fires peaked in January at 14 percent (Figure 3). Fire incidence declined steadily after January, reaching the lowest incidence during the summer months.

Figure 3. Fatal Fires in Residential Buildings by Month (2009–2011)



Source: NFIRS 5.0.

Causes of Fatal Fires in Residential Buildings

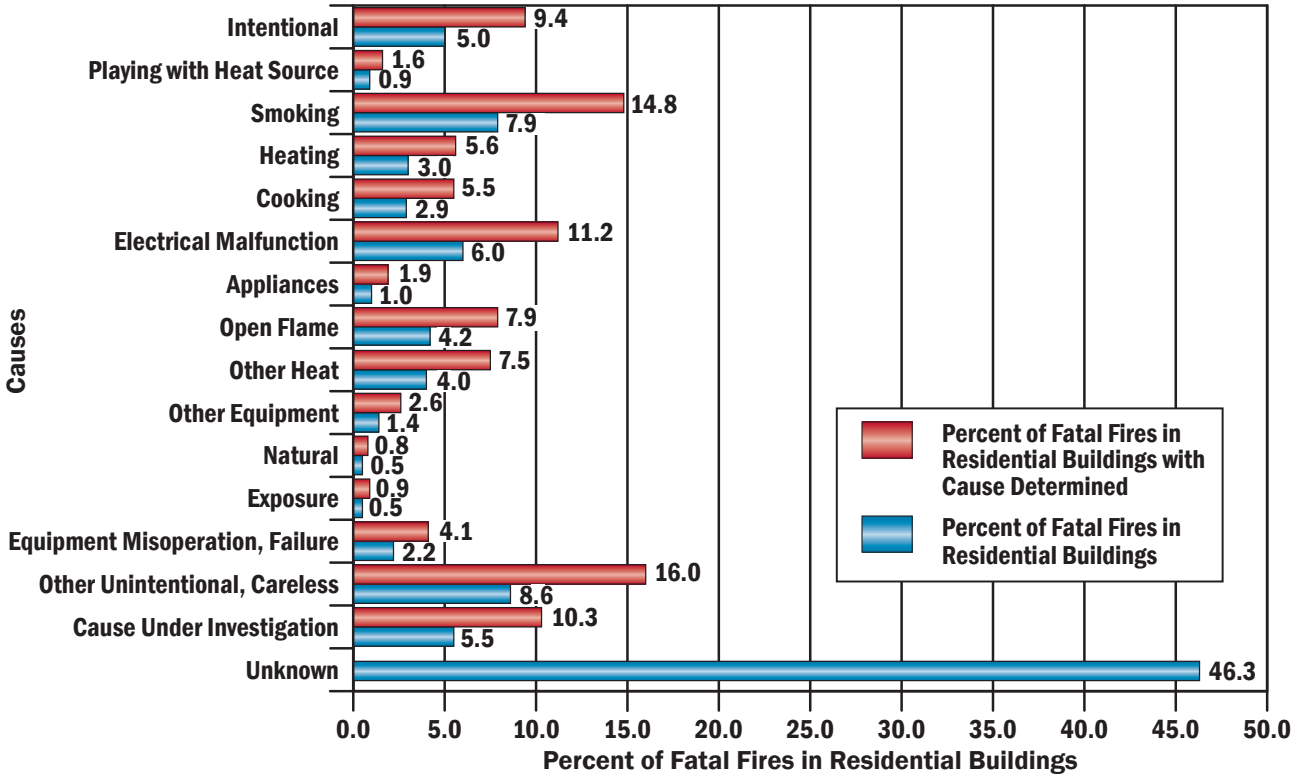
The causes of fires are often a complex chain of events. To determine the cause of a fire, analysts rely on the data collected. Heat source, equipment involved, factors (human or otherwise) contributing to the ignition, incident type, and the cause of ignition are the primary data elements used. A large percentage of residential fatal fire incidents reported to NFIRS (46 percent) did not have sufficient information to determine the cause of the fire. The cause analyses that follow reflect only the 54 percent of incidents where enough information and detail were reported to determine the cause of the fatal fire.[10]

"Other unintentional, careless" actions was the leading cause of residential fatal fires at 16 percent. "Other unintentional, careless" actions include misuse of a material or product, abandoned or discarded materials or products, heat source placed too close to combustibles, and miscellaneous unintentional actions. As shown in Figure 4, 15 percent of residential fatal fires were smoking-related.[11] Although not as prominent as it once was, "smoking" has been a leading cause of residential fatal fires since the inception of NFIRS. "Electrical malfunction" was the next leading cause at 11 percent.

