TOPICAL FIRE REPORT SERIES Volume 16, Issue 2 / July 2015

Civilian Fire Fatalities in Residential Buildings (2011–2013)

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

- Thermal burns and smoke inhalation were the primary symptoms leading to death, accounting for 90 percent of all fatalities in residential fires.
- Bedrooms, at 50 percent, 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 52 percent of civilian fire fatalities in residential buildings. This period also accounted for 49 percent of fatal fires in residential buildings.
- At the time of their deaths, 36 percent of fire victims in residential buildings were trying to escape; an additional 33 percent were sleeping.
- "Other unintentional, careless" actions (15 percent) and "smoking" (14 percent) were the leading reported causes of fatal fires in residential buildings.
- Males accounted for 58 percent of civilian fire fatalities in residential buildings; females accounted for 42 percent of fire fatalities.
- Adults aged 50 to 69 accounted for 36 percent of civilian fire fatalities in residential buildings.
- Children less than 10 years old accounted for 11 percent of civilian fire fatalities in residential buildings.

Fires can strike 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, but each year over 75 percent of all civilian fatalities occurred as a result of fires in residential buildings — our homes.[1, 2]

From 2011 to 2013, civilian fire fatalities in residential buildings accounted for 83 percent of all fire fatalities.[3] This topical fire report focuses on the characteristics of these fatalities as reported to the National Fire Incident Reporting System (NFIRS) from 2011 to 2013.[4] NFIRS data is used for the analyses presented throughout this report.

Civilian fire fatalities by definition involve people not on active duty with a firefighting organization who die as a result of a fire.[5] These fatalities generally occur when an individual is escaping, sleeping or unable to act during a fire.

Annually, from 2011 to 2013, an estimated 2,530 civilian fire fatalities resulted from 1,700 fatal fires in residential buildings and an estimated 372,900 residential building fires.[6] Fatal fires are those fires where one or more fatalities occur. This report focuses on the characteristics of 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.

For the purpose of 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, charts, headings and endnotes reflect the full category "fires in residential buildings" or "residential building fires."

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 nearly six civilian fatalities per 1,000 residential fires (Table 1).[7] Residential fires that resulted in fatalities had 1,191 fatalities for every 1,000 fires or slightly more than one fatality per fatal fire. Of the residential fatal fires, 86 percent resulted in one civilian fatality, 10 percent resulted in two civilian fatalities, and 3 percent resulted in three or more civilian fatalities.[8]

Table 1. Fatality Rates for Residential Building Fires per 1,000 Fires (2011–2013)

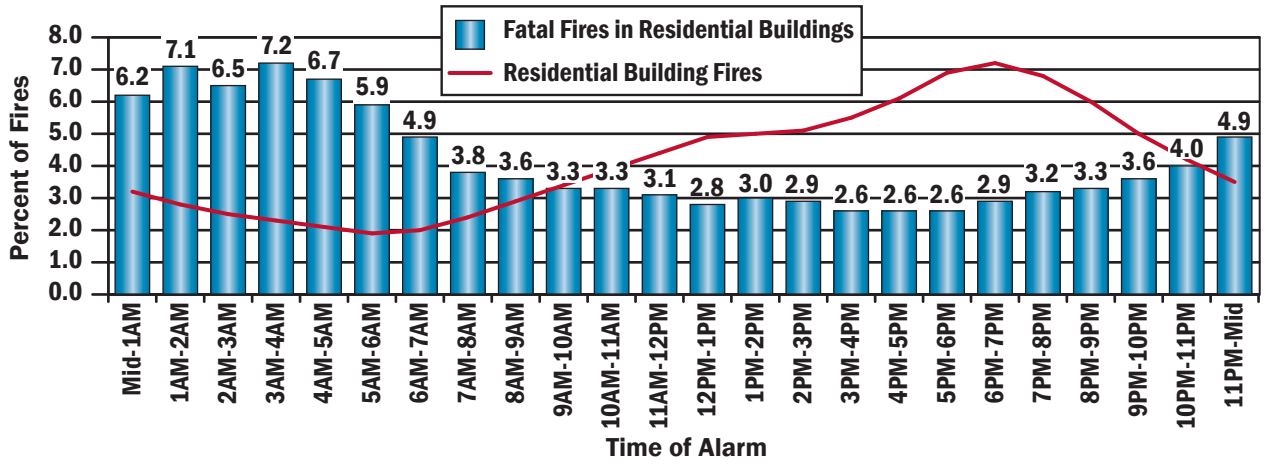
Fatalities per 1,000 Fatal Fires	Fatalities per 1,000 Residential Building Fires
1,190.8	5.5

