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Civilian Fire Fatalities in Residential Buildings (2017-2019)

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

- Annually, from 2017 to 2019, an estimated 2,770 civilian fire fatalities resulted from 1,900 fatal fires in residential buildings.
- From 2017 to 2019, civilian fire fatalities in residential buildings accounted for 77% of all estimated fire fatalities.
- Thermal burns and smoke inhalation were the primary symptoms leading to death, accounting for 89% of all fatalities in residential building fires.
- Bedrooms, at 50%, were the leading specific location where civilian fire fatalities occurred in residential buildings.
- The time period from 11 p.m. to 7 a.m. accounted for 49% of civilian fire fatalities in residential buildings. This period also accounted for 46% of fatal fires in residential buildings.
- At the time of their deaths, 37% of fire victims in residential buildings were trying to escape; an additional 31% were sleeping.
- "Other unintentional, careless" actions (19%) and "smoking" (13%) were the leading causes of fatal fires in residential buildings.
- Males accounted for 58% of civilian fire fatalities in residential buildings; females accounted for 42% of civilian fire fatalities in residential buildings.
- Adults aged 50 to 69 accounted for 36% of civilian fire fatalities in residential buildings.
- Children less than 10 years old accounted for 10% of civilian fire fatalities in residential buildings.

Fires can occur anywhere — in structures, buildings, automobiles and the outdoors. Fires that affect our homes are often the most tragic and the most preventable. It is a sad fact that each year, over 75% of all civilian fire fatalities occurred as a result of fires in residential buildings — our homes.[1,2]

Annually, from 2017 to 2019, an estimated 2,770 civilian fire fatalities resulted from 1,900 fatal fires in residential buildings and an estimated 368,500 residential building fires.[3] Fatal fires are those where 1 or more fatalities occurred. National estimates for 2017 to 2019 show that civilian fire fatalities in residential buildings accounted for 77% of all fire fatalities.[4,5]

By definition, civilian fire fatalities involved people not on active duty with a firefighting organization who died as a result of a fire.[6] These fatalities generally occurred when an individual was escaping, sleeping or unable to act during a fire.

This topical fire report focuses on the characteristics of these fatalities as reported to NFIRS from 2017 to 2019.[7,8] NFIRS data are used for the analyses presented throughout this report.

For this report, the term "residential building fires" is synonymous with "residential fires." The term "residential fires" is used throughout the body of this report; the findings, tables, figures, headings and endnotes reflect the full category "fires in residential buildings" or "residential building fires."

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Civilian fire fatality rates in residential buildings

Not all fires produced fatalities. When civilian fatalities were averaged across all reported residential fires, the overall fatality rate was 6 civilian fatalities per 1,000 residential fires (Table 1).[9] Residential fatal fires had 1,185 fatalities for every 1,000 fires, or slightly more than 1 fatality per fatal fire. Of the residential fatal fires, 87% resulted in 1 civilian fatality, 10% resulted in 2 civilian fatalities, and 3% resulted in 3 or more civilian fatalities.

Table 1. Fatality rates for residential building fires per 1,000 fires (3-year average, 2017-2019)

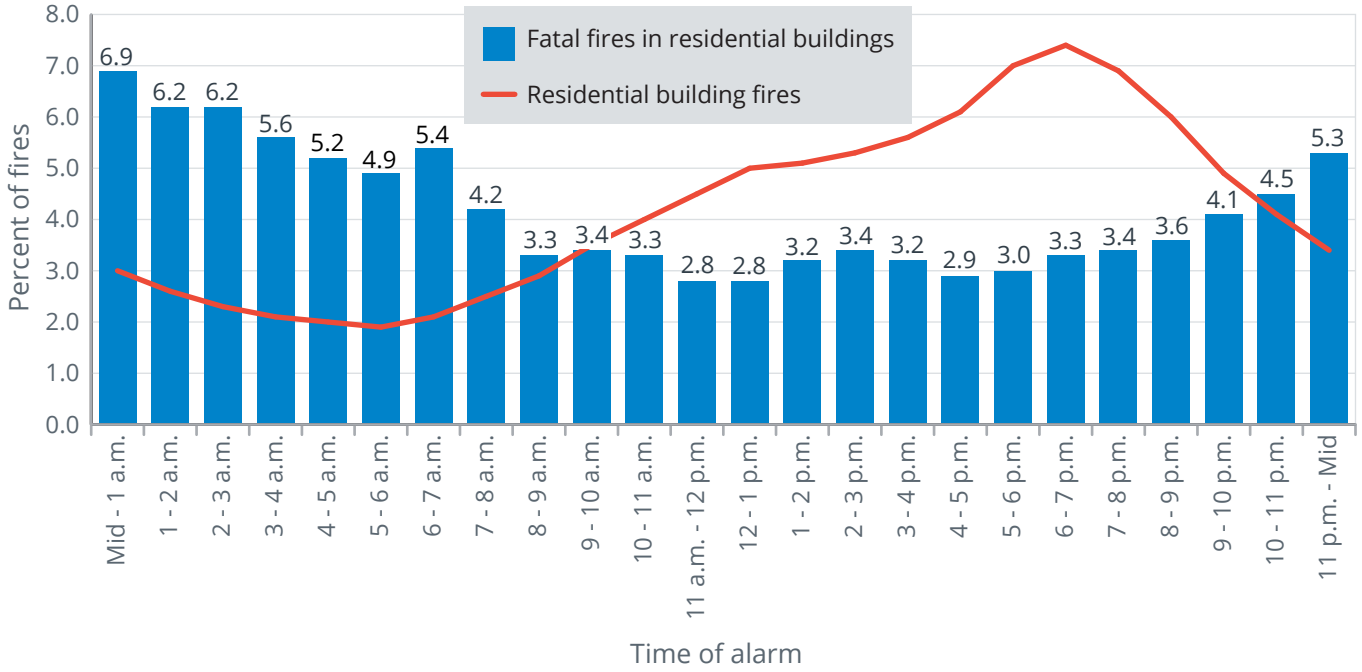
Fatalities per 1,000 fatal fires	Fatalities per 1,000 residential building fires
1,185.0	6.2

Source: NFIRS 5.0.

