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Fatal Fires in Residential Buildings (2018-2020)

The U.S. Fire Administration's (USFA's) topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the USFA's National Fire Incident Reporting System (NFIRS) from incidents reported by local response agencies. 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

- Each year, from 2018 to 2020, an estimated average of 1,900 fatal fires in residential buildings were reported to fire departments within the United States. These fires caused an estimated average of 2,745 deaths, 625 injuries and $230 million in property loss.
- Fatal fires in residential buildings were highest between midnight to 1 a.m. (7%). The 8-hour peak period (11 p.m. to 7 a.m.) accounted for 45% of the fatal fires in residential buildings.
- Fatal fires in residential buildings were more prevalent in the cooler months, peaking in January (14%).
- "Other unintentional, careless" action (20%) was the leading cause of fatal fires in residential buildings followed by "cause under investigation" (16%) and "smoking" (14%).
- In 80% of fatal fires in residential buildings, the fire extended beyond the room of origin.
- Fatal fires in residential buildings most often started in bedrooms (27%) and common areas such as living and family rooms (26%).
- The leading human factor contributing to the ignition of fatal fires in residential buildings was being "asleep" (41%). When "asleep" was reported as a contributing factor to the fatal fires in residential buildings, "smoking" and "other unintentional, careless" actions were the leading causes.
- Smoke alarms were not present in 24% of fatal fires in occupied residential buildings.
- Automatic extinguishing systems (AESs), including residential sprinklers, were reported to have not been present in 90% of fatal fires in occupied residential buildings.

An estimated average of 3,620 civilian fire deaths were reported to fire departments across the country each year from 2018 to 2020.[1] Because 76% of all civilian fire deaths occurred in residential buildings, the fatal fires in these types of buildings are the focus of this report.[2, 3]

Each year, from 2018 to 2020, an estimated average of 1,900 fatal fires in residential buildings occurred in the U.S.[4, 5] These fires resulted in an annual estimated average of 2,745 deaths, 625 injuries and $230 million in property loss.[6]

This topical report, issued by the U.S. Fire Administration's (USFA) National Fire Data Center (NFDC), addresses the characteristics of fatal fires in residential buildings as reported to the National Fire Incident Reporting System (NFIRS).[7] The focus of this report is on fires from 2018 to 2020, the most recent data available at the time of the analysis. NFIRS data from the Public Data Release (PDR) files are used for the analyses throughout this report. Some of the characteristics examined include fire spread, area of fire origin, human factors contributing to ignition and alerting/suppression systems.[8] The information in this report can be used not only to assess and understand the nature of the fatal fire problem and its implications for the targeting of prevention programs.

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

Loss measures

Although residential fatal fires accounted for less than 1% of the overall residential fire profile, they had tremendous and devastating outcomes. Table 1 presents losses of reported residential fatal and nonfatal fires averaged over the 3-year period from 2018 to 2020.[9] In addition to resulting in fatalities, residential fatal fires had over 5 times the dollar loss per fire and over 10 times the injury rate of residential nonfatal fires. 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. 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, 2018-2020)

Measure	Fatal fires in residential buildings	Nonfatal fires in residential buildings
Average loss:		
Fatalities/1,000 fires	1,174.2	0.0
Injuries/1,000 fires	243.4	23.5
Dollar loss/fire	$98,170	$18,210

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 rounded to the nearest $10.
2. The 2018 and 2019 dollar-loss values were adjusted to 2020 dollars.

Property use

As shown in Table 2, 79% 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.[10] Multifamily dwellings accounted for 15% of all residential fatal fires. Other residential occupancies including boarding and rooming houses, and hotels and motels, were a very small portion, accounting for the remaining 6% of residential fatal fires.[11]

Table 2. Property use for fatal fires in residential buildings (2018-2020)

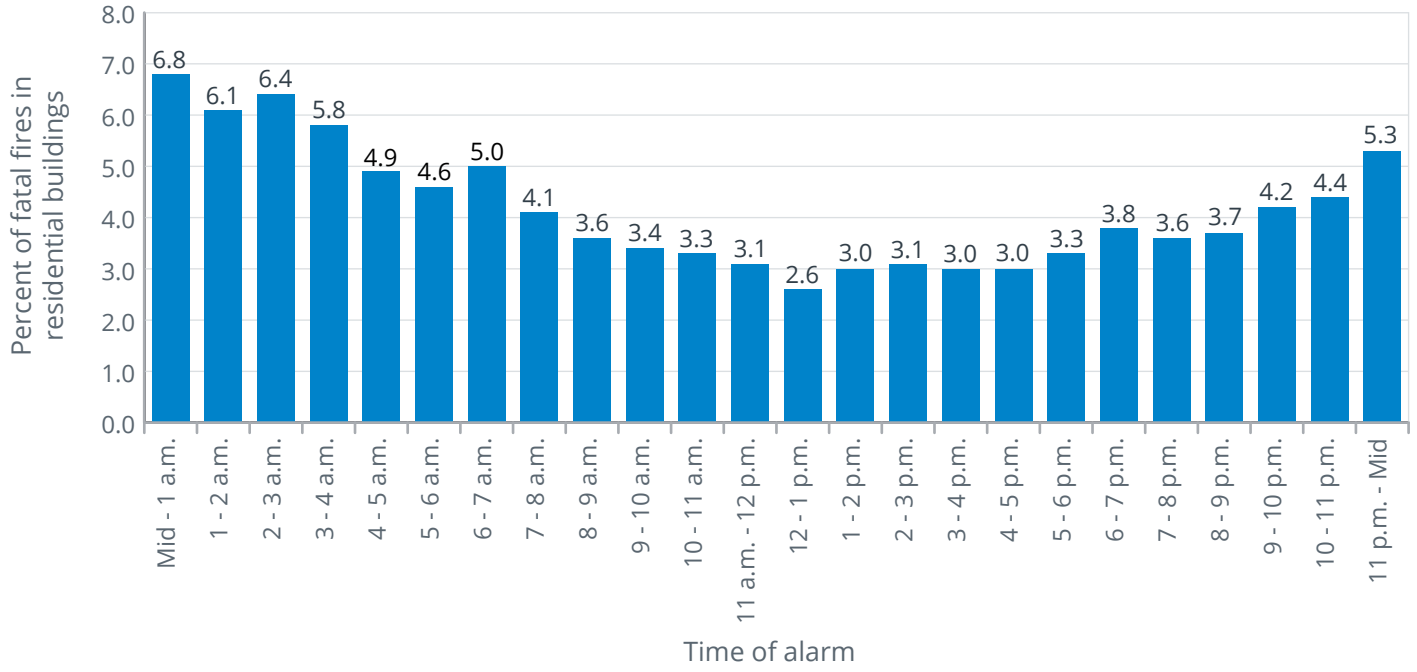
Property use	Percent
One- and two-family dwellings	79.4
Multifamily dwellings	14.5
Other residential buildings	5.3
Boarding, rooming houses	0.5
Hotels and motels	0.4
Total	100.0