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 fatality (see Table 2). From 2011 to 2013, fatal fire incidence was highest from 1 to 5 a.m. Fatal fires were most prevalent when overall residential fire incidence was at its lowest, making nighttime fires the most deadly. The eight-hour peak period (11 p.m. to 7 a.m.) accounted for 49 percent of residential fatal fires and 52 percent of deaths.[9]

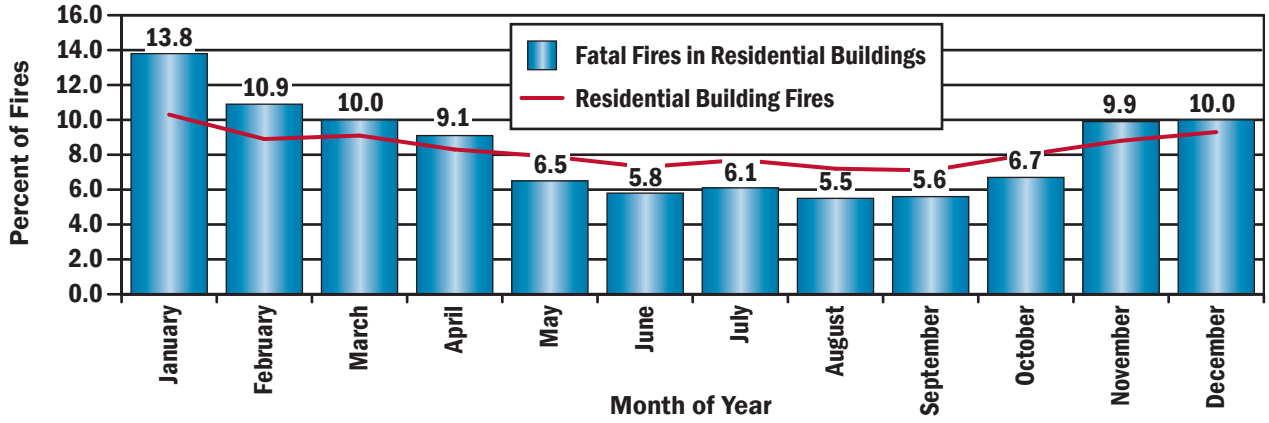
Figure 1. Fatal Fires in Residential Buildings by Time of Alarm (2011–2013)



Source: NFIRS 5.0.

Residential fatal fires occurred more frequently in the colder months, tracking the overall monthly residential fire incidence (Figure 2). The winter peak occurred during January (14 percent). Residential fatal fires were lowest from June through September.

Figure 2. Fatal Fires in Residential Buildings by Month (2011–2013)