When fatal fires in residential buildings occur

As shown in Figure 1, residential fatal fires occurred most frequently late at night or in the very early morning when most people were sleeping, a major factor contributing to the fatalities (see Table 2). From 2017 to 2019, fatal fires were highest from midnight to 4 a.m. Fatal fires were most prevalent when overall residential fire incidence was generally at its lowest, making nighttime fires the most deadly. The 8-hour peak period (11 p.m. to 7 a.m.) accounted for 46% of residential fatal fires and 49% of deaths.[10]

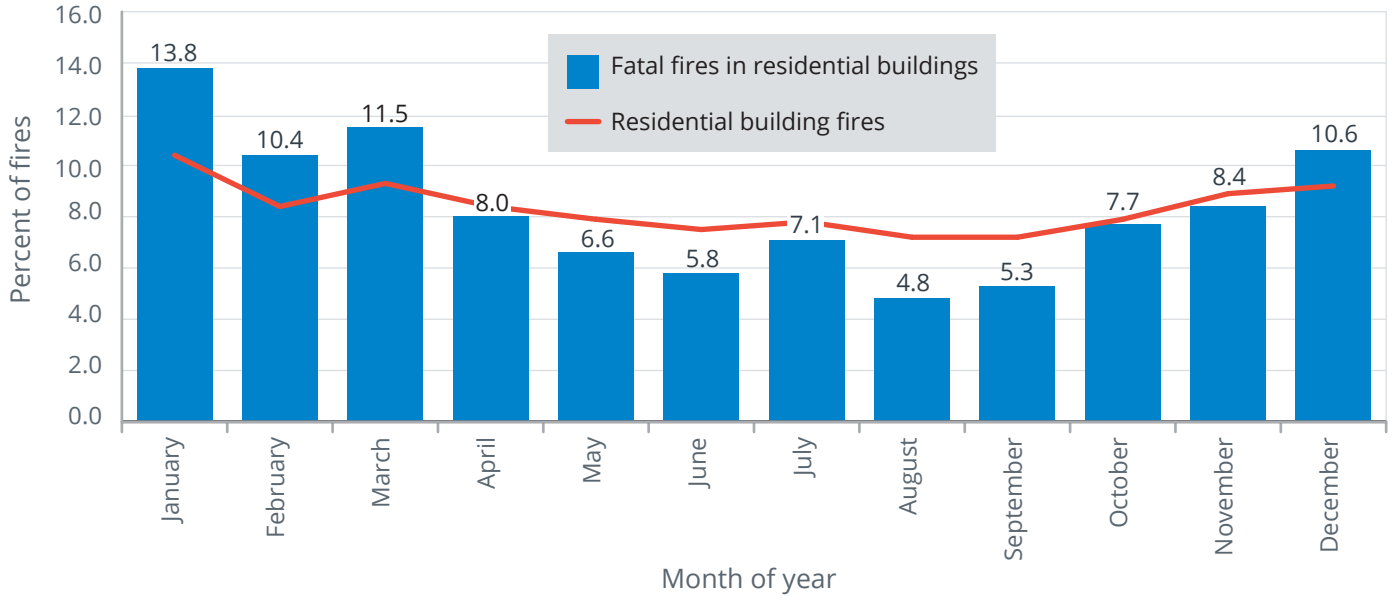
Figure 1. Fatal fires in residential buildings by time of alarm (2017-2019)



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

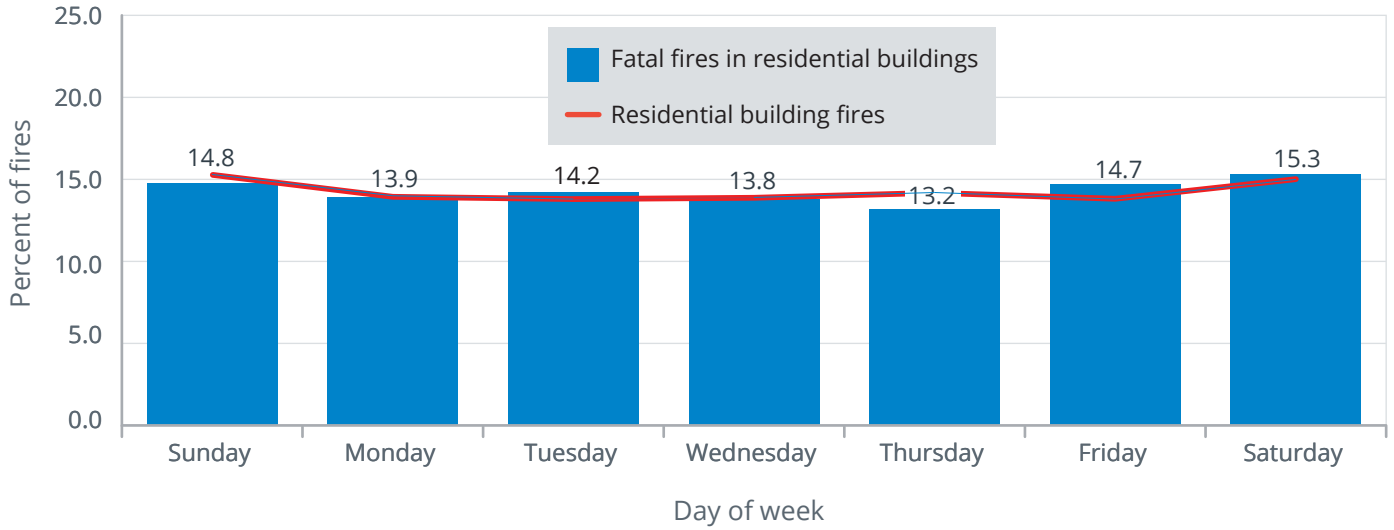
Residential fatal fires occurred more frequently in the colder months, as did all residential fires (Figure 2). The winter peak occurred during January (14%). Residential fatal fires were lowest during August and September. Although fatal fires in residential buildings are generally lowest from June through September, there was a slight peak in July.[11] The leading causes of these July fatal fires were smoking, intentional actions, cause under investigation, and other, unintentional actions. Comparable to all fires in residential buildings, residential fatal fires occurred most often on weekends (Figure 3).