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

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.[12] From 2018 to 2020, residential fatal fires were highest from midnight to 1 a.m. (7%). The 8-hour peak period (11 p.m. to 7 a.m.) accounted for 45% of residential fatal fires. Fatal fires then declined throughout the day, reaching the lowest point from 12 to 1 p.m. (3%). There are several possible reasons for this. First, many people are sleeping and unaware in the middle of the night. If smoke alarms are not present, these individuals may have a higher probability of dying 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.

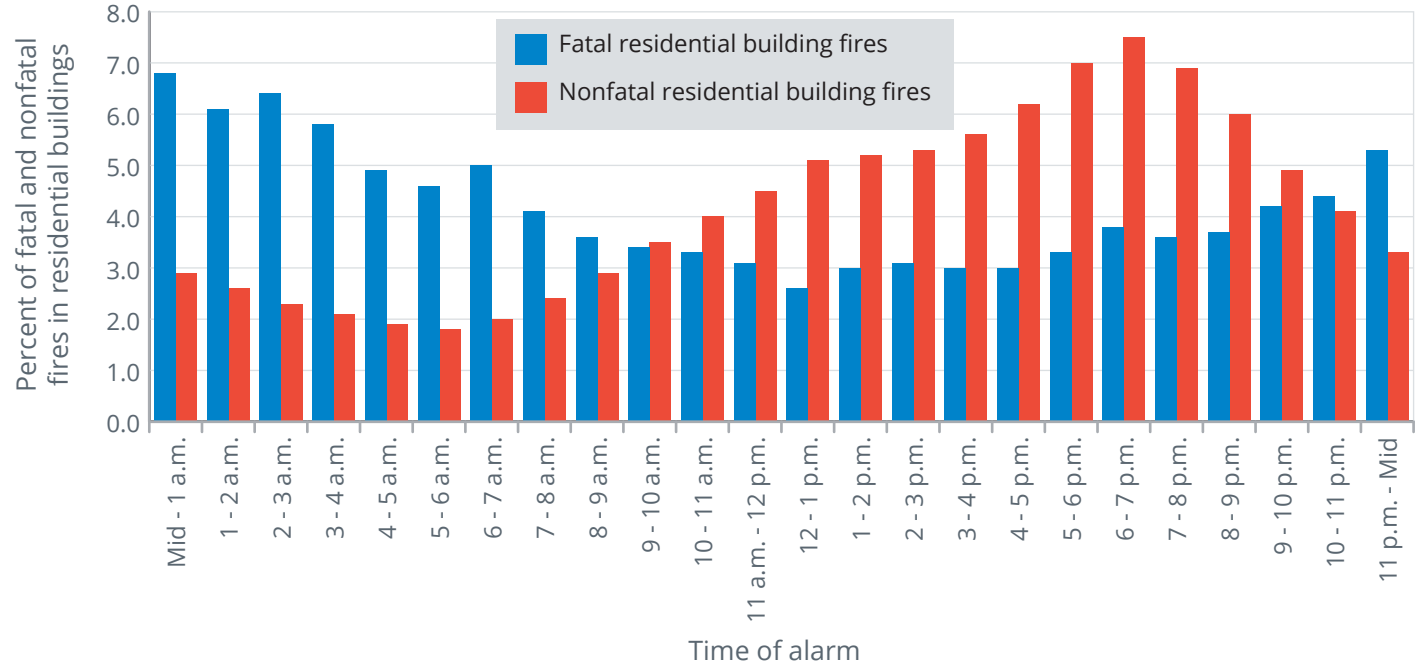
Figure 1. Fatal fires in residential buildings by time of alarm (2018-2020)