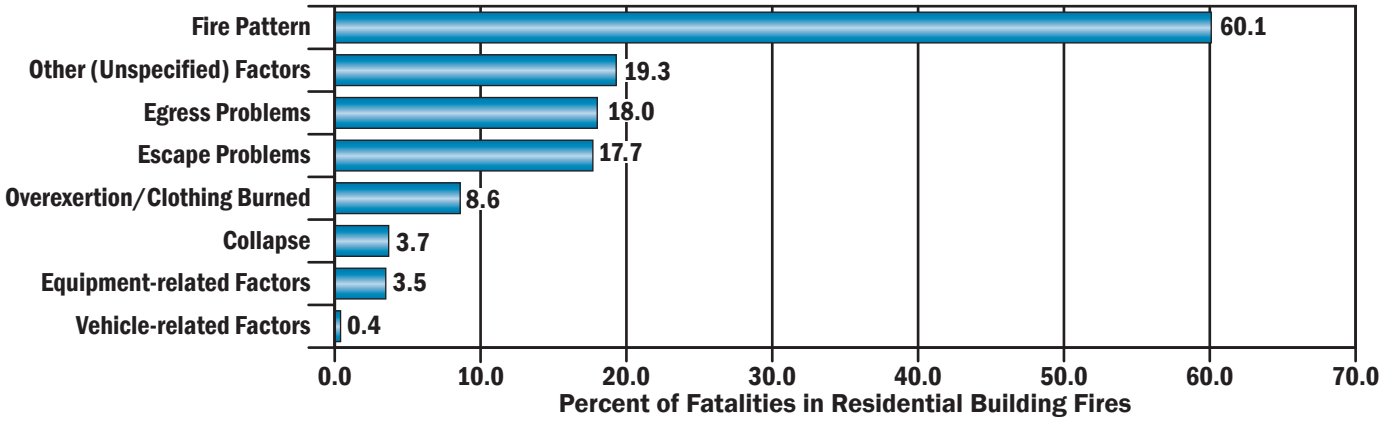


Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

Factors Contributing to Civilian Fire Fatalities in Residential Buildings

The most notable factors contributing to the fatalities (outside of "other (unspecified) factors") (Figure 3) were "fire pattern" (60 percent), "egress problems" (18 percent) and "escape problems" (18 percent). 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, and mechanical obstacles to the exit. Escape factors include unfamiliarity with exits, excessive travel distance to the nearest clear exit, choice of an inappropriate exit route, re-entering the building, and clothing catching on fire while escaping.

Figure 3. Factors Contributing to Civilian Fire Fatalities in Residential Buildings (2011–2013)



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 29 percent of reported fatalities.
2. As multiple factors contributing to fatalities may be noted for each fatality, the total sums to more than 100 percent.

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" (47 percent). 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 (27 percent). This was followed by "possibly impaired by alcohol" and "unconscious" at 18 percent and 9 percent, respectively (Table 2).

Table 2. Human Factors Contributing to Civilian Fire Fatalities in Residential Buildings (2011–2013)

Human Factors Contributing to Fatality	Percent of Fire Fatalities in Residential Buildings (Unknowns Apportioned)
Asleep	46.6
Physical disability	26.5
Possibly impaired by alcohol	18.2
Unconscious	9.3
Possible intellectual disability	7.9
Possibly impaired by other drug or chemical	7.5
Unattended or unsupervised person	6.3
Physically restrained	0.6

Source: NFIRS 5.0.
Notes: 1. Only includes fatalities where human factors that contributed to the fatality were specified. A human factor contributing to the fatality was specified in 33 percent of reported fatalities.
2. Multiple human factors contributing to the fire fatality may be noted for each incident; total will exceed 100 percent.

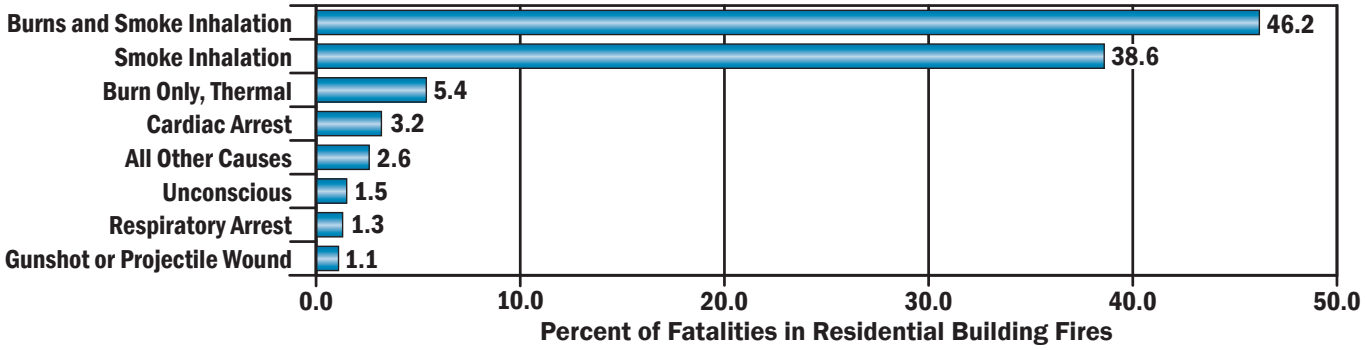
Primary Symptoms of Civilian Fire Fatalities

Thermal burns and smoke inhalation were the primary symptoms leading to death, accounting for 90 percent of all fatalities in residential fires. Burns and smoke inhalation combined made up 46 percent of the fatalities. Smoke inhalation by itself accounted for 39 percent of residential fire fatalities,

and thermal burns (as opposed to scalds or chemical or electrical burns) alone accounted for 5 percent of fatalities (Figure 4). Cardiac arrests accounted for only 3 percent of fatalities.