Multiple fatality fires, those fires resulting in two or more deaths, in residential buildings were most often caused by "other unintentional, careless" actions (16 percent) followed by "cause under investigation," "electrical malfunction" and "intentional" fires at about 12 percent each. "Other unintentional, careless" actions and "smoking" were the leading causes of single fatality fires in residential buildings at about 16 percent each.

Fires caused by "other unintentional, careless" actions played a larger role in residential fatal fires (16 percent) than in residential nonfatal fires (7 percent).

Figure 4. Causes of Fatal Fires in Residential Buildings (2009–2011)



Source: NFIRS 5.0.

Notes: 1. Totals do not add up to 100 percent due to rounding.

2. Causes are listed in order of the USFA Structure Fire Cause Hierarchy for ease of comparison of fire causes across different aspects of the fire problem. Fires are assigned to one of 16 cause groupings using a hierarchy of definitions, approximately as shown in the chart above. A fire is included in the highest category into which it fits. If it does not fit the top category, then the second one is considered, and if not that one, the third and so on. For example, if the fire is judged to be intentionally set and a match was used to ignite it, it is classified as intentional and not open flame because intentional is higher in the hierarchy.

Causes of Winter and Summer Fatal Fires in Residential Buildings

Residential fatal fires had much higher incidence in the cooler months (Figure 3). While the addition of heating contributed to the increase in overall residential fires in the cooler winter months, heating was not a primary cause of these winter residential fatal fires. As shown in Table 2, four causes accounted for 54 percent of all residential fatal fires in December through March: "other unintentional, careless" actions (20 percent), "smoking" (14 percent), "electrical malfunction" (10 percent) and "cause under investigation" (10 percent). "Heating," the next leading cause, was the cause of 8 percent of these winter fatal fires.

Half as many residential fatal fires occurred in the warmer months of June through September (also Figure 3). With the exception of "intentional" fires, the leading causes of summer fatal fires were not remarkably different from winter fatal fires (Table 2). Three of the four leading causes remained the same: "smoking" (17 percent), "other unintentional, careless" actions (12 percent) and "electrical malfunction" (12 percent). The increase in fatal fires in the winter months is more likely to be related to the increase in indoor activities, as noted earlier, rather than the type of fire.

Table 2. Relative Proportion of Leading Causes of Fatal Fires in Residential Buildings: Winter and Summer (3-year average, 2009–2011)