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

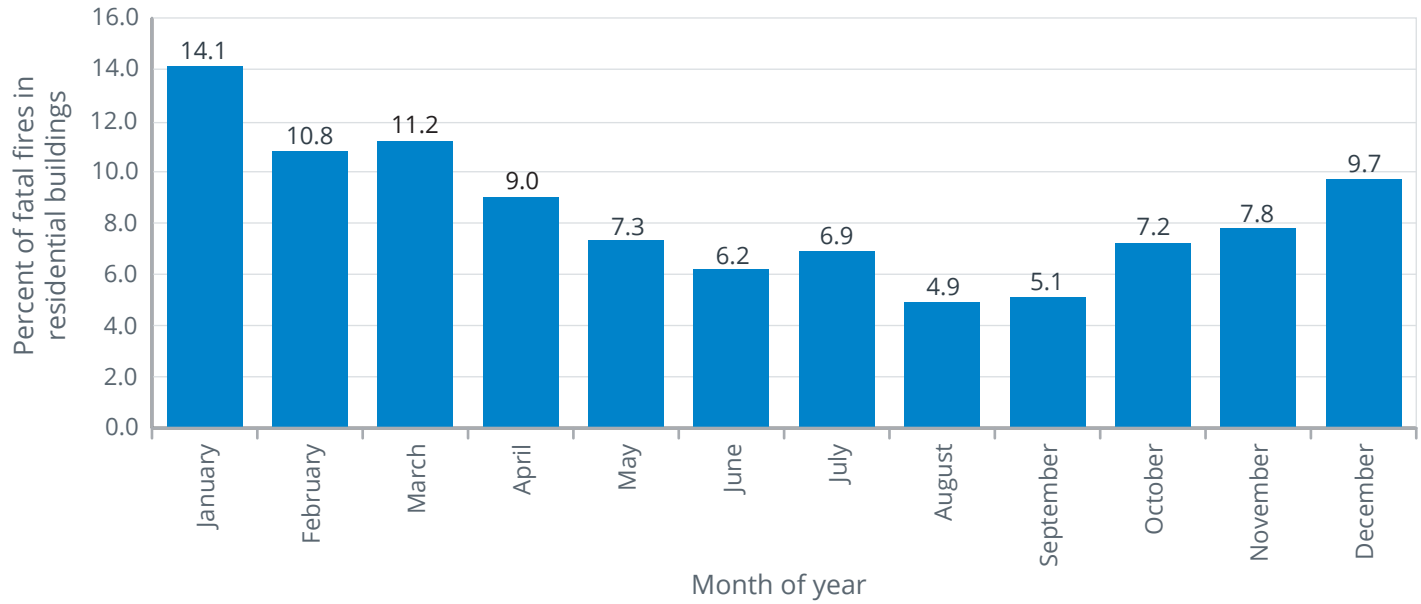
Figure 2. Time of alarm for fatal and nonfatal fires in residential buildings (2018-2020)



Source: NFIRS 5.0.

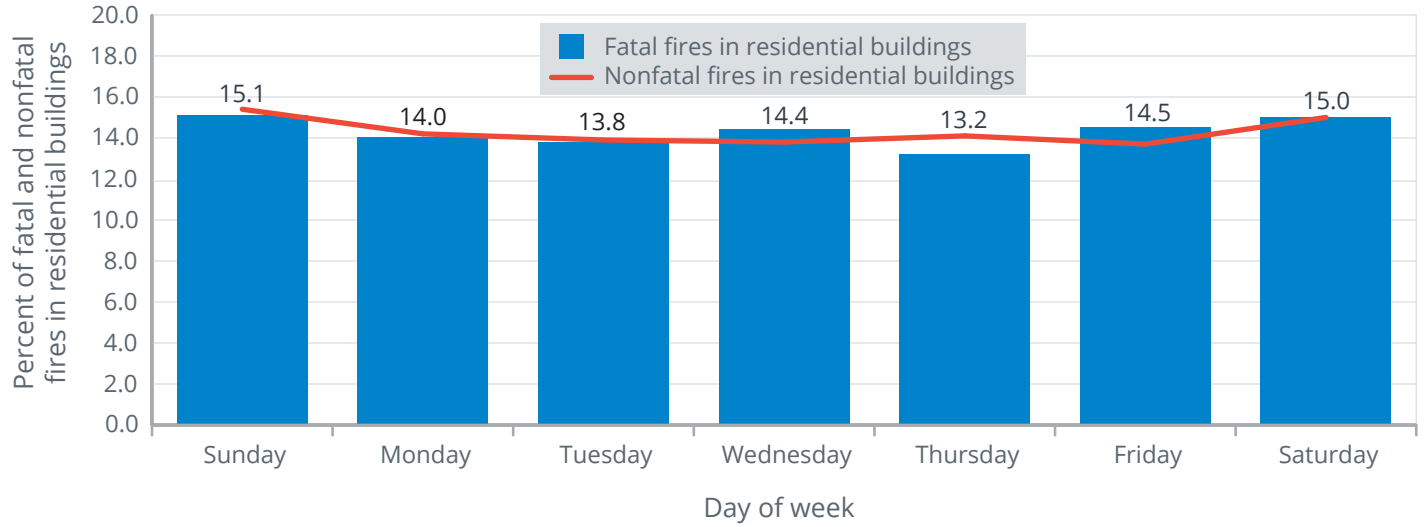
There was a much higher incidence of residential fatal fires in the cooler months twice that of the summer months. This could be because of increased activities indoors. Residential fatal fires peaked in January at 14% (Figure 3). Fire incidence then declined after January, reaching the lowest incidence in August (5%) and September (5%). In addition, as shown in Figure 4, residential fatal fires occurred more often on weekends similarly to when residential nonfatal fires occurred.

