

Civilian Fire Injuries in Residential Buildings (2012-2014)

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

- Seventy-eight percent of all civilian fire injuries occurred in residential buildings.
- Residential building fires resulting in injuries occurred most frequently in the late afternoon and early evening hours.
- January, at 10 percent, had the highest incidence of residential building fires resulting in injuries.
- Cooking was the leading reported cause of residential building fires that resulted in injuries.
- Of the civilian fire injuries that occurred in residential buildings, 35 percent resulted from trying to control a fire; an additional 26 percent occurred while the victim was attempting to escape.
- Smoke inhalation and thermal burns were the primary symptoms resulting in injury, accounting for 78 percent of all injuries resulting from residential building fires.
- The leading human factor contributing to injuries in residential building fires was being “asleep” (53 percent).
- Bedrooms (33 percent) were the leading specific location where civilian injuries occurred in residential building fires.

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. While the loss of our possessions can be upsetting, often far more devastating are the physical injuries and psychological impact that fires can inflict on our lives. It is a sad fact that each year, over 70 percent of all civilian fire injuries occurred as a result of fires in residential buildings — our homes.^{1, 2}

From 2012 to 2014, 78 percent of all civilian fire injuries occurred in residential buildings.³ This topical fire report focuses on the characteristics of these injuries as reported to the National Fire Incident Reporting System (NFIRS) from 2012 to 2014.⁴ NFIRS data is used for the analyses presented throughout this report.

Civilian fire injuries by definition involve people not on active duty with a firefighting organization who are injured as a result of a fire.⁵ These injuries generally occur from activities of fire control, escaping from the dangers of fire, or sleeping. Fires resulting in injuries are those fires where one or more injuries occur.

Annually, from 2012 to 2014, an estimated 12,525 civilian fire injuries resulted from an estimated 7,900 residential

building fires resulting in injuries and 377,900 total residential building fires.⁶ On average, every 42 minutes someone is injured in a residential building fire.

For the purpose of this report, the term “residential building fires resulting in injuries” is synonymous with “residential fires resulting in injuries” and the term “residential building fires” is synonymous with “residential fires.” The term “residential fires resulting in injuries” is used throughout the body of this report; the findings, tables, charts, headings and endnotes reflect the full category, “residential building fires resulting in injuries.”

Civilian Injury Rates for Residential Building Fires

Not all fires produce injuries. When civilian fire injuries were averaged over all reported residential fires, the overall injury rate was nearly three civilian injuries per 100 residential fires (Table 1).⁷ Residential fires that resulted in injuries, however, had 130 injuries for every 100 fires. Of the residential fires resulting in injuries, 82 percent resulted in one civilian injury, 13 percent resulted in two civilian injuries, and 6 percent resulted in three or more civilian injuries.⁸

Table 1. Civilian Injury Rates for Residential Building Fires per 100 Fires (2012-2014)

Injuries per 100 Injury-Producing Residential Building Fires	Injuries per 100 Residential Building Fires
129.6	2.7

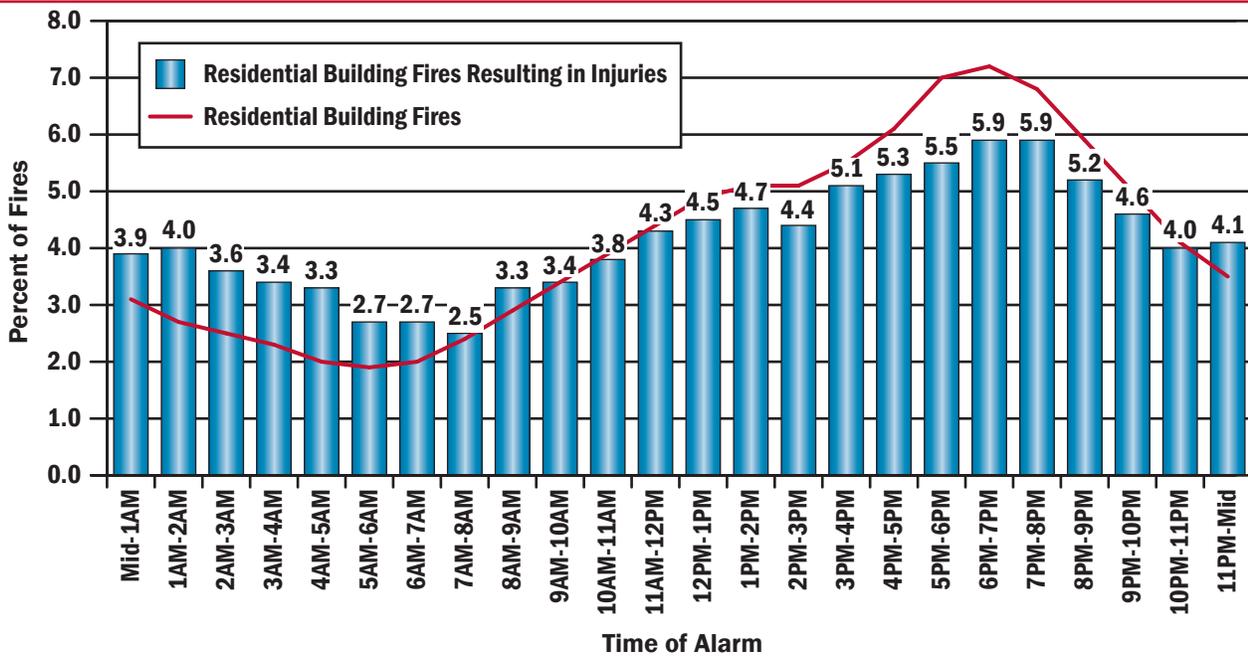
Source: NFIRS 5.0.