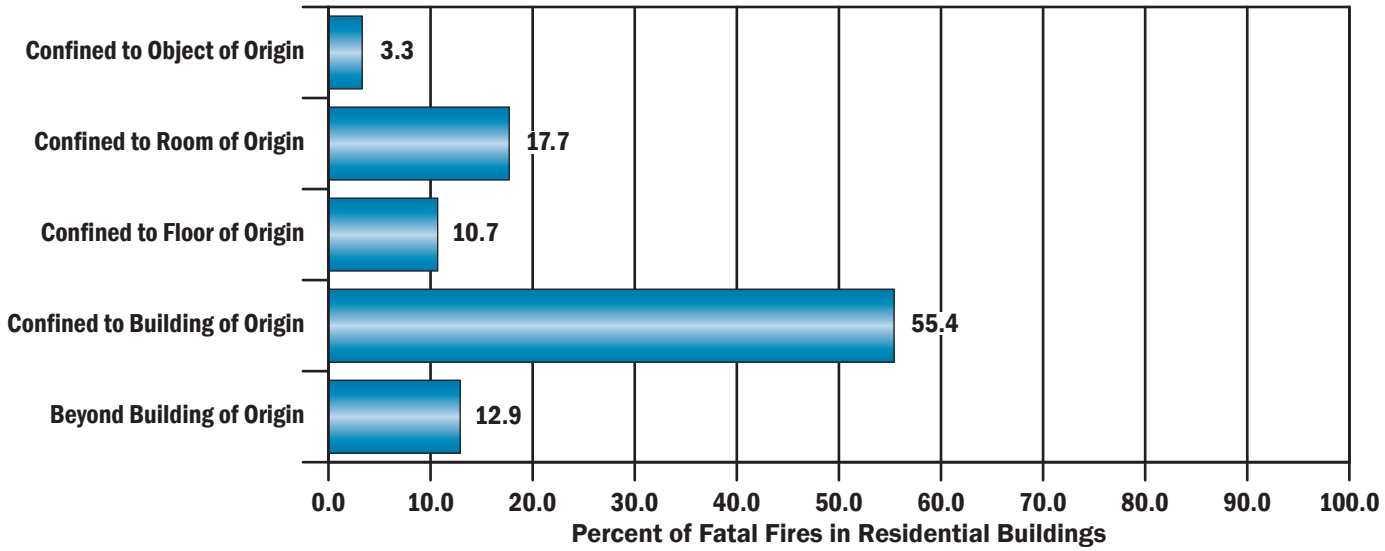
Leading Cause of Fatal Fire	Percent (Unknowns Apportioned)	
	December–March	June–September
Other Unintentional, Careless	19.5	12.1
Smoking	14.1	17.1
Intentional		14.2
Electrical Malfunction	10.4	11.7
Cause Under Investigation	10.2	

Source: NFIRS 5.0.

Fire Spread in Fatal Fires in Residential Buildings

As shown in Figure 5, 79 percent of residential fatal fires extended beyond the room of origin. These fires often occurred in the middle of the night when occupants were more likely to be asleep and unaware of the fire. In addition, 21 percent of residential fatal fires were confined to the room or object of origin. These smaller spreading fires are evidence that a fire does not have to be large to be deadly.

Figure 5. Extent of Fire Spread in Fatal Fires in Residential Buildings (2009–2011)



Source: NFIRS 5.0.

Where Fatal Fires in Residential Buildings Start

Table 3 shows the leading areas of fire origin in residential fatal fires. These fires started most frequently in bedrooms (26 percent) and common rooms including dens, family rooms, living rooms and lounges (23 percent). Fires starting in cooking areas or kitchens accounted for an additional 16 percent of residential fatal fires.

Table 3. Leading Areas of Origin for Fatal Fires in Residential Buildings (2009–2011)

Area of Origin	Percent (Unknowns Apportioned)
Bedrooms	25.6
Common room, den, family room, living room, lounge	23.4
Cooking area, kitchen	16.1

Source: NFIRS 5.0.

As seen in Table 4, 80 percent of residential fatal fires occurred in one- and two-family dwellings. This is not surprising since the majority of the population lives in these types of residences.[12] Multifamily dwellings accounted for 16 percent of all residential fatal fires. Other residential occupancies including boarding and rooming houses, and hotels and motels, were a very small portion, accounting for only 5 percent of residential fatal fires.[13]

Table 4. Property Use for Fatal Fires in Residential Buildings (2009–2011)

Property Use	Percent (Unknowns Apportioned)
One- and two-family dwellings	79.7
Multifamily dwellings	15.7
Other residential buildings	3.4
Boarding, rooming houses	0.7
Hotels and motels	0.5
Total	100.0

Source: NFIRS 5.0.

Factors Contributing to Ignition of Fatal Fires in Residential Buildings

Table 5 shows the categories of factors contributing to ignition for residential fatal fires. "Misuse of material or product" (59 percent) was by far the leading category contributing to the ignition of residential fatal fires. Factors in the "electrical failure, malfunction" category contributed to the ignition of the fire in 18 percent of residential fatal fires. The "operational deficiency" and "other factors contributing to ignition" categories accounted for 13 percent and 10 percent, respectively, of residential fatal fires. These four categories played a role in nearly all residential fatal fires where a contributing factor was reported.