Figure 3. Fatal fires in residential buildings by month (2018-2020)



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

Figure 4. Fatal and nonfatal fires in residential buildings by day of week (2018-2020)



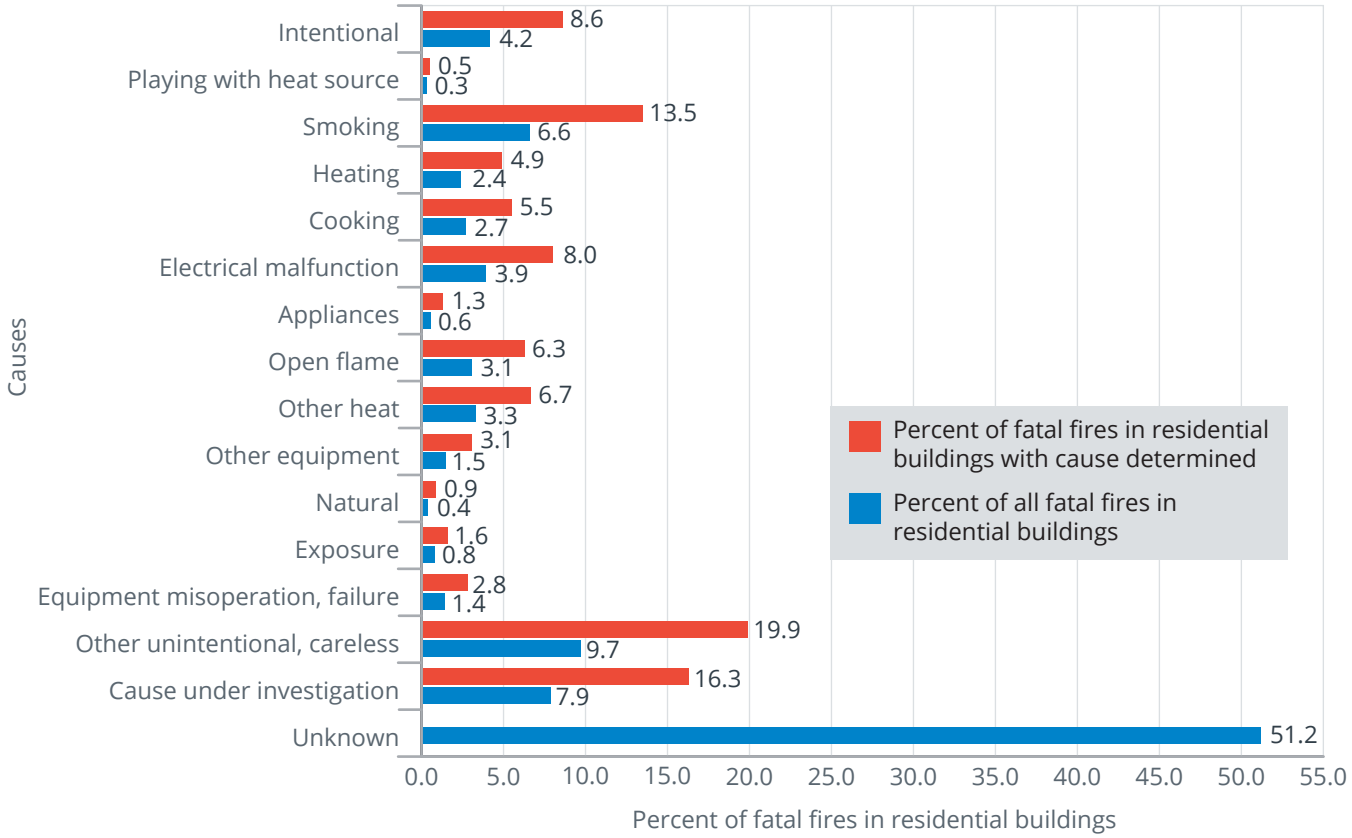
Source: NFIRS 5.0.

Causes of fatal fires in residential buildings

As shown in Figure 5, "other unintentional, careless" action was the leading cause of residential fatal fires at 20%.[13] "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. "Cause under investigation" was the next leading cause at 16%. "Smoking" was the third leading cause at 14%.[14] Although not as prominent as it once was, "smoking" has been a leading cause of residential fatal fires since the inception of the NFIRS.

Multiple fatality fires, those fires resulting in 2 or more deaths, in residential buildings were most often caused by "other unintentional, careless" actions (20%) followed by "cause under investigation" (18%), "electrical malfunction" (10%), and "smoking" (8%). "Other unintentional, careless" actions, "cause under investigation," and "smoking" were the leading causes of single fatality fires in residential buildings at 20%, 16% and 14%, respectively. Fires caused by "other unintentional, careless" actions occurred more often in residential fatal fires (20%) than in residential nonfatal fires (8%).

Figure 5. Causes of fatal fires in residential buildings (2018-2020)



Source: NFIRS 5.0.

Notes:
1. 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 this 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.
2. A large percentage (51%) of residential fatal fire incidents reported to the NFIRS did not have sufficient information to determine the cause of the fire. The cause analyses reflect only the 49% of incidents where enough information and detail were reported to determine the cause of the fatal fire.
3. Total percent of fatal fires in residential buildings with cause determined does not add up to 100% due to rounding.

Causes of winter and summer fatal fires in residential buildings

Residential fatal fires had much higher incidence in the cooler months as shown in Figure 3. While the addition of heating contributed to some of the increase in overall residential fires in the cooler winter months, heating was not 1 of the 3 leading causes of winter residential fatal fires. As shown in Table 3, the following 3 leading causes accounted for 53% of all residential fatal fires in December through March: "other unintentional, careless" actions (24%), "cause under investigation" (16%), and "smoking" (13%). "Heating" was the fourth leading cause of 7% of winter fatal fires. 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.