Thermal burns are caused by contact with flames, hot liquids, hot surfaces, and other sources of high heat. Multiple body parts were involved in 86 percent of thermal burn 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.[10]

Figure 4. Civilian Fire Fatalities in Residential Buildings by Primary Symptoms (2011-2013)

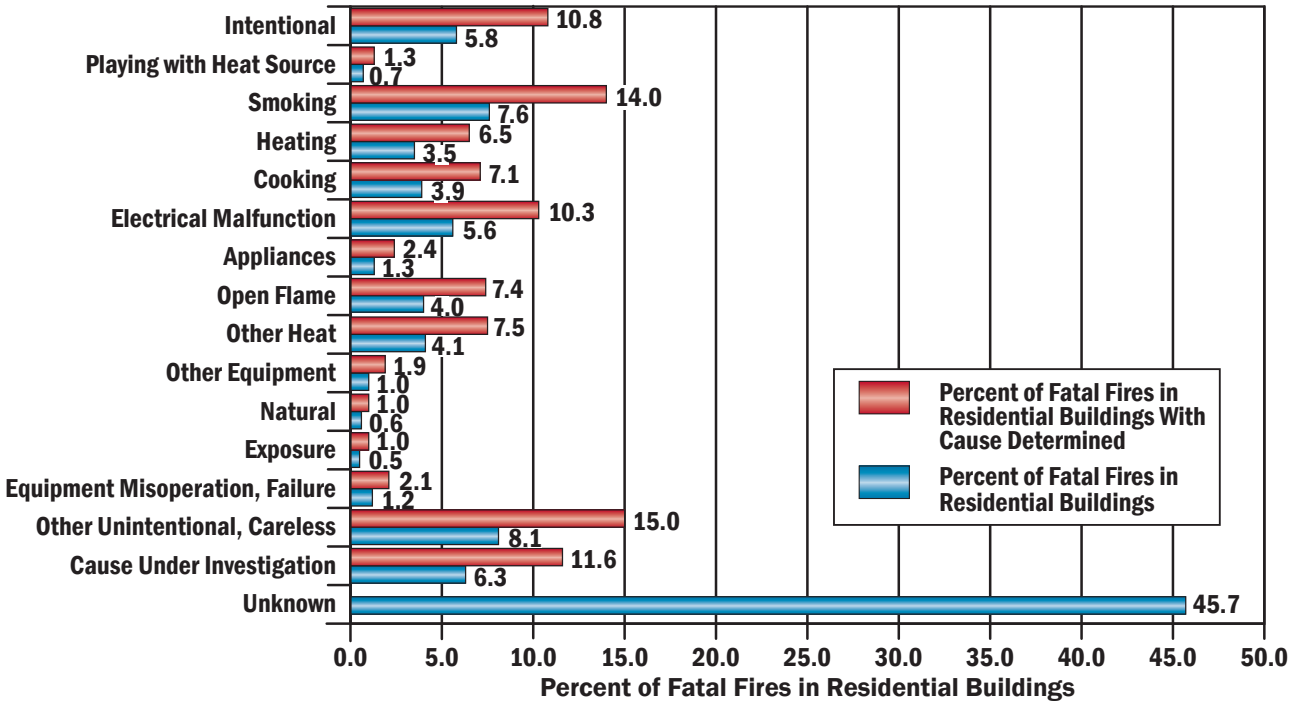


Source: NFIRS 5.0.
Note: Percentages computed only for those fatalities where symptoms were noted. Primary symptoms were specified for 46 percent of the reported fatalities. Total does not add up to 100 percent due to rounding.

Causes of Fatal Fires in Residential Buildings

"Other unintentional, careless" actions (15 percent) and "smoking" (14 percent) were the leading reported causes of residential fires that resulted in fatalities — fatal fires.[11] These two fire causes accounted for 29 percent of all residential fatal fires (Figure 5). "Other unintentional, careless" actions include misuse of materials or products, abandoned or discarded materials or products, and heat source too close to combustibles. The cause of the fire was "unknown" in 46 percent of fatal fires.[12]

Figure 5. Causes of Fatal Fires in Residential Buildings (2011-2013)