Placing a heat source too close to combustible objects, part of the "misuse of material or product" category, was the leading specific contributing factor (22 percent). Also a part of the "misuse of material or product" category, abandoned or discarded materials — primarily cigarettes — was the second leading specific contributing factor in 17 percent of residential fatal fires.

Table 5. Factors Contributing to Ignition of Fatal Fires in Residential Buildings by Major Category (Where Factor Contributing Specified, 2009–2011)

Factor Contributing to Ignition Category	Percent of Fatal Fires in Residential Buildings (Unknowns Apportioned)
Misuse of material or product	58.8
Electrical failure, malfunction	18.1
Operational deficiency	13.2
Other factors contributing to ignition	10.4
Mechanical failure, malfunction	3.8
Fire spread or control	2.3
Natural condition	1.3
Design, manufacture, installation deficiency	0.6

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; total will exceed 100 percent.

Human Factors Contributing to Ignition of Fatal Fires in Residential Buildings

Human factors — the human condition or situation that allowed the heat source and combustible material to combine to ignite the fire — played an important role in residential fatal fires. The leading human factor contributing to the ignition of the fire was being "asleep" (43 percent). This finding is not unexpected as 48 percent of residential fatal fires occurred during the 8-hour period, 11 p.m. to 7 a.m. (Figure 1). When being asleep was reported as a contributing factor to the fire, smoking and other unintentional, careless actions were the leading causes of these residential fatal fires.

"Possibly impaired by alcohol or drugs" and "physical disabilities" were the next leading human factors contributing to the ignition of the fire at 25 percent and 17 percent, respectively. When these human factors were specified as contributing to the ignition of the fire, smoking and other unintentional, careless actions were noted as the leading causes of these residential fatal fires.

Not surprisingly, where "age was a factor" (14 percent) was cited as a human factor, playing with the heat source and smoking were reported as the leading causes of these residential fatal fires. Typically, playing with a heat source is associated with fires caused by children playing.

It is not unexpected that smoking was the first or second leading fire cause for all human factors (where sufficient data were available to determine cause) as smoking was a leading cause of residential fatal fires.

Table 6. Human Factors Contributing to Ignition of Fatal Fires in Residential Buildings (Where Human Factor Contributing Specified, 2009–2011)

Human Factors Contributing to Ignition	Percent of Fatal Fires in Residential Buildings (Unknowns Apportioned)	Primary Leading Fire Causes - Percent (Unknowns Apportioned)	
Asleep	43.1	Smoking	22.2
		Other unintentional, careless	20.3
Possibly impaired by alcohol or drugs	25.3	Smoking	21.9
		Other unintentional, careless	14.2
Physical disabilities	16.8	Smoking	33.1
		Other unintentional, careless	14.6
Age was a factor	14.3	Playing with heat source	18.8
		Smoking	17.2
Unattended or unsupervised person	11.6	Other unintentional, careless	13.9
		Playing with heat source	11.3
		Smoking	11.3
Possible intellectual disabilities	8.8	Intentional	46.3
		Smoking	15.0
Multiple persons involved	2.7		--------

Source: NFIRS 5.0.
Notes: 1. Includes only incidents where human factors that contributed to the ignition of the fire were specified.
2. Multiple human factors contributing to fire ignition may be noted for each incident; total will exceed 100 percent.
3. "Multiple persons involved" was cited as a human factor contributing to ignition in too few fatal fires to determine the primary leading fire causes.