Half as many residential fatal fires occurred in the warmer months of June through September as compared to the cooler months (Figure 3). As shown in Table 3, the 3 leading causes of summer fatal fires were the same, although in a different order, as those for winter fatal fires: "cause under investigation" (16%), "smoking" (14%), and "other unintentional, careless" actions (13%). The fourth leading cause for summer fatal fires, "intentional" (11%), was different than the fourth cause of winter residential fatal fires.[15]

Table 3. Relative proportion of leading causes of fatal fires in residential buildings: Winter and summer (3-year average, 2018-2020)

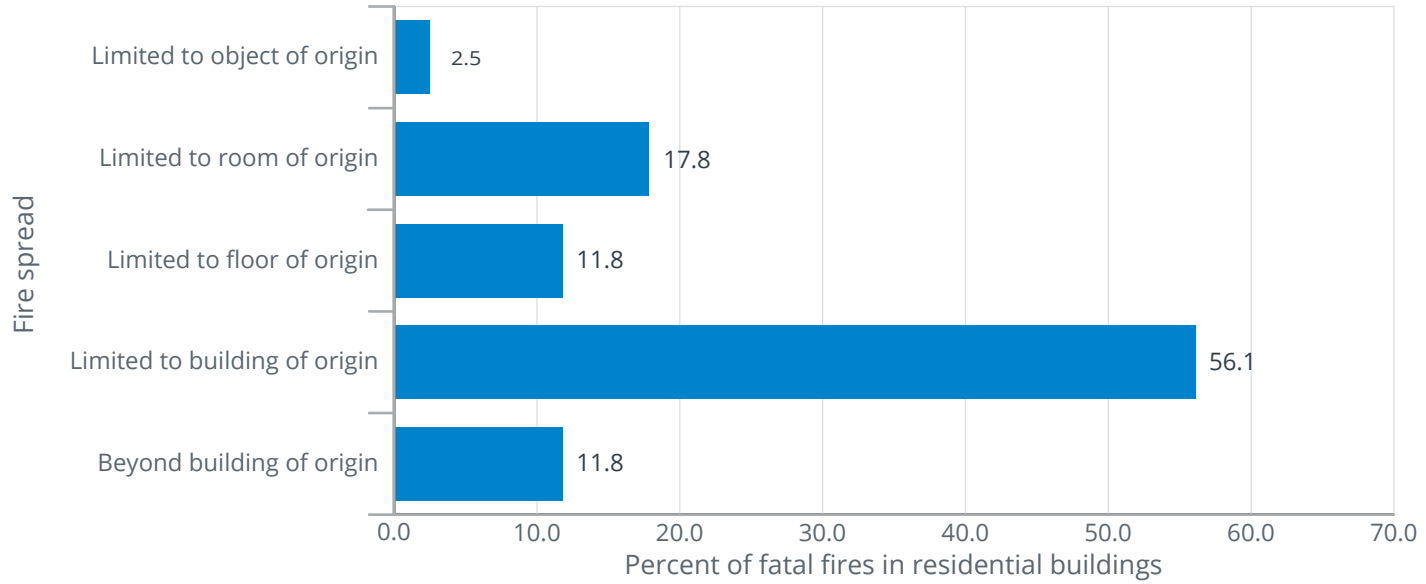
Leading cause of fatal fire	Percent (unknowns apportioned)	
	December-March	June-September
Other unintentional, careless	23.9	12.8
Cause under investigation	15.5	16.4
Smoking	13.3	14.4
Intentional		11.3
Heating	7.2	

Source: NFIRS 5.0.

Fire spread in fatal fires in residential buildings

As shown in Figure 6, 80% 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. The remaining 20% 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 6. Extent of fire spread in fatal fires in residential buildings (2018-2020)



Source: NFIRS 5.0.

Where fatal fires in residential buildings start (area of fire origin)

Table 4 shows the leading areas of fire origin in residential fatal fires. These fires started most frequently in bedrooms (27%) and common rooms including dens, family rooms, living rooms and lounges (26%). The leading causes for residential fatal fires that started in bedrooms were "smoking" (21%) and "other unintentional, careless" actions (18%). These were the same leading causes for residential fatal fires that started in common rooms ("smoking" at 23% and "other unintentional, careless" actions at 18%). After bedrooms and common rooms, residential fatal fires most often started in cooking areas or kitchens at 17%.

Table 4. Leading areas of origin for fatal fires in residential buildings (2018-2020)

Area of origin	Percent (unknowns apportioned)
Bedrooms	26.6
Common room, den, family room, living room, lounge	25.6
Cooking area, kitchen	16.8

Source: NFIRS 5.0.
Note: Only includes fatal fires where the area of origin was specified. The area of origin was specified in 75% of reported fatal fires in residential buildings.

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 — had a large impact in residential fatal fires. As shown in Table 5, the leading human factor contributing to the ignition of the fire was being "asleep" (41%). This finding is expected as 45% of residential fatal fires occurred during the 8-hour period from 11 p.m. to 7 a.m. (Figure 1). When "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," "physical disabilities" and "age was a factor" were the next human factors contributing to the ignition of the fire at 24%, 20% and 11%, respectively. When these human factors were specified as contributing to the ignition of the fire, "smoking" and "other unintentional, careless" actions were also the leading causes of these residential fatal fires.