When Residential Building Fires Resulting in Injuries Occur

Residential fires resulting in injuries follow a daily pattern.⁹ In addition, unlike fatal residential fires, which occur more frequently in the late night and early morning hours,¹⁰ residential fires resulting in civilian injuries follow a pattern similar to that of all residential fires. As shown in Figure 1, residential fires resulting in injuries occurred most frequently in the late afternoon and early evening hours, when many

people are expected to be cooking dinner. The time period from 5 to 8 p.m. accounted for 17 percent of the residential fires resulting in injuries. Cooking, discussed later in the Causes of Residential Building Fires Resulting in Injuries section, was the primary cause (37 percent) for residential fires that resulted in injuries. In general, residential fires resulting in injuries decreased to the lowest point of the day, between 7 and 8 a.m., and then steadily increased during the daytime hours until reaching the daily peak.

Figure 1. Residential Building Fires Resulting in Injuries by Time of Alarm (2012-2014)



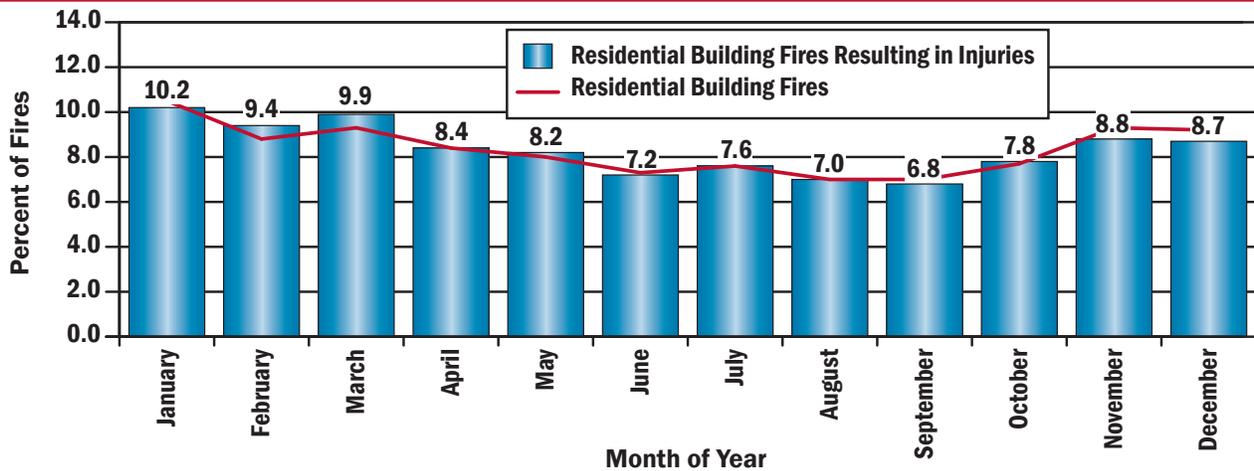
Source: NFIRS 5.0.

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

Residential fires resulting in injuries also follow a yearly pattern similar to that of all residential fires. In addition, residential fires resulting in injuries tended to follow a seasonal trend, with more fires taking place during the colder months than the warmer months (Figure 2). January, at 10 percent, had the highest incidence of residential

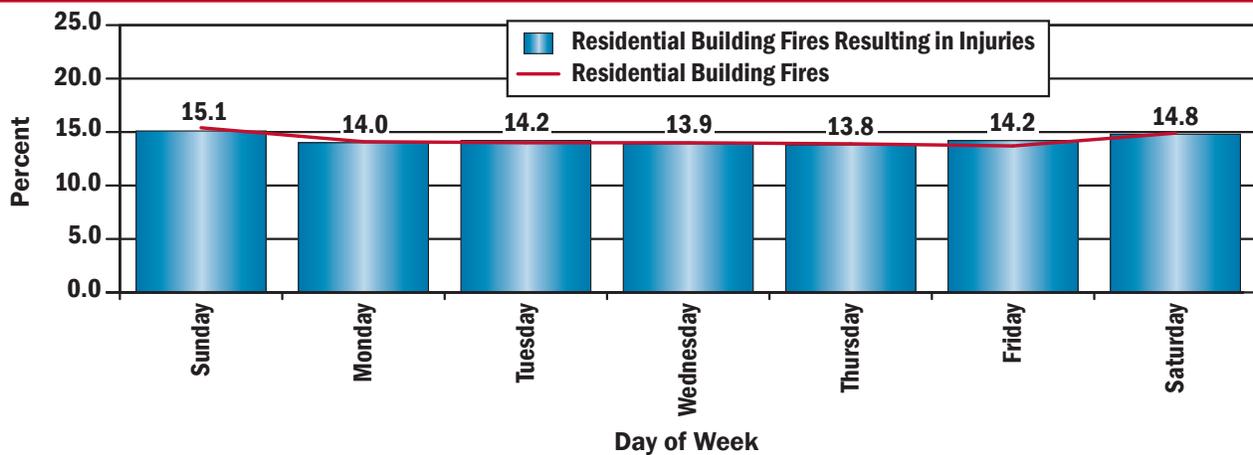
fires resulting in injuries. August and September had the least amount of residential fires resulting in injuries at 7 percent. This drop may be explained by a decrease in residential heating fires and their associated injuries during the warmer months.¹¹ Similar to all fires in residential buildings, residential fires resulting in injuries occurred most often on Saturdays and Sundays (Figure 3).

Figure 2. Residential Building Fires Resulting in Injuries by Month (2012-2014)



Source: NFIRS 5.0.