Figure 2. Fatal fires in residential buildings by month (2017-2019)



Source: NFIRS 5.0.

Figure 3. Fatal fires in residential buildings by day of week (2017-2019)

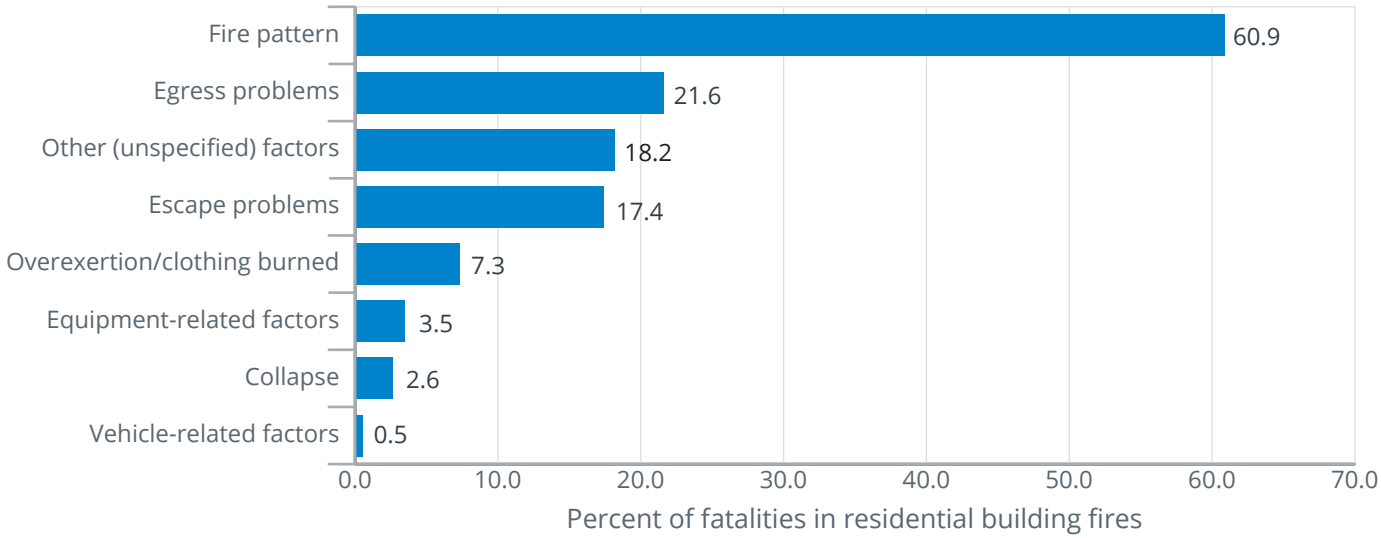


Source: NFIRS 5.0.
Note: Total does not add up to 100% due to rounding.

Factors contributing to civilian fire fatalities in residential buildings

The most notable factors contributing to fatalities (outside of "other (unspecified) factors") (Figure 4) were "fire pattern" (61%), "egress problems" (22%) and "escape problems" (17%). Fire pattern factors involve situations where exits are blocked by smoke and flame, vision is blocked or impaired by smoke, and civilians are trapped above or below the fire. Egress problems include such factors as crowded situations, limited exits, locked exits or other exit problems, as well as mechanical obstacles to the exit. Escape problem factors include unfamiliarity with exits, excessive travel distance to the nearest clear exit, choice of an inappropriate exit route, reentering the building, and clothing catching on fire while escaping.

Figure 4. Factors contributing to civilian fire fatalities in residential buildings (2017-2019)



Source: NFIRS 5.0.
Notes: 1. Only includes fatalities where factors contributing to the fatality were specified. The factors contributing to the fatality were specified in 28% of reported fatalities.
2. As multiple factors contributing to fatalities may be noted for each fatality, the total sums to more than 100%.

Human factors contributing to civilian fire fatalities

Human factors played an important role in residential fire fatalities. The leading human factor contributing to fatalities was being "asleep" (46%). This finding was not unexpected, as the largest numbers of fatalities occurred from 11 p.m. to 7 a.m.

"Physical disability" was the second leading human factor contributing to fatalities (30%). This was followed by "possibly impaired by alcohol" at 16% (Table 2).

Table 2. Human factors contributing to civilian fire fatalities in residential buildings (2017-2019)

Human factors contributing to fatality	Percent of fire fatalities in residential buildings (unknowns apportioned)
Asleep	46.2
Physical disability	30.2
Possibly impaired by alcohol	15.6
Possibly intellectual disability	8.0
Possibly impaired by other drug or chemical	6.3
Unconscious	5.7
Unattended or unsupervised person	5.6
Physically restrained	0.9

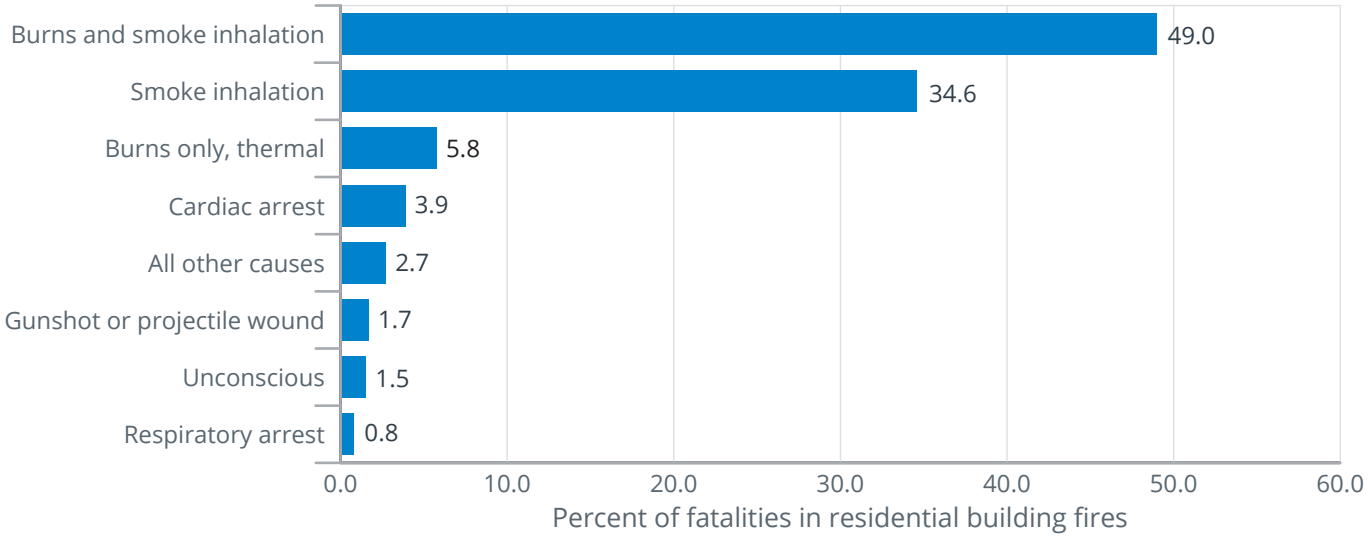
Source: NFIRS 5.0.
Notes: 1. Only includes fatalities where human factors that contributed to the fatality were specified. At least 1 human factor contributing to the fatality was specified in 31% of reported fatalities.
2. Multiple human factors contributing to the fire fatality may be noted for each incident; total will exceed 100%.