Alerting/Suppression Systems in Fatal Fires in Residential Buildings

Smoke alarms were reported as present in 37 percent of residential fatal fires.[14] By comparison, smoke alarms were present in 42 percent of residential nonfatal fires.[15] In 22 percent of residential fatal fires, there were no smoke alarms present.[16] Nationally, only 3 percent of households do not have a smoke alarm installed.[17] This lack of early warning is a considerable factor in residential fatal fires. Lastly, in 40 percent of these fires, firefighters were unable to determine if a smoke alarm was present (Table 7).[18]

Table 7. Presence of Smoke Alarms in Fatal Fires in Residential Buildings (2009–2011)

Presence of Smoke Alarms	Percent
Present	37.4
None present	22.3
Undetermined	40.3
Total	100.0

Source: NFIRS 5.0.

Where the existence of a smoke alarm was not determined, 84 percent of the fires spread beyond the floor of fire origin. Because these fires were so expansive, it may be impossible to determine the presence of smoke alarms.

Fires in one- and two-family housing accounted for 84 percent of residential fatal fires in which no smoke alarm was present. Multifamily housing accounted for just 11 percent of these fires, perhaps because they are subject to more stringent codes and often require the landlord or manager to maintain the detection systems.

Fatal fires in residential buildings that are **not** currently or routinely occupied were a small portion (4 percent) of all residential fatal fires. It is important to note, however, that these occupancies — buildings that are under construction, undergoing major renovation, vacant and the like — are unlikely to have alerting and suppression systems that are in place, and if in place, that are operational. In fact, only 11 percent of fatal fires in residential buildings that were not routinely occupied were reported as having smoke alarms that operated. In addition, in fatal fires in residential buildings that were not routinely occupied, no automatic suppression systems were reported as present. As a result, the detailed smoke alarm analyses in the next section focus on fatal fires in occupied residential buildings only.

Occupied Residential Buildings

A continuing trend of fatal fires in occupied residential buildings is the high proportion with no smoke alarms or nonfunctioning smoke alarms. Households with fires (both fatal and nonfatal) were less likely to have had smoke alarms (93 percent) than nonfire households (97 percent).[19]

In addition, occupied residential buildings with fatal fires were less likely to have had smoke alarms (Table 8).

Smoke alarms were reported as present in 38 percent of fatal fires in occupied residential buildings. In 22 percent of fatal fires in occupied residential buildings, there were no smoke alarms present. Lastly, in 41 percent of fatal fires in occupied residential buildings, firefighters were unable to determine if a smoke alarm was present (Table 8).[20]

When operational status was considered, the percentage of smoke alarms reported as present (38 percent) consisted of:

—Present and operated — 16 percent.

—Present but did not operate — 8 percent (alarm did not operate, 8 percent; fire too small, less than 1 percent).

—Present but operational status unknown — 14 percent.

When the subset of incidents where smoke alarms were reported as present is analyzed separately, smoke alarms were reported to have operated in 42 percent of the incidents and failed to operate in 21 percent. In less than 1 percent of this subset, the fire was too small to activate the alarm. The operational status of the alarm was undetermined in 36 percent of these incidents.

Note that the data presented in Table 8 are the raw counts from the NFIRS data set and are not scaled to national estimates of smoke alarms in residential fatal 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 point of origin of the fire.

Table 8. NFIRS Smoke Alarm Data for Fatal Fires in Occupied Residential Buildings (2009–2011)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		9	0.3
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	262	7.7
		Smoke alarm alerted occupants, occupants failed to respond	73	2.1
		No occupants	1	0.0
		Smoke alarm failed to alert occupants	29	0.9
		Undetermined	180	5.3
	Smoke alarm failed to operate		272	8.0
	Undetermined		461	13.6
None present			736	21.6
Undetermined			1,377	40.5
Total incidents			3,400	100.0

Source: NFIRS 5.0.

Note: 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 fatal fires in occupied residential buildings. They are presented for informational purposes.

Overall, full or partial automatic extinguishing systems — mainly sprinklers — were present in only 2 percent of fatal fires in occupied residential buildings (Table 9).[21] The presence of suppression systems in nonfatal fires in occupied residential buildings was only 4 percent.[22]

Table 9. NFIRS Automatic Extinguishing System (AES) Data for Fatal Fires in Occupied Residential Buildings (2009–2011)

AES Presence	Count	Percent
AES present	54	1.6
Partial system present	4	0.1
AES not present	3,073	90.4
Unknown	269	7.9
Total incidents	3,400	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 fatal fires in occupied residential buildings. They are presented for informational purposes.