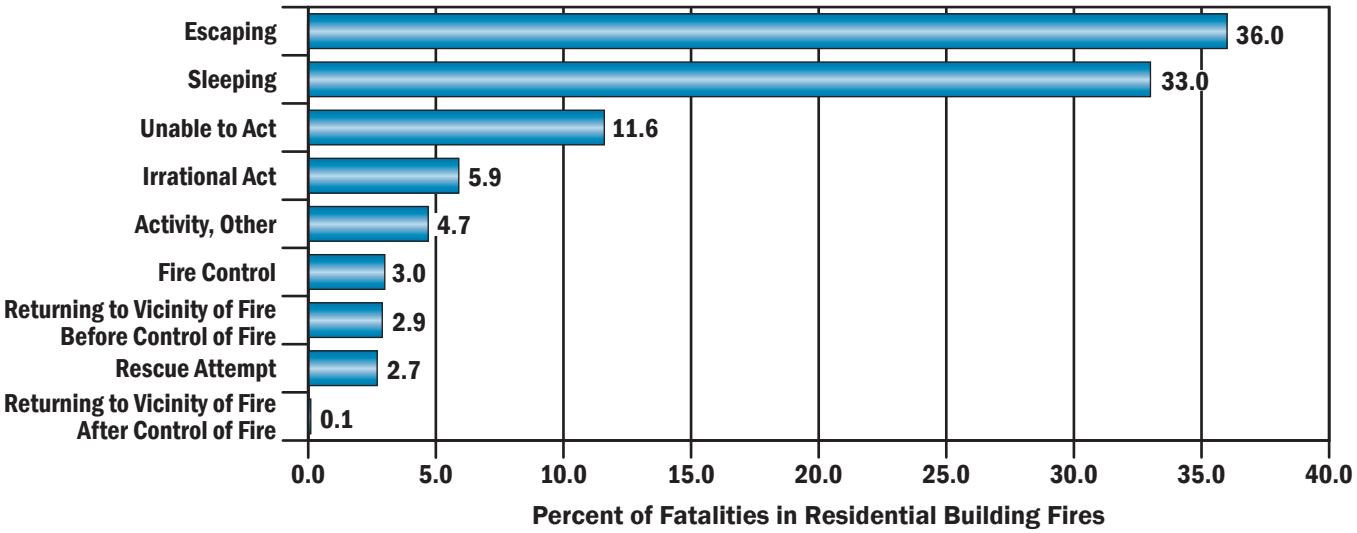


Source: NFIRS 5.0.
Notes: 1. Total percent of each distribution of fatal fires in residential buildings does not add up to 100 percent due to rounding.
2. Fires caused by intentional actions include, but are not limited to, fires that are deemed to be arson. Intentional fires are those fires that are 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, FBI, Criminal Justice Information Services Division, http://www.fbi.gov/about-us/cjis/ucr/ucr.
3. Causes are listed in order of the U.S. Fire Administration (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.

Civilian Activity Prior to Death

Most civilian fire fatalities occurred when the victim was attempting to escape (36 percent) or sleeping (33 percent), as shown in Figure 6. 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 an escape plan be prepared and practiced. With a well-thought out plan that includes multiple escape options, the chances of survival and escape greatly increase. In addition, it has been demonstrated that people may not wake up from the smell of smoke while sleeping. Therefore, it is also vital that smoke alarms are installed in homes to alert sleeping people to the presence of fire.[13]

Figure 6. Civilian Activity Prior to Death in Residential Building Fires (2011-2013)



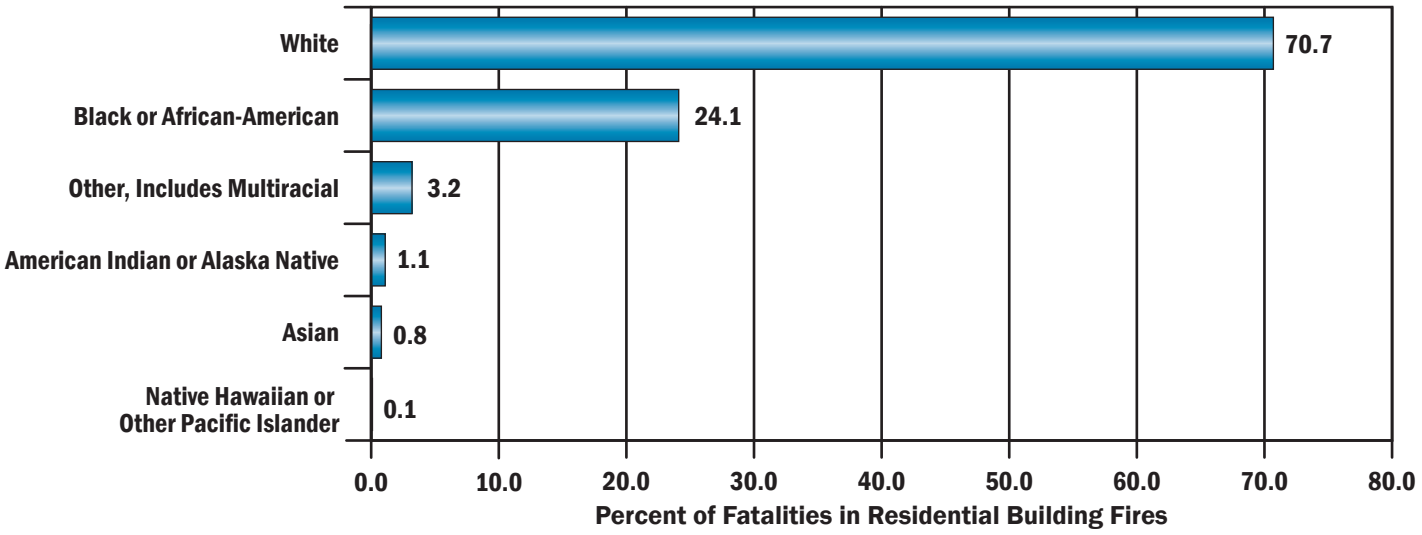
Source: NFIRS 5.0.
Notes: 1. Percentages computed for only those fatalities where activity information was available. The activity prior to death was specified for 32 percent of reported fatalities.
2. Total does not add up to 100 percent due to rounding.