Figure 3. Residential Building Fires Resulting in Injuries by Day of Week (2012-2014)

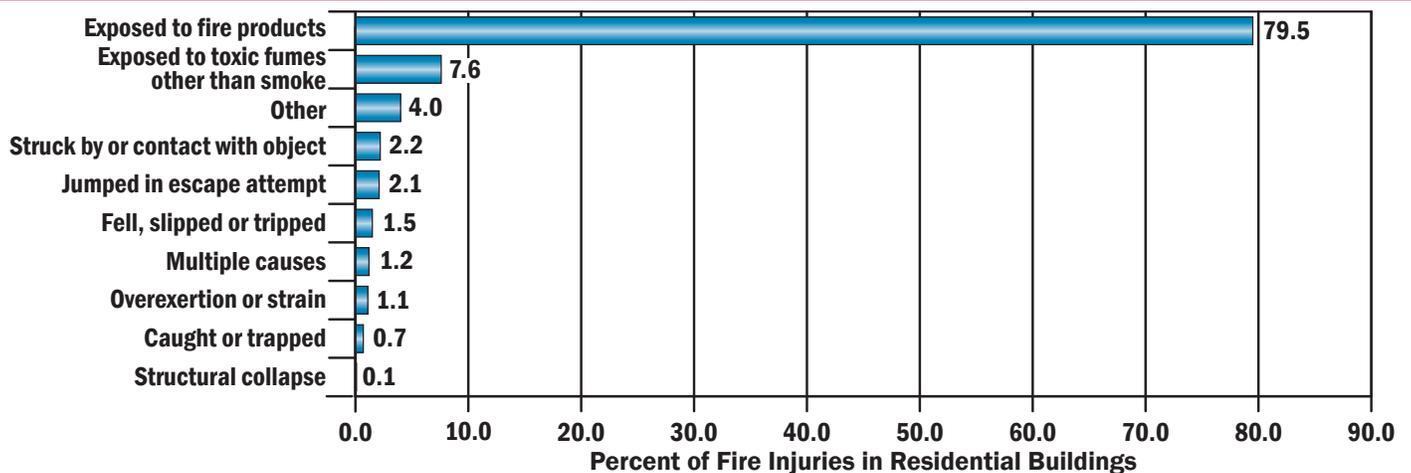


Source: NFIRS 5.0.

Cause of Injury

The predominant cause of residential fire injuries, by far, involved exposure to fire products (80 percent), such as flame, heat, smoke or gas (Figure 4). The next two leading causes were exposure to toxic fumes other than smoke (8 percent) and other, unspecified causes (4 percent).

Figure 4. Civilian Fire Injuries in Residential Buildings by Cause of Injury (2012-2014)



Source: NFIRS 5.0.

Note: Percentages computed for only those injuries where causes were specified. The cause of injury was specified in 71 percent of reported injuries.

Primary Symptoms of Civilian Fire Injuries

Smoke inhalation and thermal burns were the primary symptoms of reported injuries, accounting for 78 percent of all injuries resulting from residential fires (Figure 5). Smoke inhalation alone accounted for 41 percent of residential fire injuries. Thermal burns (as opposed to scalds or chemical or electrical burns) accounted for another 24 percent, and burns combined with smoke inhalation accounted for an additional 13 percent. Breathing difficulty was reported for only 6 percent of injuries. Scalds (4 percent) and cuts or lacerations (3 percent) accounted for an even smaller proportion of the injuries.

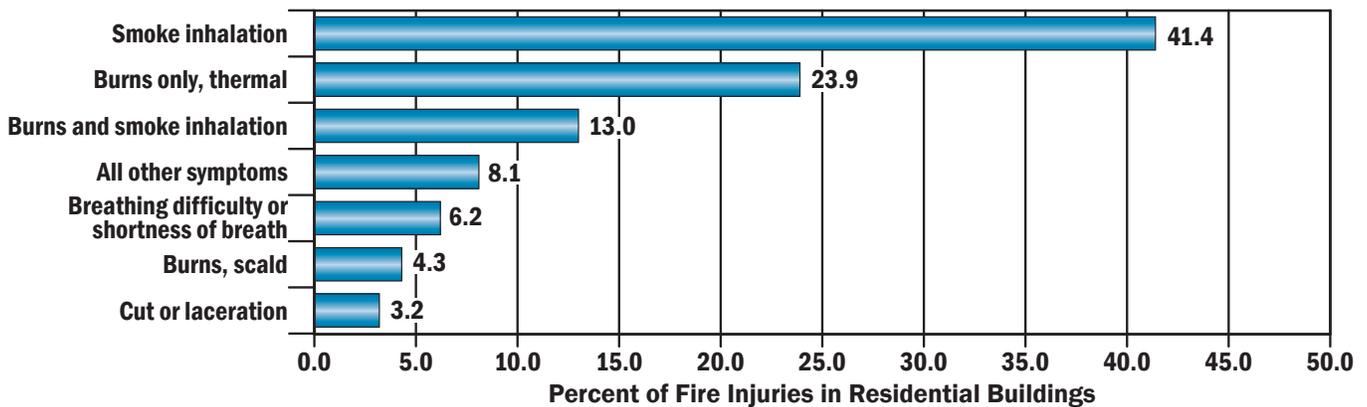
Thermal burns are caused by contact with flames, hot liquids, hot surfaces, and other sources of high heat. Of the

thermal burns to the body, 73 percent were to the upper and lower extremities (58 percent and 15 percent, respectively).

Of the smoke inhalation injuries, 70 percent were internal injuries, which are particularly critical, as they can lead to lung damage. The inflammation and damage caused by smoke inhalation to delicate breathing sacs in the lungs actually grow worse in the hours after the incident. A chest X-ray can look clear, and oxygen levels in the blood may appear normal in the first few hours after a fire. A day or two later, however, the victim can suddenly take a turn for the worse as the lungs become unable to properly exchange oxygen.¹²

Based on the severity of the injury, 59 percent of the civilian fire injuries in residential fires were deemed minor. Only 14 percent of the injuries were considered serious or life-threatening.

