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Fire Risk in 2015

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

- Risk by age: In 2015, adults ages 50 or older had a greater relative risk of dying in fires than the general population. Those ages 85 and older had the highest risk of fire death. Adults ages 85 and older, as well as those ages 25 to 64, were also at greater risk of fire injury than the general population. In addition, while lower than the relative risk of the general population, children ages 4 and younger faced an elevated risk of both injury and death in a fire when compared with older children (ages 5 to 14).
- Risk by gender: Males were 1.7 times more likely to die in fires than females.
- Risk by race: African-Americans and American Indians/Alaska Natives were at a greater relative risk of dying in a fire than the general population.
- Risk by region: The relative risk of dying in a fire for people living in the South was higher than for populations living in other regions of the United States.

The risk of death or injury from fire is not the same for everyone. In 2015, 3,360 deaths and 15,700 injuries in the U.S. were caused by fires.[1] These casualties were not equally distributed across the U.S. population, and the resulting risk of death or injury from fire is not uniform — it is more severe for some groups than for others.[2] Much can be learned from understanding why different segments of society are at a heightened risk from the fire problem. This topical fire report explores fire risk as it applies to fire casualties in the U.S. population and is an update to "Fire Risk in 2014," Volume 17, Issue 7.

Risk is a factor, element or course of action involving uncertainty. It is an exposure to some peril, and it often implies a probability of occurrence, such as investment risk or insurance risk. In terms of the fire problem, risk is the potential for injury to or death of a person, or damage to or loss of property, as a result of fire.

This topical report focuses on how fire risk, specifically the risks of death and injury, varies with age, and how other demographic and socioeconomic factors weigh upon that risk.

Per capita rates, risk and fire casualties

When determining fire risk, geographic, demographic and socioeconomic factors all come into play. People in the South and Midwest, the poor, and adults ages 50 or older were all at a higher risk of dying in a fire than the general population. Although their risk of fire death and injury was less than the general population, the very young (ages 4 or younger) were also at a higher risk of fire death and injury when compared to older children. Males, African-Americans, and American Indians/Alaska Natives also had a higher risk of death from fire than the population as a whole. These groups remained at a higher risk despite considerable long-term reductions in fires and fire casualties.

Fire casualties across population groups can be assessed in several ways. The simplest method is to look at the distribution of the numbers of deaths or injuries across the factor of interest. For example, in the case of race