Primary symptoms of civilian fire fatalities

Thermal burns and smoke inhalation were the primary symptoms leading to death, accounting for 89% of all fatalities in residential fires. Burns and smoke inhalation combined made up 49% of the fatalities. Smoke inhalation by itself accounted for 35% of residential fire fatalities, and thermal burns (as opposed to scalds or chemical or electrical burns) alone accounted for 6% of fatalities (Figure 5).[12] Thermal burns are caused by contact with flames, hot liquids, hot surfaces and other sources of high heat. Multiple body parts were involved in 87% of thermal burn fatalities. Cardiac arrests accounted for only 4% of fatalities.

Smoke inhalation affects the internal organs, specifically the lungs and airways within the body. It results from breathing smoke that contains harmful gases and small particles that are present in the air during a fire. These gases and particles include chemicals or toxins that can lead to inflammation and blockage of the airways.[13]

Figure 5. Civilian fire fatalities in residential buildings by primary symptoms (2017-2019)

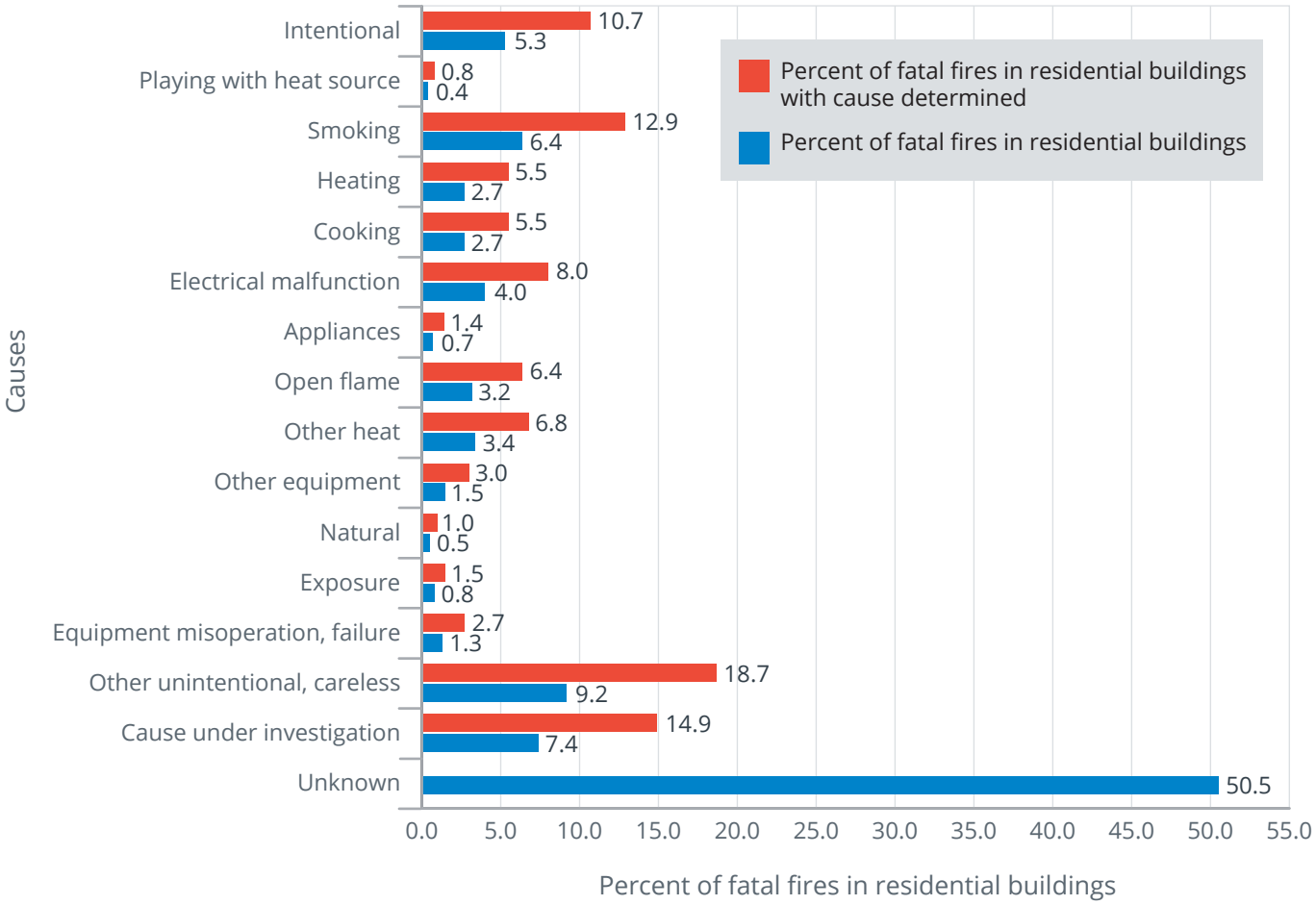


Source: NFIRS 5.0.
Note: Percentages computed only for those fatalities where symptoms were noted. Primary symptoms were specified for 45% of the reported fatalities.