Figure 5. Civilian Fire Injuries in Residential Buildings by Primary Symptoms (2012-2014)



Source: NFIRS 5.0.

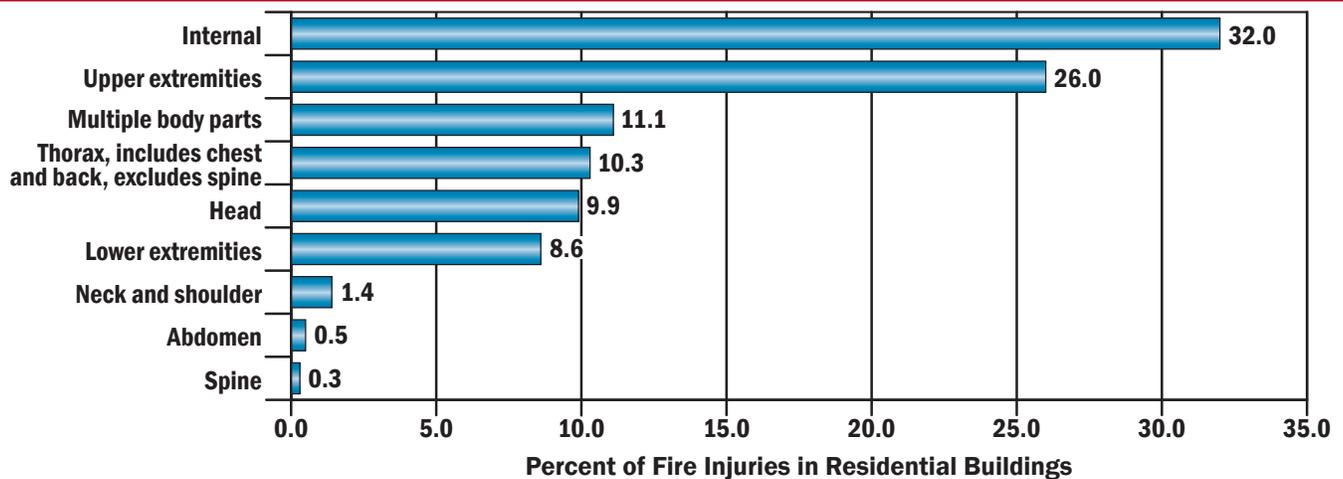
Notes: 1. Percentages computed for only those injuries where symptoms were specified. The primary symptoms were specified in 64 percent of reported injuries.
2. Total does not add up to 100 percent due to rounding.

Areas of the Body Affected

The body parts affected most by residential fire injuries (Figure 6) included internal parts (32 percent) and the

upper extremities (26 percent). As discussed, the types of injuries that affected most areas of the body consisted of smoke inhalation, thermal burns, or a combination of both.

Figure 6. Civilian Fire Injuries in Residential Buildings by Part of Body Injured (2012-2014)



Source: NFIRS 5.0.

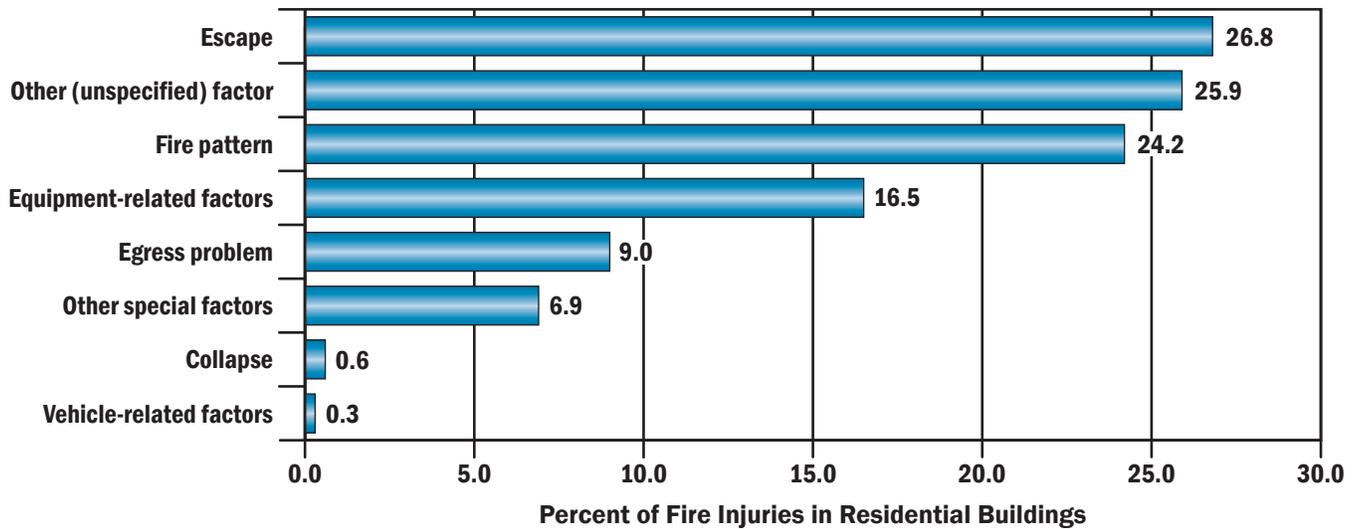
Notes: 1. Percentages computed for only those injuries where part of body injured was specified. The part of body injured was specified in 58 percent of reported injuries.
2. Total does not add up to 100 percent due to rounding.

Factors Contributing to Civilian Fire Injuries

As shown in Figure 7, the most notable factors contributing to civilian fire injuries (outside of “other (unspecified) factors”) involved escape (27 percent), fire pattern (24 percent), and equipment-related factors (17 percent). Escape factors include unfamiliarity with exits, excessive travel distance to the nearest clear exit, a choice of an

inappropriate exit route, re-entering the building, and clothing catching fire while escaping. Fire pattern factors involve such situations as exits are blocked by smoke and flame, vision is blocked or impaired by smoke, and civilians are trapped above or below the fire. Equipment-related problems include such factors as the improper use of cooking or heating equipment and the use of unvented heating equipment.