Table 5. Human factors contributing to ignition of fatal fires in residential buildings (where human factors contributing to ignition are specified, 2018-2020)

Human factors contributing to ignition	Percent of fatal fires in residential buildings (unknowns apportioned)
Asleep	41.3
Possibly impaired by alcohol or drugs	24.4
Physical disabilities	20.4
Age was a factor	10.8
Possible intellectual disabilities	9.6
Unattended or unsupervised person	8.8
Multiple persons involved	3.2

Source: NFIRS 5.0.
Notes: 1. Only includes fatal fires where human factors that contributed to the ignition of the fire were specified. At least 1 human factor contributing to ignition was specified in 28% of reported fatal fires in residential buildings. In 69% of reported fatal fires in residential buildings, the human factor contributing to ignition was reported as "none."
2. Multiple human factors contributing to fire ignition may be noted for each incident; total will exceed 100%.

Alerting/suppression systems in fatal fires in residential buildings

Partly due to early detection and fire extinguishing systems, fire fatalities and injuries have declined over the last 40 years. Smoke alarms are present in most homes. In addition, residential sprinkler systems have gained support from the fire service and many residential communities.

In this report, "smoke alarms" refer to both smoke alarms and smoke detectors.[16] Smoke alarms are stand-alone devices with their own power source and notification capability. Smoke detectors detect smoke as a component of a larger system containing separate notification capability, typically in larger areas or structures.

Note that the data presented in Tables 7 and 8 show the reported counts from the NFIRS dataset. These counts are not scaled to national estimates of smoke alarms or AESs in fatal fires in residential buildings. In addition, while NFIRS allows for the determination of the type of detector (i.e., smoke, heat or combination), the NFIRS does not allow for the determination of the type of smoke alarm (i.e., photoelectric or ionization) or the location of the smoke alarm with respect to the area of fire origin.

Smoke alarms in fatal fires in residential buildings

Smoke alarms were reported as present in 33% of residential fatal fires. By comparison, smoke alarms were present in 44% of residential nonfatal fires.[17] In 25% of residential fatal fires, there were no smoke alarms present. Lastly, in 43% of these fires, firefighters were unable to determine if a smoke alarm was present (Table 6).[18]

Table 6. Presence of smoke alarms in fatal fires in residential buildings (2018-2020)

Presence of smoke alarms	Percent
Present	32.7
None present	24.8
Undetermined	42.5
Total	100.0

Source: NFIRS 5.0.

Where the existence of a smoke alarm was undetermined, 82% of the fires spread beyond the floor of fire origin. Because these fires were so expansive, it may have been impossible to determine the presence of smoke alarms.

Fires in one- and two-family housing accounted for 87% of residential fatal fires in which no smoke alarm was present. Multifamily housing accounted for just 7% 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 were **not** currently or routinely occupied accounted for a small portion (5%) of all residential fatal fires. These unoccupied buildings — which are under construction, undergoing major renovations, 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 6% of fatal fires in residential buildings that were unoccupied were reported as having smoke alarms that operated. In addition, in fatal fires in residential buildings that were unoccupied, AESs were reported as present in less than 1% of the fires. As a result, the detailed smoke alarm and AES analyses in the next sections focus on fatal fires in occupied residential buildings only.

Smoke alarms in fatal fires in occupied residential buildings

Smoke alarms were reported as present in 34% of fatal fires in occupied residential buildings. In 24% of fatal fires in occupied residential buildings, there were no smoke alarms present, while in 42% of fatal fires in occupied residential buildings, firefighters were unable to determine if a smoke alarm was present (Table 7).

When smoke alarms were present (34%) and the alarm's operational status was analyzed, the percentage of smoke alarms reported as present consisted of:

- Present and operated — 16%.
- Present but did not operate — 7% (alarm failed to operate, 7%; fire too small, less than 1%).
- Present but operational status unknown — 11%.

When only the subset of incidents where smoke alarms were reported as present was analyzed, smoke alarms were reported to have operated in 47% of the incidents and failed to operate in 19%. In 1% of this subset, the fire was too small to activate the alarm. The operational status of the alarm was undetermined in 33% of these incidents.

At least 24% of fatal fires in occupied residential buildings had no smoke alarms present. This percentage is likely higher considering reported fires without information on smoke alarms are not factored in.[19]

If a fire occurs, properly installed and maintained smoke alarms provide an early warning signal to everyone in a home. It is well documented that smoke alarms help save lives and property. The USFA continues to partner with other government agencies, nongovernment organizations 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 can be found at https://www.usfa.fema.gov/prevention/home-fires/prepare-for-fire/smoke-alarms/. Additionally, the USFA's position statement on home smoke alarms is available at https://www.usfa.fema.gov/about/position-statements/.

Table 7. NFIRS smoke alarm data for fatal fires in occupied residential buildings (2018-2020)

Presence of smoke alarms	Smoke alarm operational status	Smoke alarm effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		8	0.2
	Smoke alarm operated	Smoke alarm alerted occupants; occupants responded	264	7.2
		Smoke alarm alerted occupants; occupants failed to respond	81	2.2
		No occupants	5	0.1
		Smoke alarm failed to alert occupants	29	0.8
		Undetermined	204	5.5
	Smoke alarm failed to operate		241	6.5
	Undetermined		412	11.2
None present			883	24.0
Undetermined			1,556	42.2
Total incidents			3,683	100.0

Source: NFIRS 5.0.

Notes: 1. The data presented in this table are reported counts from the NFIRS dataset summed (not averaged) from 2018 to 2020. They do not represent national estimates of smoke alarms in fatal fires in occupied residential buildings. They are presented for informational purposes.
2. Total percent does not add up to 100% due to rounding.