Gender, Race and Ethnicity of Civilian Fire Fatalities

Males accounted for 58 percent of residential fire fatalities; females accounted for 42 percent of fire fatalities. Where racial information was provided, whites constituted 71 percent of the fatalities, followed by blacks or African-Americans (24 percent). All other races accounted for 5 percent of fire fatalities (Figure 7). Race was specified for 62 percent of reported fatalities.

Where ethnicity data was provided, 91 percent of civilian fatalities were non-Hispanic or non-Latino. The remaining 9 percent were Hispanic or Latino. Ethnicity was specified for 41 percent of reported fatalities.

Figure 7. Civilian Fire Fatalities in Residential Buildings by Race (2011-2013)



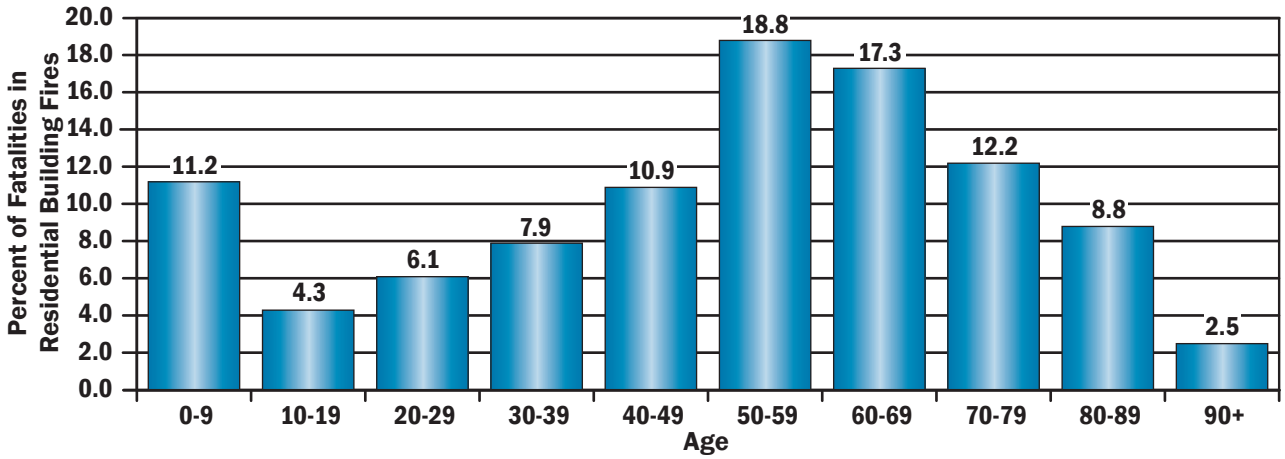
Source: NFIRS 5.0.
Note: Percentages computed for only those fatalities where racial information was available. Race was specified for 62 percent of reported fatalities.

Age and Activity Prior to Death

Adults aged 50 to 69 accounted for 36 percent of civilian fatalities in residential fires (Figure 8). Children less than 10 years old accounted for 11 percent of fatalities, while adults aged 70 and over accounted for 24 percent of fatalities.

Where the information was reported, at the time of death, escaping (36 percent) and sleeping (33 percent) were the two leading activities that resulted in fatalities. Children aged 0 to 9 were primarily sleeping (47 percent) over trying to escape (30 percent). Those aged 20 to 39 and those aged 90 and over were also more likely to be sleeping at the time of their deaths. Those aged 40 to 89 were more likely trying to escape at the time of their deaths as opposed to sleeping (Table 3). Overall, activity at the time of the fatal injury was reported for 32 percent of the fatalities.