Causes of fatal fires in residential buildings

The cause of the fire was "unknown" in 51% of fatal fires in residential buildings.[14] Where fire cause was determined, "other unintentional, careless" actions (19%) was the leading cause of residential fatal fires (Figure 6).[15] "Cause under investigation" (15%) and "smoking" (13%) accounted for an additional 28% of all residential fatal fires where cause was determined. "Other unintentional, careless" actions include misuse of materials or products, abandoned or discarded materials or products, and a heat source being too close to combustibles.

Figure 6. Causes of fatal fires in residential buildings (2017-2019)



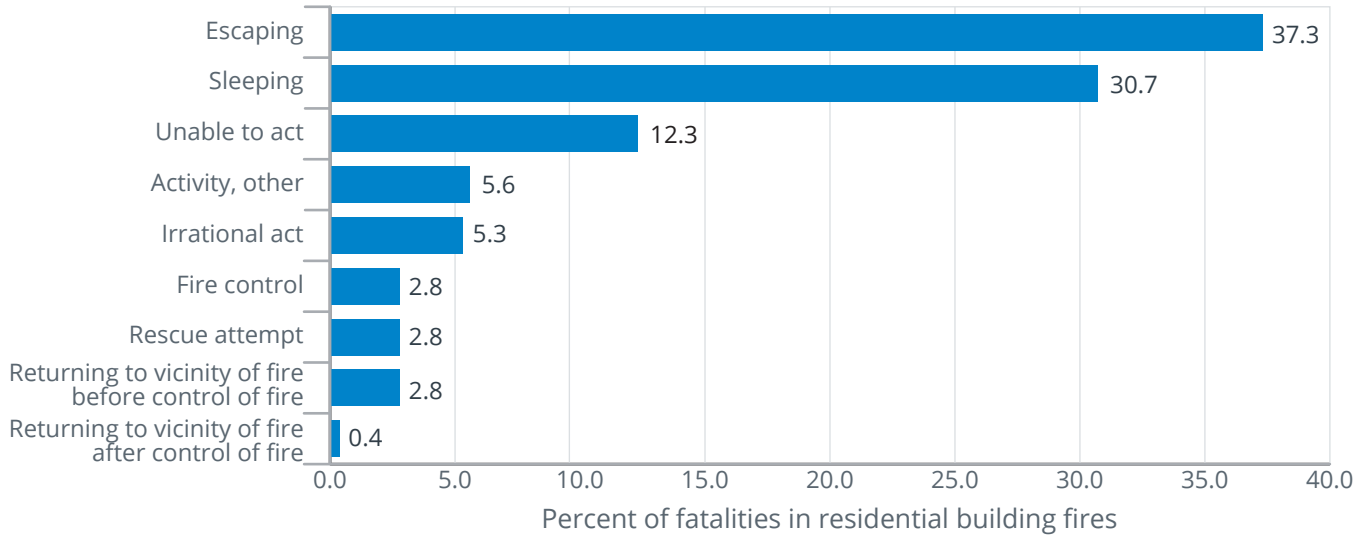
Source: NFIRS 5.0.

Notes:
1. Total percent of fatal fires in residential buildings with cause determined does not add up to 100% due to rounding.
2. Fires caused by intentional actions include, but are not limited to, fires that are deemed to be arson. Intentional fires are those fires that are deliberately set and include fires that result from the deliberate misuse of a heat source and fires of an incendiary nature (arson) that require fire service intervention. For information and statistics on arson fires only, refer to the Uniform Crime Reporting Program arson statistics from the U.S. Department of Justice, Federal Bureau of Investigation, Criminal Justice Information Services Division, http://www.fbi.gov/about-us/cjis/ucr/ucr.
3. 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 1 of 16 cause groupings using a hierarchy of definitions, as shown in the figure. 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.

Civilian activity prior to death

Most civilian fire fatalities occurred when the victim was attempting to escape (37%) or sleeping (31%), as shown in Figure 7. To escape a fire, many civilians make the mistake of fleeing through the area where the fire is located. The area of a fire has tremendous heat, smoke and a toxic atmosphere that can render a person unconscious. As a result, it is imperative that residents create and practice a home fire escape plan. A home fire escape plan includes multiple escape options and is created around the abilities of everyone in the home. In addition, studies show that people may not wake up from the smell of smoke while sleeping.[16] Therefore, it is also vital to have smoke alarms inside and outside of each bedroom and on every level of the home.[17] This will help alert sleeping people to the presence of fire.

Figure 7. Civilian activity prior to death in residential building fires (2017-2019)



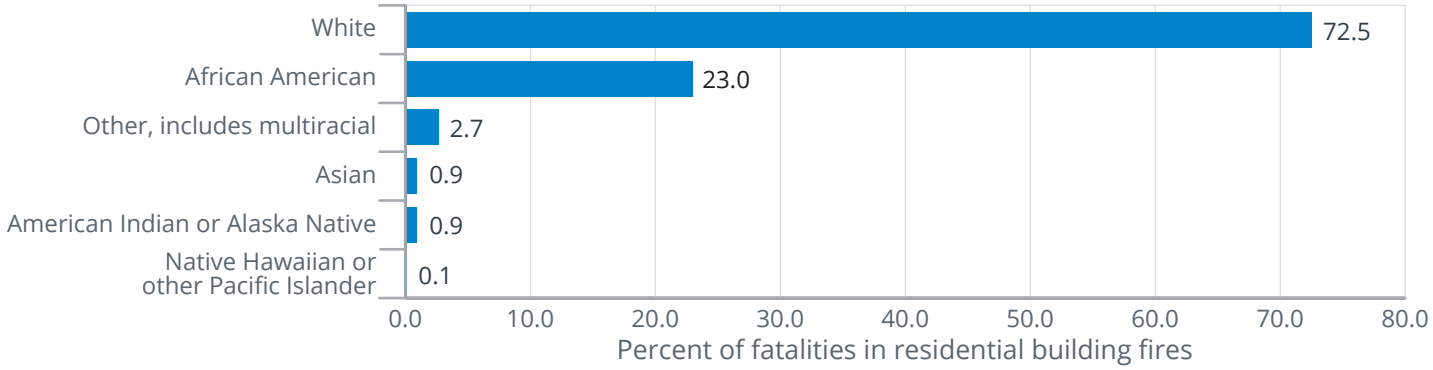
Source: NFIRS 5.0.
Note: Percentages computed for only those fatalities where activity information was available. The activity prior to death was specified for 29% of reported fatalities.