Figure 7. Factors Contributing to Civilian Fire Injuries in Residential Buildings (2012-2014)



Source: NFIRS 5.0.

Notes: 1. Includes incidents where factors contributing to injury were specified. Factors contributing to injury were specified in 31 percent of reported injuries.
2. As multiple factors contributing to injury may be noted for each injury, the total sums to more than 100 percent.

Human Factors Contributing to Civilian Fire Injuries

Human factors also play an important role in residential fire injuries. Table 2 shows that the leading human factor contributing to injuries was being “asleep” (53 percent).

This is not unexpected, as the largest number of injuries occurred in bedrooms (33 percent). “Possibly impaired by alcohol” (16 percent) was the second leading human factor contributing to injuries. This was followed by “unattended or unsupervised” individuals (11 percent) and people with “physical disabilities” (also 11 percent).

Table 2. Human Factors Contributing to Civilian Fire Injuries in Residential Buildings (2012-2014)

Human Factors Contributing to Injury	Percent of Fire Injuries in Residential Buildings (Unknowns Apportioned)
Asleep	52.7
Possibly impaired by alcohol	16.4
Unattended or unsupervised	11.3
Physical disabilities	10.6
Possibly impaired by other drug or chemical	9.0
Possible intellectual disabilities	7.7
Unconscious	5.3
Physically restrained	0.8

Source: NFIRS 5.0.

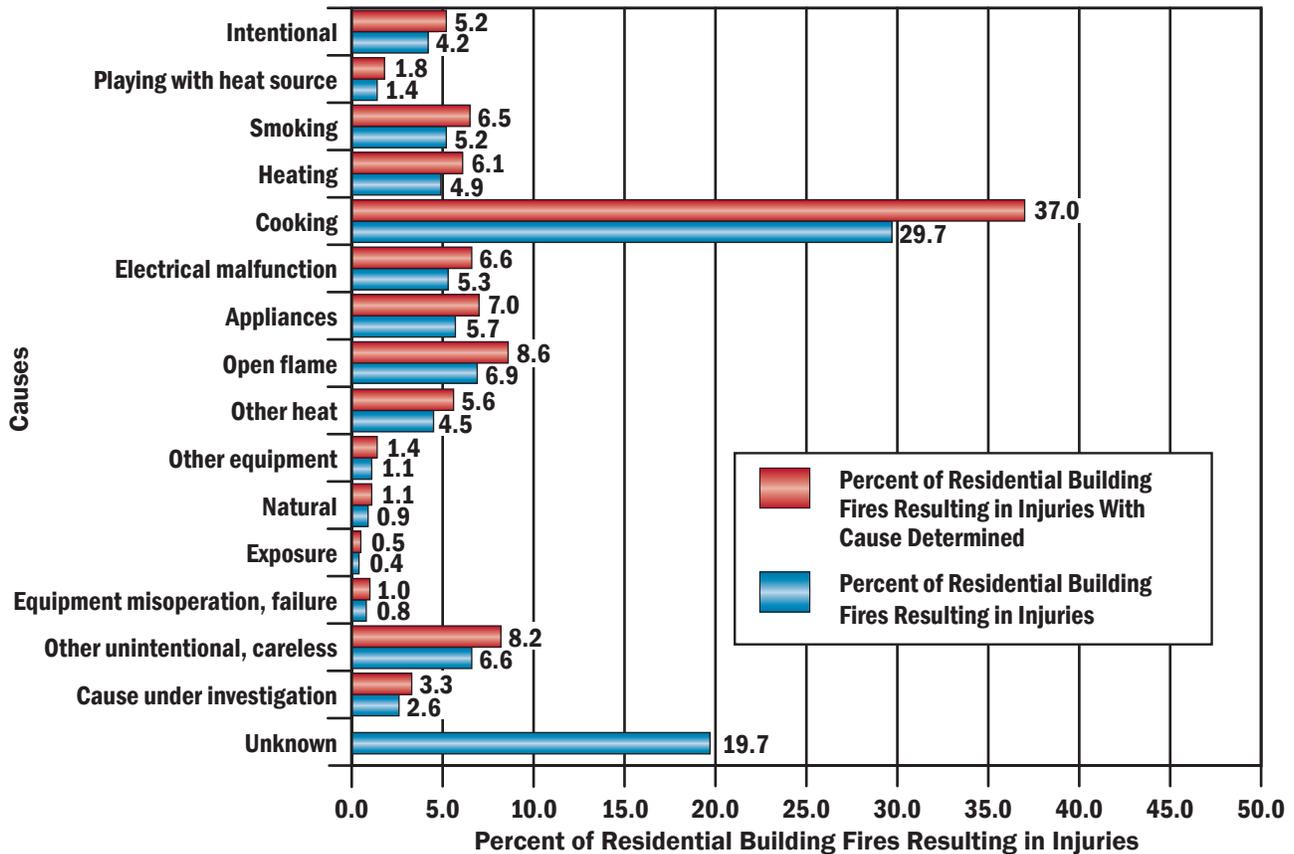
Notes: 1. Includes only incidents where human factors that contributed to the injury were specified. A human factor contributing to the injury was specified in 19 percent of reported injuries.
2. Multiple human factors contributing to the fire injury may be noted for each incident; total will exceed 100 percent.