Automatic extinguishing systems in fatal fires in occupied residential buildings

Overall, full or partial AESs — mainly sprinklers — were present in only 2% of fatal fires in occupied residential buildings (Table 8). As a comparison, the presence of suppression systems in nonfatal fires in occupied residential buildings was 5%.[20]

Table 8. NFIRS automatic extinguishing system data for fatal fires in occupied residential buildings (2018-2020)

AES presence	Count	Percent
AES present	56	1.5
Partial system present	5	0.1
AES not present	3,324	90.3
Unknown	298	8.1
Total incidents	3,683	100.0

Source: NFIRS 5.0.
Notes: The data presented in this table are reported counts from the NFIRS dataset summed (not averaged) from 2018 to 2020. They do not represent national estimates of AESs in fatal fires in occupied residential buildings. They are presented for informational purposes.

Residential sprinkler systems help to reduce the risk of deaths and injuries, homeowners insurance premiums, and insured and uninsured property losses. Despite these advantages, many homes do not have AESs, although they are often found in other frequently occupied locations such as hotels and businesses. Sprinklers are required by code in most hotels and many multifamily residences. In addition, there are major movements in the U.S. fire service to require sprinklers in all new single-family homes.

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 https://www.usfa.fema.gov/prevention/home-fires/prepare-for-fire/home-fire-sprinklers/. Additionally, the USFA's position statement on residential sprinklers is available at https://www.usfa.fema.gov/about/position-statements/.

Examples

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

- March 2022: A fatal Houma, Louisiana, house fire started in a bedroom around 9:45 p.m. on a Thursday night. Firefighters, who were able to extinguish the fire in about 10 minutes, reported that all residents except 1 safely escaped. A male resident, who did not escape, was found in the bedroom where the fire started and died at the scene. While the official cause of the fire has not yet been determined, investigators reportedly have not ruled out that it may have been caused by unsafe smoking practices involving a medical oxygen tank.[21]

- January 2022: A midmorning house fire in Tyngsborough, Massachusetts, resulted in the death of 1 person. Upon arrival, a police officer rescued 1 resident who was treated at the scene and survived. The second resident, a 30-year-old woman, was trapped in a second-floor bedroom and had to be rescued by firefighters. The woman was taken to a local hospital but died because of her injuries. The accidental fire was caused when an immersion water heater ignited nearby combustible items.[22]

- January 2022: At least 12 people died, including 8 children, in a Philadelphia, Pennsylvania, row house fire. Firefighters arrived on the scene of the fire just before 6:40 a.m. on Wednesday and had the fire under control 50 minutes later. The 3-story row house, which was divided into 2 duplex units, had approximately 26 people living in it. In addition to the 12 victims who were fatally injured, 2 others were critically injured and had to be transported to local hospitals. 8 others were able to safely evacuate without injury. The cause of the fire is still under investigation, but it is reported to have started near the kitchen.[23]

- December 2021: 1 adult died after a late-Friday afternoon house fire broke out in Tacoma, Washington. Upon arrival, firefighters found fire spreading up the side of the 3-story house. Firefighters located the victim inside of the structure after the fire was extinguished and a search could be conducted. The cause of the fire was reported to be an electrical wire malfunction.[24]

NFIRS data specifications for fatal fires in residential buildings

Data for this report were extracted from the NFIRS annual PDR files for 2018, 2019 and 2020.25 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 counting a single incident more than once.
- 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, detached, manufactured home, mobile home not in transit, duplex
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 deaths greater than zero.

Although voluntary, the NFIRS is the world's largest national database of fire incident information. By contributing to the NFIRS, the fire service is helping to make data-informed decisions ranging from local budget development to the identification of national preparedness initiatives. It is important that fire departments participate in the NFIRS and critical that the data they report are complete and accurate. This provides for sound decision-making that has impact on community risk and emergency response at the local level.

Analysis disclaimer

Complete or full years of data are required for statistical analyses presented in these topical reports. Although NFIRS data for a calendar year are often reported to the USFA throughout the year, fire departments and/or states have until the official cutoff date as set forth by the NFDC to submit their data to the USFA. Typically, this cutoff date is July 1 after the end of the previous calendar year. This provides states with ample time to perform data quality checks and correct questionable incidents before they are set to released status in the national production database and Enterprise Data Warehouse. Once the data are released to the USFA, additional data quality reviews are completed before the data are prepared for public release.

The analyses contained in this report reflect the current methods 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 data received from participating fire departments and the analytical methods used to fulfill this goal. Because of this commitment and the variation in the quality of the reported data as well as any changes in the fire problem from year to year, data collection strategies and methodological changes are possible and do occur. As a result, analyses and estimates of the fire problem may vary over time. Previous analyses and estimates for specific issues (or similar issues) may have used different methodologies or different data definitions and therefore may not be directly comparable to the current analyses and estimates.

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 22)," https://www.usfa.fema.gov/downloads/pdf/statistics/data-sources-and-national-estimates-methodology-vol22.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.

Notes:

[1] The 2018-2020 annual average estimate of civilian fire deaths is based on data from the following National Fire Protection Association's (NFPA) reports: Evarts, Ben, "Fire Loss in the United States During 2018," NFPA, October 2019; Ahrens, Marty and Evarts, Ben, "Fire Loss in the United States During 2019," NFPA, September 2020; Ahrens, Marty and Evarts, Ben, "Fire Loss in the United States During 2020," NFPA, September 2021.
[2]The term "residential buildings" includes what are commonly referred to as "homes," whether they are one- or two-family dwellings or multifamily buildings. It also includes manufactured housing, hotels and motels, boarding houses or residential hotels, dormitories, sorority/fraternity houses, assisted living facilities, and halfway houses — residences for formerly institutionalized individuals (patients with mental disabilities, drug addictions or those formerly incarcerated) that are designed to facilitate their readjustment to private life. The term "residential buildings" does not include institutions, such as prisons, nursing homes, juvenile care facilities or hospitals, even though people may reside in these facilities for short or long periods of time.
[3]The percentage cited here is derived from the USFA's annual average estimate of residential building fire deaths and the NFPA's annual average estimate of civilian fire deaths from 2018 to 2020: ((2,745/3,620) x 100) = 75.8%.
[4]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.
[5]In 2018 and 2020, there was 1 confined fire incident with a reported civilian fire death for each of these years. By definition, confined fires should not have reported fire deaths. As a result, these fire incidents were excluded from all fire data analyses conducted for this report.