Gender, race and ethnicity of civilian fire fatalities

Males accounted for 58% of residential fire fatalities; females accounted for 42% of fire fatalities. Where racial information was provided, whites constituted 73% of the fatalities, followed by Blacks or African Americans at 23%. All other races accounted for 5% of fire fatalities (Figure 8).[18] Race was specified for 60% of reported fatalities.

Where ethnicity data was provided, 92% of civilian fatalities were non-Hispanic or non-Latino. The remaining 8% were Hispanic or Latino. Ethnicity was specified for 38% of reported fatalities.

Figure 8. Civilian fire fatalities in residential buildings by race (2017-2019)



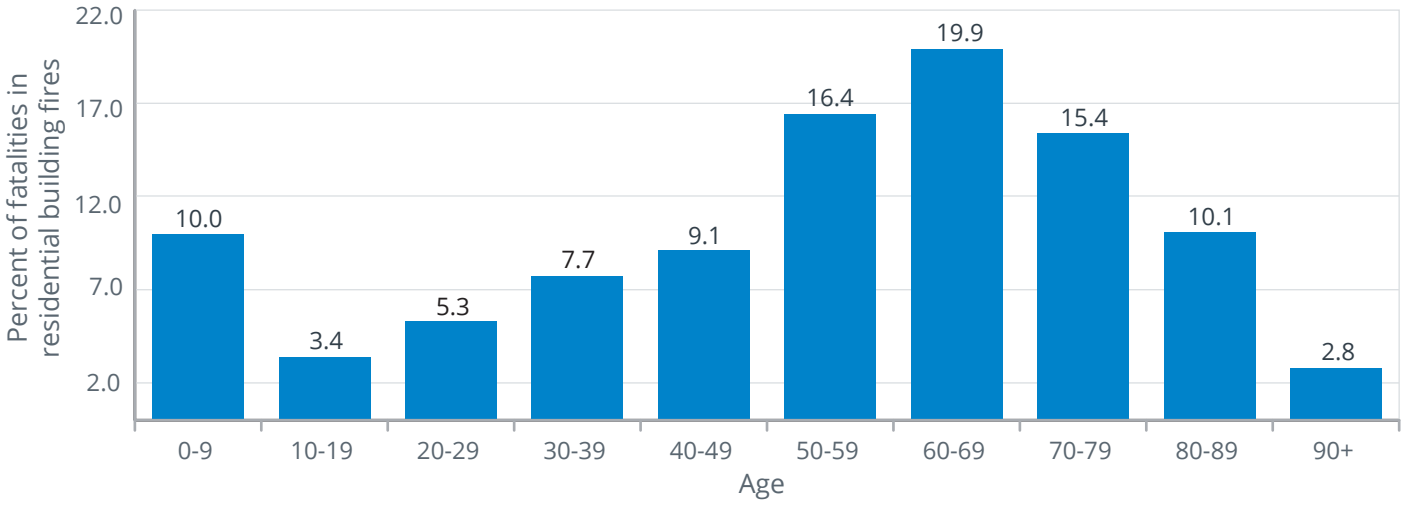
Source: NFIRS 5.0.
Notes: 1. Total does not add up to 100% due to rounding.
2. Percentages computed for only those fatalities where racial information was available. Race was specified for 60% of reported fatalities.

Age and activity prior to death

Adults aged 50 to 69 accounted for 36% of civilian fatalities in residential fires (Figure 9). Children less than 10 years old accounted for 10% of fatalities, while adults aged 70 and over accounted for 28% of fatalities.

Where the information was reported, at the time of death, escaping (37%) and sleeping (31%) were the 2 leading activities that resulted in fatalities (Table 3). Children aged 0 to 9 were primarily sleeping (58%) over trying to escape (26%). Children and adolescents aged 10 to 19 were equally likely to be escaping or sleeping at the time of their deaths. Adults aged 20 and over were more likely trying to escape at the time of their deaths, as opposed to sleeping. Overall, activity at the time of the fatal injury was reported for 29% of the fatalities.

Figure 9. Civilian fire fatalities in residential buildings by age group (2017-2019)



Source: NFIRS 5.0.
Notes: 1. Percentages computed only for those fatalities where age was valid. A valid age was provided for nearly all reported fatalities (99.8%).
2. Total does not add up to 100% due to rounding.

Table 3. Leading activities resulting in civilian fire fatalities in residential buildings by age group (2017-2019)

	Percent of fatalities where age and activity reported (2017-2019)	
Age group	**Escaping**	**Sleeping**
0-9	26.1	58.0
10-19	42.6	42.6
20-29	41.3	25.3
30-39	33.3	28.1
40-49	41.9	17.9
50-59	37.0	33.0
60-69	39.1	28.8
70-79	33.9	29.6
80-89	42.3	18.1
90+	47.6	23.8
Overall	37.3	30.7

Source: NFIRS 5.0.
Note: Percentages computed only for those fatalities where age was valid and activity was reported.

Specific location of fire fatality

Bedrooms (50%) were the leading specific location where civilian fire fatalities occurred in residential buildings (Table 4). Family rooms or living rooms (12%), bathrooms (7%), and kitchens and cooking areas (7%) accounted for an additional 26%.

While not specific rooms in the home, egress areas accounted for 12% of fatalities. Exits (such as corridors, stairways and doors) can get filled with smoke, fire or extreme heat, making escape routes treacherous.

Table 4. Leading specific location of civilian fire fatalities in residential buildings (2017-2019)

Specific location at time of fatal injury	Percent (unknowns apportioned)
Bedrooms	50.1
Common rooms, dens, family rooms, living rooms, lounges	12.2
Bathrooms	7.3
Kitchens and cooking areas	6.8

Source: NFIRS 5.0.
Note: Percentages computed only for those fatalities where the specific location at the time of fatal injury was specified. The location of the fatality was specified for 27% of reported fatalities.