Examples

The following are recent examples of residential fatal fires reported by the media:

—March 2013: Two people died and two others escaped injury in a house fire in Durant, Okla. The residents of the home were sleeping at the time of the fire. According to the fire marshal, a space heater was likely the cause of the fire. It was reported that the space heater was located too close to the bed and likely caught the bedding on fire. The victims, ages 18 and 23, were unable to escape the burning home, but were found near a back door. The home reportedly had no smoke alarms.[23]

—February 2013: A Reston, Va., woman died in an apartment fire that was ruled intentionally set. The fire started at 6:12 a.m. and firefighters were dispatched to reports of smoke coming from the second floor apartments.[24]

—February 2013: Investigators believe that a lit cigarette was the cause of a fatal apartment fire that killed an 82-year-old man in southeast Houston, Texas. The fire started at about 11:30 p.m., and the man was discovered lying on a mattress. It is alleged that the man may have fallen asleep with a burning cigarette. No other injuries were reported as a result of the blaze.[25]

—February 2013: A 36-year-old man and three children died as a result of a 4 a.m. fire in a single-family home in Glenarden, Md. The children ranged in age from 4 to 11. A woman and one child who escaped through a window of the home were hospitalized with smoke inhalation injuries but were later released. It was reported that the home had no smoke alarms. The cause of the fire was determined to be electrical.[26]

NFIRS Data Specifications for Fatal Fires in Residential Buildings

Data for this report were extracted from the NFIRS annual Public Data Release files for 2009, 2010 and 2011. Only version 5.0 data were extracted.

Fatal fires in residential buildings were defined using the following criteria:

—Aid Types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid double counting of incidents.

—Incident Types 111 to 123 (excludes Incident Type 112):

Incident Type	Description
111	Building fire
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: Incident Types 113 to 118 do not specify if the structure is a building.

—Property Use series 400, which consists of the following:

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

—Structure Type:

—For Incident Types 113–118:
—1—Enclosed building.
—2—Fixed portable or mobile structure, and
—Structure Type not specified (null entry).

—For Incident Types 111 and 120–123:
—1—Enclosed building.
—2—Fixed portable or mobile structure.

—Civilian deaths greater than zero.

The analyses contained in this report reflect the current methodologies used by the USFA. USFA is committed to providing the best information on the U.S. 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://apps.usfa.fema.gov/feedback/.

Notes:

[1] The U.S. fire death rate for 2011 shown here is based on the National Fire Protection Association's estimate of fire deaths in 2011 and the U.S. Census Bureau's July 1 estimate of the 2011 U.S. resident population.

[2] USFA's "Fire Death Rate Trends: An International Perspective," July 2011, Volume 12, Issue 8, http://www.usfa.fema.gov/downloads/pdf/statistics/v12i8.pdf.

[3] The Geneva Association, "World Fire Statistics," *Geneva Association Information Newsletter,* Number 28, October 2012. **Note:** Belgium was excluded from this review as their 2007–2009 death rates were unavailable.

[4] The 2009–2011 annual average estimate of civilian fire deaths is based on data from the NFPA's report, "Fire Loss in the United States During 2011," September 2012.

[5] National estimates are based on 2009–2011 native version 5.0 data from NFIRS, residential structure fire loss estimates from NFPA's annual surveys of fire loss, and USFA's residential building fire loss estimates: http://www.usfa.fema.gov/statistics/estimates/index.shtm. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25 and losses to the nearest million.

[6] In NFIRS 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 structures 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.

[7] The average fire death and fire injury loss rates computed from the national estimates do not agree with average fire death and fire injury loss rates computed from NFIRS data alone. The national estimates are based on a sample of fire departments that report fatality totals. The NFIRS data are based on a large set of fires, with the data at the individual fire incident level. The fire death rate computed from national estimates is (1,000*(2,495/1,600)) = 1,559.4 deaths per 1,000 fatal residential building fires and the fire injury rate is (1,000*(625/1,600)) = 390.6 injuries per 1,000 fatal residential building fires.