Figure 8. Civilian Fire Fatalities in Residential Buildings by Age Group (2011–2013)



Source: NFIRS 5.0.
Note: Percentages computed only for those fatalities where age was valid. A valid age was provided for nearly all reported fatalities (99.9 percent).

Table 3. Leading Activities Resulting in Civilian Fire Fatalities in Residential Buildings by Age Group (2011–2013)

Percent of Fatalities Where Age and Activity Reported (2011-2013)		
Age Group	Escaping	Sleeping
0-9	29.6	46.7
10-19	51.4	30.6
20-29	35.0	43.8
30-39	27.9	43.3
40-49	36.9	25.5
50-59	37.3	30.7
60-69	38.6	28.0
70-79	34.7	30.1
80-89	38.3	27.5
90+	25.0	40.6
Overall	36.0	33.1

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 percent) were the leading specific location where civilian fire fatalities occurred in residential buildings (Table 4). Common rooms such as dens, family rooms, living rooms or lounges (11 percent); bathrooms (8 percent); and kitchens and cooking areas (8 percent) accounted for an additional 27 percent.

While not specific rooms in the home, egress areas accounted for 11 percent 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 (2011–2013)

Specific Location at Time of Fatal Injury	Percent (Unknowns Apportioned)
Bedrooms	50.0
Common rooms, dens, family rooms, living rooms, lounges	11.0
Bathrooms	8.3
Kitchens and cooking areas	7.9

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 26 percent of reported fatalities.

Examples

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

- March 2015: Smoking was determined to be the cause of a house fire that led to the death of an Anderson County, South Carolina, resident. Firefighters were called to the scene around noon. The man, 88, was found in the bathroom of his home and had suffered from smoke inhalation and carbon monoxide poisoning. It was reported that his clothing had caught on fire as a result of smoking.[14]
- March 2015: Shortly before 4 a.m., a mobile home fire in Hudson, Texas, claimed the life of a 73-year-old man. Neighbors tried to rescue the victim, but the home was quickly engulfed by flames. The cause of the fire was believed to have been a gas heater. Medical oxygen also may have been a contributing factor in the ignition of the blaze.[15]
- March 2015: An early morning apartment fire in Nashville, Tennessee, resulted in the deaths of a father, 34, and his daughter, 4. Two other children were rescued from the home and transported to a hospital where they were treated for burn injuries. The fire broke out around 2 a.m. in the kitchen of the home. Investigators determined that a stove was the cause of the fire, but they were uncertain as to why the stove caught on fire. There were no smoke alarms present in the home.[16]
- March 2015: A physically disabled man died in an early morning apartment fire in Titusville, Pennsylvania. Firefighters found the 79-year-old man on the bedroom floor; they believed he was trying to get to his wheelchair. The man perished as a result of smoke inhalation and burns. The fire had started in the dining room and was caused by an electrical cord on a portable heater. There were smoke alarms in the unit; however, it was undetermined if they operated. No other injuries were reported.[17]

Escape Planning for Residential Buildings

Everyone should know how to escape from his or her residence. USFA recommends leaving fighting a fire to trained firefighters. Instead, efforts should be focused on following a preset escape plan.

A home filled with smoke is a very dangerous situation. Smoke blocks vision, and the toxic gases can cause dizziness, disorientation and ultimately death. Under these conditions, one can easily become lost or trapped in the home. Unfamiliarity with exits, excessive distance to the nearest exit, or an inappropriate choice of exit can hinder a crucial escape. Many civilian fatalities occur as the victim is trying to escape. With a well-thought out plan that includes multiple escape options, your chances of survival greatly increase.

The first step in an escape plan is to make sure smoke alarms are installed on every level of the home and are in good working order. Plan and practice at least two escape routes for every room, and have procedures in place for those who require additional help, such as infants, older adults and individuals with disabilities. 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

Technologies to detect and extinguish fires have been major contributors to the drop in fire fatalities and injuries over the past 35 years. Smoke alarms are now present in the majority of residential buildings. In addition, the use of residential sprinklers is widely supported by the fire service and is gaining support within residential communities.

Nationally, only 3 percent of households lack smoke alarms.[18] Properly installed and maintained smoke alarms provide an early warning signal to household members in the event that a fire occurs. Smoke alarms help save lives and property.

USFA continues to partner with other government agencies and fire service entities to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, disposal and storage, training bulletins, and public education and outreach materials is available at http://www.usfa.fema.gov/prevention/technology/smoke_fire_alarms.html.