Examples

The following are some recent examples of civilian fire fatalities reported by the media:

- April 2021: A house fire in Marion, Ohio, claimed the life of a 55-year-old man and 3 dogs. The fire, which was reported around 5:30 a.m. on Easter Sunday, was believed to have started by a heater in the living room. When firefighters arrived on scene, about 75% of the house was overcome by flames, and the roof was beginning to collapse. Firefighters were unable to rescue the man who was discovered on the second level of the home. The house was deemed to be a complete loss. The Office of the State Fire Marshal is investigating the fire.[19]
- April 2021: An 82-year-old female died in a house fire in Jackson, New Jersey, on a Thursday night. Fire crews were dispatched to a fire with entrapment around 8:45 p.m. When firefighters arrived on scene, the house was fully engulfed in flames. A kerosene heater located too close to a combustible liquid was determined to have started the fire. The cause of the woman's death was determined to be smoke inhalation. A second victim received minor injuries after jumping from the second story to escape the blaze. A police officer was also treated on scene for smoke inhalation, and a second police officer was treated for minor injuries at a local hospital.[20]
- April 2021: A second-floor apartment fire resulting in the death of a 60-year-old man in Arlington, New York, began around 6:35 p.m. on a Saturday evening. The fire started in the kitchen and was believed to have been cooking related. Fire crews found the man to be unconscious with extensive burns. He was transported to a local hospital where he was pronounced dead. The cause of the fire remains under investigation.[21]
- April 2021: A woman died as a result of a 2-story house fire in Memphis, Tennessee. The fire started around 3:30 a.m. on a Thursday. Upon arrival, firefighters found heavy smoke coming from the home and extinguished the fire in about 30 minutes. The woman was then found in an upstairs hallway. The cause of the fire was reported to be faulty electrical wiring in a storage room. No firefighters were injured while putting out the blaze.[22]

Escape planning for residential buildings

Everyone should know how to escape from a burning home. The USFA recommends leaving fighting a fire to trained firefighters. Instead, efforts should focus on escaping.

Smoke is very dangerous. It blocks vision, and the poisonous gases can cause dizziness, disorientation and ultimately death. These conditions can result in becoming lost or trapped in a home. Because many people die trying to escape from a fire, everyone should practice a home escape plan.

Working smoke alarms should be installed on every level of the home, as well as inside and outside sleeping areas. Everyone should create a home escape plan, know 2 safe ways out of each room, and establish a family meeting place outside the home. In addition, because young children, older adults and individuals with disabilities may need help getting out of the home, the plan should include who will assist them in a fire. Everyone in the home should practice the plan at least 2 times a year. For more information on preparing and practicing a fire escape plan, visit http://www.usfa.fema.gov/prevention/outreach/escape.html.

Alerting/suppression systems in residential buildings

Fire fatalities and injuries have declined over the last 40 years, partly due to new technologies to detect and extinguish fires. Residential sprinklers have gained support from the fire service and many residential communities.

Properly installed and maintained smoke alarms provide an early warning signal to everyone in a home if a fire occurs. Smoke alarms help save lives and property.

The USFA continues to partner with other government agencies and fire service organizations to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, training bulletins, and public education and outreach materials is available at http://www.usfa.fema.gov/prevention/technology/smoke_fire_alarms.html. Additionally, the USFA's position statement on smoke alarms is available at https://www.usfa.fema.gov/about/smoke_alarms_position.html.

Residential sprinkler systems help to reduce the risk of deaths and injuries, homeowner insurance premiums, and uninsured property losses. Yet many homes do not have automatic extinguishing systems, although they are often found in hotels and businesses. Sprinklers are required by code in hotels and many multifamily residences. There are major movements in the U.S. fire service to require sprinklers in all new homes. At present, however, they are largely absent in residences nationwide.[23]

The USFA and fire service officials across the nation are working to promote and advance residential fire sprinklers. More information on costs and benefits, performance, training bulletins, and public education and outreach materials regarding residential sprinklers is available at http://www.usfa.fema.gov/prevention/technology/home_fire_sprinklers.html. Additionally, the USFA's position statement on residential sprinklers is available at http://www.usfa.fema.gov/about/sprinklers_position.html.

NFIRS data specifications for civilian fire fatalities in residential buildings

Data for this report were extracted from the NFIRS annual Public Data Release files for 2017, 2018 and 2019. Only Version 5.0 data were extracted.

Civilian fatalities in residential building fires were defined using the following criteria:

- Incidents with Aid Types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid counting a single incident more than once.
- Incident Types 111 to 123 (excluding 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 to 118:
    - 1 — Enclosed building, or
    - 2 — Fixed portable or mobile structure, or
    - Structure Type not specified (null entry).
  - For Incident Types 111 and 120 to 123:
    - 1 — Enclosed building, or
    - 2 — Fixed portable or mobile structure.

- Civilian casualty severity: 5 (death).
- Other civilian deaths: greater than 0.

The analyses contained in this report reflect the current methodologies used by the USFA. The USFA is committed to providing the best and most current 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.

Information regarding the USFA's national estimates for residential building fires, as well as the data sources used to derive the estimates, can be found in the document "Data Sources and National Estimates Methodology Overview for the U.S. Fire Administration's Topical Fire Report Series (Volume 21)," https://www.usfa.fema.gov/downloads/pdf/statistics/data-sources-and-national-estimates-methodology-vol21.pdf. This document also addresses the specific NFIRS data elements analyzed in the topical reports, as well as "unknown" data entries and missing data.

To request additional information, visit: https://www.usfa.fema.gov/contact.html. Provide feedback on this report.

Notes:

[1]In NFIRS Version 5.0, a structure is a constructed item of which a building is one type. In previous versions of the 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 the NFIRS 5.0 includes 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. In addition, confined fire incidents that have a residential property use, but do not have a structure type specified, are presumed to occur in buildings. Nonconfined fire incidents that have a residential property use without a structure type specified are considered to be invalid incidents (Structure Type is a required field) and are not included.

[2]The percentage presented here is based on the analysis of residential building fire deaths since 2003, the first year for which residential building estimates are available (http://www.usfa.fema.gov/data/statistics/order_download_data.html), and the National Fire Protection Association's (NFPA's) annual estimates of fire deaths (https://www.nfpa.org/News-and-Research/Data-research-and-tools/US-Fire-Problem/Fire-loss-in-the-United-States). The consistency of the percentage of residential building fire deaths leads analysts to believe that this proportion has most likely been stable for some time.