[8] 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.

[9] USFA, "Cooking Fires in Residential Buildings (2008-2010)," Volume 13, Issue 12, January 2013: http://www.usfa.fema.gov/downloads/pdf/statistics/v13i12.pdf.

[10] The USFA Structure Fire Cause Methodology was used to determine the cause of fatal residential building fires: http://www.usfa.dhs.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm.

[11] 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" fire.

[12] The U.S. Census Bureau shows that in 2011, 76.3 percent (87.7 million) of occupied housing units were one-unit attached and detached structures or manufactured/mobile homes (http://www.census.gov/housing/ahs/data/national.html for occupied housing). Household size (2007-2011) was estimated at 2.6 people per household (http://quickfacts.census.gov/qfd/states/00000.html). Thus, 87.7 million housing units x 2.6 people per household = 228.0 million people lived in one-unit attached and detached structures or mobile homes. With the 2011 U.S. population estimate given as 311.6 million, (Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2012 (NST-EST2012-01) http://www.census.gov/popest/data/national/totals/2012/index.html), approximately 73.2 percent of the population lived in what NFIRS defines as one- and two-family housing.

[13] Total does not add to 100 percent due to rounding.

[14] The smoke alarm and AES analyses exclude one fatal fire that was a confined cooking fire incident (Incident Type 113) resulting in a fatality. By definition confined fires generally do not result in deaths, and the NFIRS smoke alarm and AES data elements are not required to be completed for confined fires.

[15] Here, 42 percent reflects nonconfined residential nonfatal fires only. Nonconfined fires are generally large and more serious fires. Confined fires, defined in NFIRS as Incident Types 113-118, are excluded from this analysis as the NFIRS smoke alarm data elements are not required to be completed for these types of fires.

[16] Here, *at least* 22 percent of fatal residential building fires had no smoke alarms present — the 22 percent that were known to not have smoke alarms and some portion (or as many as all) of the fires where the smoke alarm presence was undetermined.

[17] Greene, Michael, and Craig Andres. 2004–2005 *National Sample Survey of Unreported Residential Fires*. Division of Hazard Analysis, Directorate for Epidemiology, U.S. Consumer Product Safety Commission, July 2009.

[18] The percentages cited for the presence of smoke alarms in fatal fires in residential buildings do not add up to 100 percent due to rounding.

[19] Greene, Michael, and Craig Andres. 2004–2005 *National Sample Survey of Unreported Residential Fires*. Division of Hazard Analysis, Directorate for Epidemiology, CPSC, Table 5-3, July 2009.

[20] Total does not add to 100 percent due to rounding.

[21] In this report, the analysis was performed for occupied residential buildings as 96 percent of fatal fires occurred in occupied residential buildings.

[22] The 4 percent reflects nonconfined residential nonfatal fires in occupied residential buildings.

[23] "Space heater blamed in fatal house fire in Durant," newsok.com, March 1, 2013. http://newsok.com/space-heater-blamed-in-fatal-house-fire-in-durant/article/3760178 (accessed March 1, 2013).

[24] Meredith Somers, "Police: fatal fire in Fairfax was arson," washingtontimes.com, Feb. 18, 2013. http://www.washingtontimes.com/news/2013/feb/18/police-fatal-fire-fairfax-was-arson/ (accessed March 1, 2013).

[25] Dale Lezon, "Police ID man who died in fire possibly caused by cigarette," chron.com, Feb. 1, 2013. http://www.chron.com/news/houston-texas/houston/article/Police-ID-man-who-died-in-fire-possibly-caused-by-4242431.php (accessed March 1, 2013).

[26] "Glenarden house fire claims fourth victim," washington.cbslocal.com, Feb. 23, 2013. http://washington.cbslocal.com/2013/02/23/glenarden-house-fire-claims-fourth-victim/ (accessed March 1, 2013).