[6]National estimates are based on 2018 to 2020 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 2020 Fire Experience Survey," August 2021, https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/US-Fire-Problem/Methodsfirelossandothers.ashx. In this topical report, fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25 and dollar loss, to the nearest million dollars.

[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 2018 to 2020, 65% of the NFPA's annual average estimated 1,332,800 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]This report excludes analyses of 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. These characteristics are analyzed separately as part of the Civilian Fire Fatalities in Residential Buildings topical report.

[9]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 the NFIRS data alone. The fire death rate computed from national estimates is (1,000 x (2,745/1,900)) = 1,444.7 deaths per 1,000 fatal fires in residential buildings, and the fire injury rate is (1,000 x (625/1,900)) = 328.9 injuries per 1,000 fatal fires in residential buildings. 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 reported at the individual fire incident level. The fire death rate computed from national estimates is (1,000 x (2,700/1,800)) = 1,500.0 deaths per 1,000 fatal residential building fires and the fire injury rate is (1,000 x (600/1,800)) = 333.3 injuries per 1,000 fatal residential building fires.

[10]The U.S. Census Bureau showed that, in 2019, 74.6% of occupied housing units were 1-unit attached and detached structures or mobile homes (92.6 million), U.S. Department of Housing and Urban Development and U.S. Census Bureau, 2019 American Housing Survey — Table Creator, select "2019 (Year) Housing Unit Characteristic (Table); Units by Structure Type (Variable 1); Occupancy/Vacancy Status (Variable 2)," https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html?s_areas=00000&s_year=2019&s_tablename=TABLE0&s_bygroup1=3&s_bygroup2=27&s_filtergroup1=1&s_filtergroup2=1 (accessed April 7). In 2019, household size was estimated at 2.61 people per household (https://data.census.gov/cedsci/table?q=social%20characteristics&tid=ACSCP1Y2019.CP02). Thus, 92.6 million housing units x 2.61 people per household = 241.7 million people. With the 2019 U.S. population given as 328.3 million, (https://www2.census.gov/programs-surveys/popest/tables/2010-2020/national/totals/NST-EST2020.xlsx), approximately 73.6% of the population lived in what the NFIRS defines as one- and two-family housing.

[11]"One- and two-family residential buildings" include detached dwellings, manufactured homes, mobile homes not in transit and duplexes. "Multifamily residential buildings" include apartments, town houses, row houses, condominiums and other tenement properties. "Other residential buildings" include boarding/rooming houses, hotels/motels, residential board and care facilities, dormitory-type residences, sorority/fraternity houses, and barracks.

[12]For 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.

[13]The USFA Structure Fire Cause Methodology was used to determine the cause of fatal fires in residential buildings. 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.

[14]The 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 to be a group of fires where smoking materials were the heat source. The 2 sets are similar but not identical. A deliberately set fire with smoking materials as the heat source 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.

[15]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, FBI, Criminal Justice Information Services Division, https://www.fbi.gov/about-us/cjis/ucr/ucr.

[16]Smoke alarms in the context of this report refer to both smoke alarms and smoke detectors. This distinction is **not** made within the NFIRS, as the NFIRS refers only to "detectors," and semantically these are really "alarms."

[17]Here, 44% reflects nonconfined residential nonfatal fires only. Nonconfined fires are generally large and more serious fires. Confined fires, defined in NFIRS as Incident Types 113 to 118, are excluded from this analysis as the NFIRS smoke alarm data elements are not required to be completed for these types of fires.

[18]Total does not add up to 100% due to rounding.

[19]Here, **at least** 24% of fatal fires in occupied residential buildings had no smoke alarms present — the 24% 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.

[20]The 5% reflects nonconfined nonfatal fires in occupied residential buildings.

[21]Walker, Letitia, "Fatal House Fire in Houma," 4WWL, March 4, 2022, https://www.wwltv.com/article/news/local/fatal-house-fire-houma/289-0a6c5359-bbcf-4672-9650-220ef39aae6b (accessed March 24).
[22]"Fatal Tyngsborough House Fire Ruled Accidental," NBC 10 Boston, Feb. 1, 2022, https://www.nbcboston.com/news/local/fatal-tyngsborough-house-fire-ruled-accidental/2631379 (accessed March 24).
[23]El-bawab, Nadine, "At Least 12 Dead in Philadelphia Row House Fire, Including Several Children," ABC News, Jan. 6, 2022, https://abcnews.go.com/US/fatal-fire-breaks-philadelphia-row-house/story?id=82086627 (accessed March 24).
[24]Needles, Allison, "One Found Dead After Fire Breaks Out in Tacoma Home," The News Tribune, Jan. 1, 2022, https://www.thenewstribune.com/news/local/article256986457.html (accessed March 24).
[25]The NFIRS PDR files are available for download at: https://www.fema.gov/about/openfema/data-sets/fema-usfa-nfirs-annual-data.