[3]In this topical report, fires are rounded to the nearest 100 and deaths to the nearest 5. National estimates are based on 2017 to 2019 native Version 5.0 data from the NFIRS, residential structure fire loss estimates from the NFPA's annual surveys of fire loss, and the USFA's residential building fire loss estimates: http://www.usfa.fema.gov/data/statistics/order_download_data.html. Further information on the USFA's residential building fire loss estimates can be found in the "National Estimates Methodology for Building Fires and Losses," August 2012, http://www.usfa.fema.gov/downloads/pdf/statistics/national_estimate_methodology.pdf. For detailed information regarding the NFPA's survey methodology, see the NFPA's "Methodology used in calculating national estimates from NFPA's fire experience survey," August 2020, https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/Methodsfirelossandothers.ashx.

[4]Residential buildings include, but are not limited to, 1- or 2-family dwellings, multifamily dwellings, manufactured housing, hotels and motels, boarding houses or residential hotels, dormitories, sorority/fraternity houses, and assisted living facilities.

[5]The percentage shown here is derived from the national estimates of residential building fire deaths as explained in Endnote 3 and the summary data resulting from the NFPA's annual fire loss surveys (Ahrens, Marty and Evarts, Ben, "Fire Loss in the United States During 2019," NFPA, September 2020; Evarts, Ben, "Fire Loss in the United States During 2018," NFPA, October 2019; Evarts, Ben, "Fire Loss in the United States During 2017," NFPA, October 2018).

[6]Civilians also include emergency personnel who are not members of the fire department, such as police officers or utility workers.

[7]Fire department participation in the NFIRS is voluntary; however, some states do require their departments to participate in the state system. Additionally, if a fire department is a recipient of a Fire Act Grant, participation is required. From 2017 to 2019, 68% of the NFPA's annual average estimated 1,309,800 fires to which fire departments responded were captured in the NFIRS. Thus, the NFIRS is not representative of all fire incidents in the U.S. and is not a "complete" census of fire incidents. Although the NFIRS does not represent 100% of the incidents reported to fire departments each year, the enormous dataset exhibits stability from one year to the next without radical changes. Results based on the full dataset are generally similar to those based on part of the data.

[8]A total of 4,797 civilian fire fatalities resulting from 4,048 fatal residential building fires was reported to the NFIRS from 2017 to 2019. This report examines the characteristics of these civilian fire fatalities (e.g., gender, race and age of the victim; activity prior to death) in residential buildings as opposed to the characteristics of the fires (e.g., fire spread, factors contributing to ignition, alerting/suppression systems) from which these fatalities occurred.

[9]The average fire fatality rates computed from the national estimates do not agree with average fire fatality rates computed from the NFIRS data alone. The fire fatality rate for fatal fires computed from national estimates is 1,000 x (2,770/1,900) = 1,457.9 deaths per 1,000 fatal fires in residential buildings. The fire fatality rate for all residential building fires computed from national estimates is 1,000 x (2,770/368,500) = 7.5 deaths per 1,000 residential building fires.

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

[11]USFA, "Civilian Fire Fatalities in Residential Buildings (2013-2015)," Volume 18, Issue 4, July 2017, https://www.usfa.fema.gov/downloads/pdf/statistics/v18i4.pdf.

[12]Total does not add up to 89% due to rounding.

[13]Caldwell, David S., "Smoke Inhalation and Your Body," ezinearticles.com, http://ezinearticles.com/?Smoke-Inhalation-and-Your-Body&id=4807600 (accessed April 13, 2021).

[14]A large percentage of residential fatal fire incidents reported to the NFIRS (51%) did not have sufficient information to determine the cause of the fire. The cause analysis reflects only the 49% of incidents where enough information and detail were reported to determine the cause of the fatal fire.

[15]The USFA Structure Fire Cause Methodology was used to determine the cause of fatal residential building fires. The cause methodology and definitions can be found in the document "National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues," July 2011, https://www.usfa.fema.gov/downloads/pdf/nfirs/nfirs_data_analysis_guidelines_issues.pdf.

[16]Brown University, "Scents Will Not Rouse Us From Slumber, Says New Brown University Study," Science Daily, May 2004 (Providence, Rhode Island), http://www.sciencedaily.com/releases/2004/05/040518075747.htm (accessed April 13, 2021).

[17]USFA, Smoke alarm outreach materials, https://www.usfa.fema.gov/prevention/outreach/smoke_alarms.html.

[18]Total percent of civilian fire fatalities in residential buildings by race does not add up to 100% due to rounding.

[19]Hooper, Mitch, "Marion man, three dogs die in Easter morning house fire in Big Island Township," www.marionstar.com, April 6, 2021, https://www.marionstar.com/story/news/local/2021/04/06/house-fire-easter-kills-marion-man-three-dogs/7093944002/ (accessed April 14, 2021).

[20]"Update: Officials determine kerosene heater too close to combustible liquid cause of Jackson fatal fire," midjersey.news, April 3, 2021, https://midjersey.news/2021/04/03/update-officials-determine-kerosene-heater-too-close-to-combustible-liquid-cause-of-jackson-fatal-fire/ (accessed April 14, 2021).

[21]"Fatal Arlington fire started in kitchen," www.midhudsonnews.com, April 6, 2021, https://midhudsonnews.com/2021/04/06/fatal-arlington-fire-started-in-kitchen/ (accessed April 14, 2021).

[22]Bardos, Istvan, "Woman dies in Whitehaven house fire," www.localmemphis.com, April 8, 2021, https://www.localmemphis.com/article/news/local/woman-dies-in-whitehaven-house-fire/522-d96fd5ac-6b43-4736-8d3f-a56948439551 (accessed April 14, 2021).

[23]U.S. Department of Housing and Urban Development and U.S. Census Bureau, "American Housing Survey for the United States: 2011," September 2013, "Health and Safety Characteristics-All Occupied Units (National)," Table S-01-AO, https://www.census.gov/content/dam/Census/library/publications/2013/demo/h150-11.pdf (accessed April 16, 2021).