Causes of Residential Building Fires Resulting in Injuries

As shown in Figure 8, “cooking” (37 percent) was the leading reported cause of residential fires that resulted in injuries.¹³ “Open flame” (9 percent) and “other unintentional, careless” actions (8 percent) were the next leading

causes. “Open flame” includes torches, candles, matches, lighters, embers and the like. “Other unintentional, careless” actions include misuse of material or product, abandoned or discarded materials or products, and heat source too close to combustibles. These two causes were followed by “appliances” (7 percent), “electrical malfunction” (7 percent) and “smoking” (also 7 percent).

Figure 8. Causes of Residential Building Fires Resulting in Injuries (2012-2014)



Source: NFIRS 5.0.

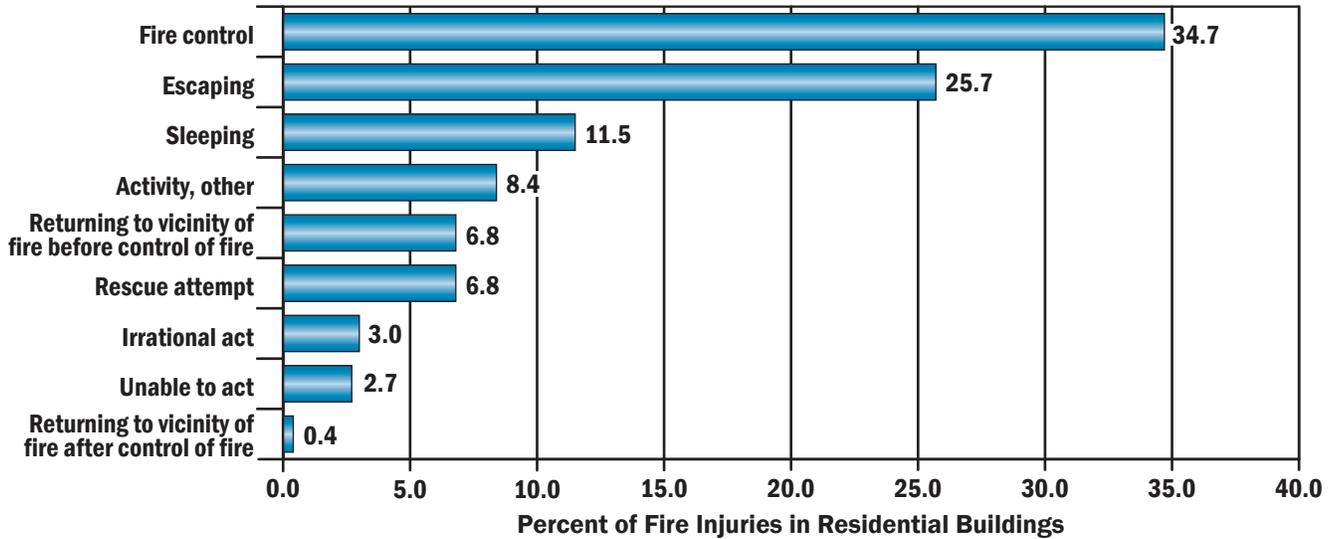
- Notes:
1. Causes are listed in order of the U.S. Fire Administration (USFA) Structure Fire Cause Hierarchy for ease of comparison of fire causes across different aspects of the fire problem. Fires are assigned to one of 16 cause groupings using a hierarchy of definitions, approximately as shown in 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.
 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. Total percent for each distribution of residential building fires resulting in injuries does not add up to 100 percent due to rounding.

Civilian Activity When Injured

Most civilian fire injuries occurred when the victim was attempting to control the fire (35 percent), followed by attempting to escape (26 percent) and sleeping (12 percent), as shown in Figure 9. USFA recommends leaving fighting a fire to trained firefighters and that efforts be focused on following a preset escape plan. 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 escaping without injuries 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.¹⁴

Figure 9. Civilian Fire Injuries in Residential Buildings by Activity When Injured (2012-2014)



Source: NFIRS 5.0.

Note: Percentages computed for only those injuries where activity information was available. The activity when injured was specified in 57 percent of reported injuries.

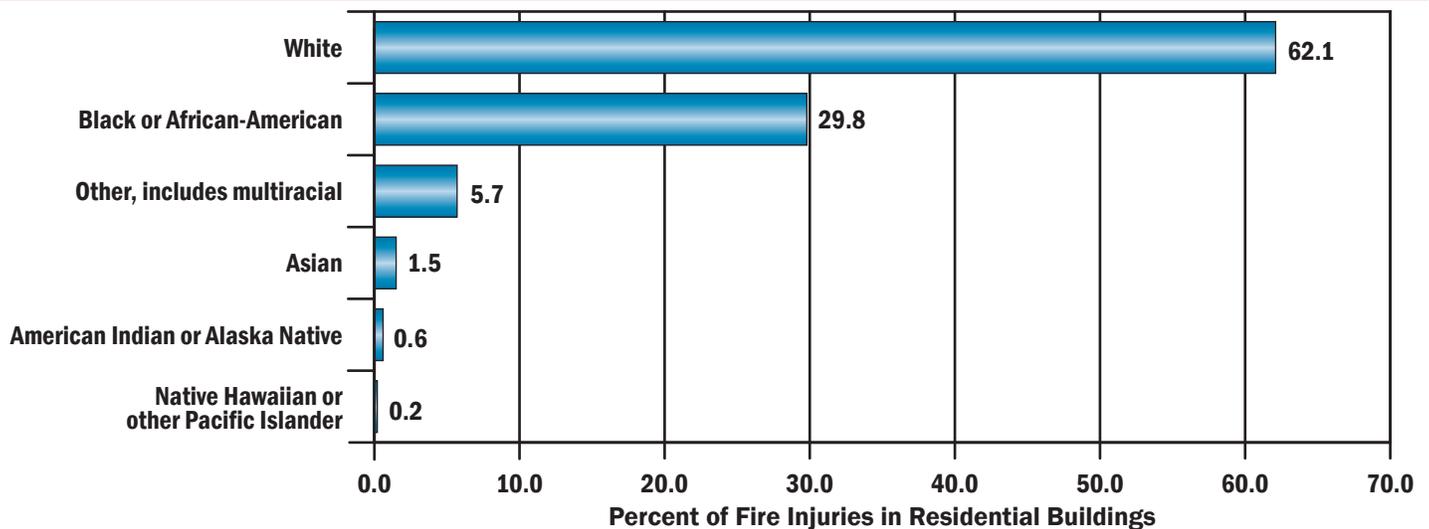
Gender, Race and Ethnicity of Civilian Fire Injuries