Residential sprinkler systems help to reduce the risk of civilian and firefighter casualties, homeowner insurance premiums, and uninsured property losses. Yet many residences are unequipped with automatic extinguishing systems that are often installed 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 or facilitate use of sprinklers in all new homes, which could improve the use of residential sprinklers in the future. At present, however, they are largely absent in residences nationwide.[19]

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, 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 2011, 2012 and 2013. Only Version 5.0 data were extracted.

Civilian fatalities in residential building fires 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 (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 USFA. USFA is committed to providing the best and most currently available 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 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 16)," http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_and_national_estimates_methodology_vol16.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 or to comment on this report, visit http://www.usfa.fema.gov/contact.html.

Notes:

[1]In NFIRS Version 5.0, a structure is a constructed item of which a building is one type. In previous versions of NFIRS, the term "residential structure" commonly referred to buildings where people live. To coincide with this concept, the definition of a residential structure fire for NFIRS 5.0 has, therefore, changed to include only those fires where the NFIRS 5.0 Structure Type is 1 or 2 (enclosed building and fixed portable or mobile structure) with a residential property use. Such 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 estimate of fire deaths (http://www.nfpa.org/itemDetail.asp?categoryID=953&itemID=23033&URL=Research/Fire%20statistics/The%20U.S.%20fire%20problem). 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]Residential buildings include, but are not limited to, one- or two-family dwellings, multifamily dwellings, manufactured housing, boarding houses or residential hotels, commercial hotels, college dormitories, and sorority/fraternity houses.

[4]Fire department participation in 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 2011 to 2013, 68 percent of NFPA's annual average estimated 1,334,800 fires to which fire departments responded were captured in NFIRS. Thus, NFIRS is not representative of all fire incidents in the U.S. and is not a "complete" census of fire incidents. Although NFIRS does not represent 100 percent 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.

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

[6]National estimates are based on 2011-2013 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/data/statistics/order_download_data.html. Further information on 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 information on NFPA's survey methodology, see NFPA's report on fire loss in the U.S.: http://www.nfpa.org/~/media/Files/Research/NFPA%20reports/Overall%20Fire%20Statistics/osfireloss.pdf. In this topical report, fires are rounded to the nearest 100 and deaths to the nearest five.

[7]The average fire fatality rates computed from the national estimates do not agree with average fire fatality rates computed from NFIRS data alone. The fire fatality rate for fatal fires computed from national estimates is (1,000*(2,530/1,700)) = 1,488.2 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*(2,530/372,900)) = 6.8 deaths per 1,000 residential building fires.

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

[9]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 NFIRS, it is the time at which the fire was reported to the fire department.

[10]Caldwell, David S., "Smoke Inhalation and Your Body," ezinearticles.com, http://ezinearticles.com/?Smoke-Inhalation-and-Your-Body&id=4807600 (accessed April 7, 2015).

[11]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, http://www.usfa.fema.gov/downloads/pdf/nfirs/nfirs_data_analysis_guidelines_issues.pdf.

[12]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 analysis reflects only the 54 percent of incidents where enough information and detail were reported to determine the cause of the fatal fire.

[13]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 7, 2015).

[14]Abbotts, Chris, "Victim Identified in Deadly Anderson Co. Fire," www.counton2.com, March 31, 2015, http://www.counton2.com/story/28670566/victim-identified-in-deadly-anderson-co-fire (accessed April 7, 2015).

[15]Ledet, Blair, "Man Killed in Hudson-Area Home Fire," www.ktre.com, March 30, 2015, http://www.ktre.com/story/28651519/man-killed-in-hudson-area-home-fire (accessed April 7, 2015).

[16]Meyer, Holly, "Father, Daughter Killed in East Nashville Fire," www.tennessean.com, March 26, 2015, http://www.tennessean.com/story/news/local/davidson%20/2015/03/26/two-killed-east-nashville-fire/70475304/ (accessed April 7, 2015).

[17]Gushard, Keith, "Titusville Fire Victim May Have Died Trying to Reach Wheelchair," www.meadvilletribune.com, March 23, 2015, http://www.meadvilletribune.com/news/titusville-fire-victim-may-have-died-trying-to-reach-wheelchair/article_aa83672a-d160-11e4-974d-3f54f40d3699.html (accessed April 7, 2015).

[18]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.

[19]U.S. Department of Housing and Urban Development and U.S. Census Bureau, 2011 American Housing Survey, "Health and Safety Characteristics-All Occupied Units (National)," Table S-01-AO, http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2011_S01AO&prodType=table (accessed April 7, 2015).