Males accounted for 53 percent and females accounted for 47 percent of residential fire injuries. Figure 10 shows the percentage distribution of civilian fire injuries by race. Where racial information was provided, whites constituted 62 percent of the injuries, followed by blacks

or African-Americans (30 percent); other, including multi-racial (6 percent); Asians (2 percent); American Indians or Alaska Natives (less than 1 percent); and Native Hawaiians or other Pacific Islanders (also less than 1 percent).

The ethnicity element shows that 87 percent of the injuries occurred to non-Hispanics or non-Latinos, compared to Hispanics or Latinos (13 percent). Ethnicity was specified for 40 percent of reported injuries.

Figure 10. Civilian Fire Injuries in Residential Buildings by Race (2012-2014)



Source: NFIRS 5.0.

Notes: 1. Percentages computed for only those injuries where race information was available. Race was specified in 54 percent of reported injuries.

2. Total does not add up to 100 percent due to rounding.

Age of Civilians Injured and Activity When Injured

Civilians between the ages of 20 and 49 accounted for 47 percent of injuries in residential fires (Figure 11). An additional 16 percent of those with injuries were less than 20 years old. Adults aged 50 and over accounted for the remaining 37 percent of those with injuries.

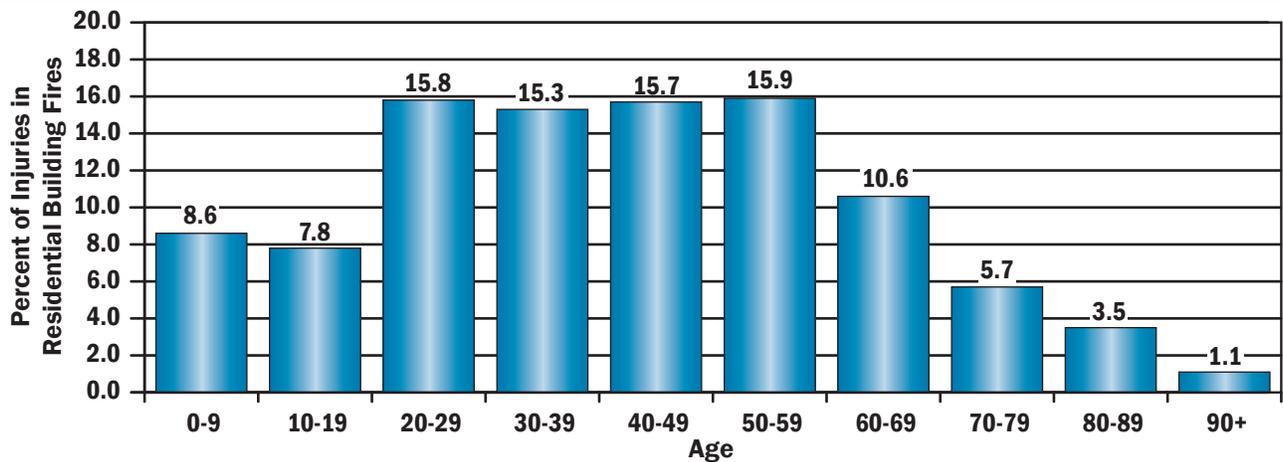
The first reaction of civilians of all ages is either to try to control or escape the fire (Table 3). At the time of injury, for those aged 10 and over, trying to control the fire and escaping were the two leading activities that resulted in injuries. Those aged 10-69 primarily got injured trying to

control the fire (38 percent), followed by trying to escape the fire (24 percent). Those aged 70 and over primarily got injured trying to escape the fire (34 percent), followed by trying to control the fire (22 percent).

For children aged 0-9, escaping and sleeping were the two leading activities that resulted in injuries. Those aged 0-9 primarily got injured when trying to escape the fire (40 percent), followed by sleeping (26 percent).

The young and the very old are less likely to be as mobile or ready to act in a fire situation. Infants, young children and older adults may require special provisions in a fire or emergency situation. Thus, it is not surprising that these individuals are less likely to attempt to control the fire.

Figure 11. Civilian Fire Injuries in Residential Buildings by Age Group (2012-2014)



Source: NFIRS 5.0.

Note: Percentages computed for only those injuries where age was valid. A valid age was provided for nearly all (99.8 percent) reported injuries.

Table 3. Leading Activities Resulting in Civilian Fire Injuries in Residential Buildings by Age Group (2012-2014)

Age Group	Percent of Fire Injuries Where Age and Activity Reported (2012-2014)		
	Fire Control	Escaping	Sleeping
0-9	8.2	39.7	26.2
10-19	37.2	28.6	10.2
20-29	41.6	23.9	8.4
30-39	43.3	20.7	8.2
40-49	39.2	21.0	10.9
50-59	35.2	24.0	11.7
60-69	28.7	27.7	12.1
70-79	23.4	33.6	13.8
80-89	21.2	34.5	11.9
90+	15.1	30.2	14.2
Overall	34.7	25.7	11.5

Source: NFIRS 5.0.

Note: Percentages computed for only those injuries where age was valid and activity was reported.

Specific Location at Time of Fire Injury

Bedrooms (33 percent) were the leading specific location where civilian fire injuries occurred in residential buildings (Table 4). Kitchens and cooking areas (11 percent) and family rooms and living rooms (tied at 11 percent) were the next leading specific locations.

While not specific rooms in the home, egress areas were the specific locations where 18 percent of fire injuries occurred. 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 Injuries in Residential Buildings (2012-2014)

Specific Location at Time of Injury	Percent (Unknowns Apportioned)
Bedrooms	32.8
Kitchens and cooking areas	10.6
Common room, den, family room, living room, lounge	10.6

Source: NFIRS 5.0.

Note: Percentages computed for only those injuries where the specific location at the time of injury was specified. The location was specified for 20 percent of reported injuries.

Examples

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

- April 2016: A man suffered an injury to his hand while trying to escape from a duplex fire in Hixson, Tennessee. Fire crews arrived at the scene just after 9 p.m. on Thursday to find the right side of the duplex engulfed in flames. The man was inside the home when he discovered the blaze. He was transported to a local hospital for treatment. No other injuries were reported. The cause of the fire is under investigation.¹⁵
- April 2016: One university student and a firefighter were injured as the result of a morning house fire in Providence, Rhode Island, that displaced seven students. The fire started on the first floor of the home and was reported shortly after 7 a.m. on Thursday. The fire caused significant damage to the building and spread to a nearby home. A male student was rescued from the second floor and transported to a local hospital, where he was treated for smoke inhalation injuries. The firefighter suffered minor injuries and was also transported to the hospital. The cause of the fire is under investigation, and it is unknown if the building had working smoke alarms.¹⁶
- March 2016: Three residents were injured in an apartment complex fire that broke out shortly before 2 a.m. in Houston, Texas. Two of the three people were hospitalized for the treatment of burn and smoke inhalation injuries. Each of the injured victims, a 13-year-old boy and two women, one believed to be in her 50s and the

other in her 60s, lived in separate units. Many of the victims were asleep when the fire started. Multiple units of the building were completely destroyed by the fire. The cause of the fire is under investigation, as arson investigators believe that a flammable liquid may have been used to start the fire.¹⁷

Escape Planning for Residential Buildings

Everyone should know how to escape from a burning home. USFA recommends leaving fighting a fire to trained firefighters. Instead, efforts should be focused 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.

Put working smoke alarms on every level of the home, as well as inside and outside of sleeping areas. Everyone should create a home escape plan and know two safe ways out of each room. 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. Practice the plan with everyone in the home at least two 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 35 years, partly due to new technologies to detect and extinguish fires. Smoke alarms are present in most homes. 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 do not have smoke alarms.¹⁸ 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.

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, 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 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.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 Injuries in Residential Buildings

Data for this report were extracted from the NFIRS annual Public Data Release files for 2012, 2013 and 2014. Only Version 5.0 data were extracted.

Civilian injuries in residential building fires are 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: 1 (minor), 2 (moderate), 3 (severe), 4 (life-threatening), and U (undetermined).
- Other civilian injuries: 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 17)," http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_and_national_estimates_methodology_vol17.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 injuries 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 injuries (<http://www.nfpa.org/research/reports-and-statistics/fires-in-the-us/overall-fire-problem/overview-of-the-us-fire-problem>). The consistency of the percentage of residential building fire injuries leads analysts to believe 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 2012 to 2014, 67 percent of NFPA's annual average estimated 1,304,300 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 In this topical report, fires are rounded to the nearest 100 and injuries to the nearest 25. National estimates are based on 2012-2014 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/research/reports-and-statistics/fires-in-the-us/overall-fire-problem/fire-loss-in-the-united-states>.

⁷ The average fire injury rates computed from national estimates do not agree with average fire injury rates computed from NFIRS data alone. The fire injury rate for fires with injuries computed from national estimates is $(100 * (12,525 / 7,900)) = 158.5$ injuries per 100 injury-producing residential building fires. The fire injury rate for all residential building fires computed from national estimates is $(100 * (12,525 / 377,900)) = 3.3$ injuries per 100 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 USFA, "Civilian Fire Fatalities in Residential Buildings (2012-2014)," Volume 17, Issue 4, July 2016, <http://www.usfa.fema.gov/downloads/pdf/statistics/v17i4.pdf>.

¹¹ USFA, "Heating Fires in Residential Buildings (2010-2012)," Volume 15, Issue 7, December 2014, <http://www.usfa.fema.gov/downloads/pdf/statistics/v15i7.pdf>.

¹² Ubelacker, Sheryl, "Doctors: Smoke inhalation victim can seem fine, go into lung failure suddenly," EMS Responder, October 2004, (Toronto, Canada), <http://www.emsworld.com/news/10341024/doctors-smoke-inhalation-victim-can-seem-fine-go-into-lung-failure-suddenly> (accessed April 27, 2016).

¹³ The USFA Structure Fire Cause Methodology was used to determine the cause of residential building fires resulting in injuries. 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.

¹⁴ 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 27, 2016).

¹⁵ "Man suffers injuries in duplex fire in Hixson," www.chattanooga.com, April 21, 2016, <http://www.chattanooga.com/2016/4/21/322645/Man-Suffers-Injuries-In-Duplex-Fire.aspx> (accessed April 27, 2016).

¹⁶ Caligiuri, Courtney and Nancy Krause, "Student, firefighter treated for minor injuries in morning fire," wpri.com, April 14, 2016, <http://wpri.com/2016/04/14/student-firefighters-receive-minor-injuries-in-morning-fire/> (accessed April 27, 2016).

¹⁷ Kallergis, Foti, "Three injured in early-morning apartment fire in SE Houston," abc13.com, March 26, 2016, <http://abc13.com/news/three-injured-in-early-morning-apartment-fire-in-se-houston-/1264007/> (accessed April 27, 2016).

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 21, 2016).