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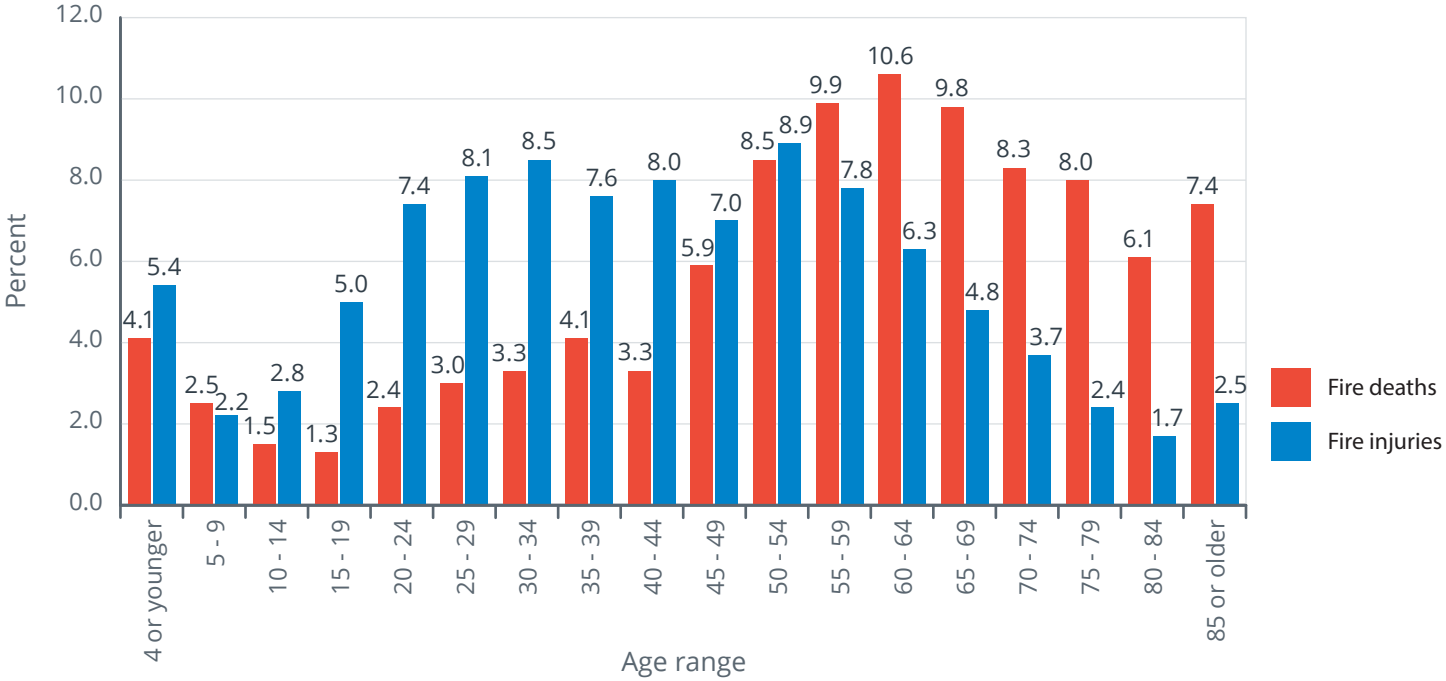
in 2015, the number of fire deaths was greatest for white Americans and least for American Indians/Alaska Natives. In the case of age, percentages of fire deaths were greatest for those ages 55 to 69, while 63 percent of fire injuries occurred among adults ages 20 to 59 (Figure 1).

Figure 1. Percentage of fire deaths and injuries by age in 2015



Sources: 2015 National Center for Health Statistics (NCHS) Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program, and 2015 National Fire Incident Reporting System (NFIRS) fire injury data.

Note: Data have been adjusted to account for deaths and injuries with unknown age. Age was specified in 99.9 percent of fire deaths, and age was specified in 99.8 percent of reported fire injuries. The total percentage of fire injuries does not add up to 100 percent due to rounding.

Although these findings are informative, they do not account for differences in the basic population groups under comparison. In the case of age, as an age group matures, its population of individuals decreases as a result of deaths. In the case of race for populations living in the U.S., there are far fewer American Indians/Alaska Natives, for example, than white Americans. As a consequence, it is possible for an age group to have greater (or fewer) injuries or deaths because the sheer number of individuals who can be injured is larger (or smaller) than that of other groups.

To account for population differences such as these, per capita rates are used. Per capita rates use a common population size, which then permits comparisons between different groups.[3] Perhaps the most useful way to assess fire casualties across groups is to determine the relative risk of death or injury. Relative risk compares the per capita rate for a particular group (e.g., females) to the overall per capita rate (i.e., the general population). For the general population in the U.S., the relative risk is set at 1.

From this report, in 2015, the relative risk of dying in a fire for the total population of females in comparison to the total population was 0.7. This is equivalent to the per capita fire death rate for females (7.8 deaths per million population), divided by the per capita fire death rate for the entire population (10.5 deaths per million population[4]). Thus, the relative risk of a female dying from fire was 30 percent less than that of the total population.

Data sources and methodology

The findings pertaining to deaths in this report were taken from the 2015 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. For each reported death certificate in the U.S., NCHS assigned International Classification of Disease (ICD) codes for all reported conditions

leading to death. For this report, the following ICD codes were analyzed: F63.1, W39-W40, X00-X06, X08-X09, X75-X76, X96-X97, Y25-Y26 and Y35.1.[5] These codes include all deaths in which exposure to fire, fire products, or explosion was the underlying cause of death, or a contributing factor in the chain of events leading to death. Only deaths where age was specified were used in the analyses in the relative risk tables; age was specified in 99.9 percent of fire deaths in 2015.

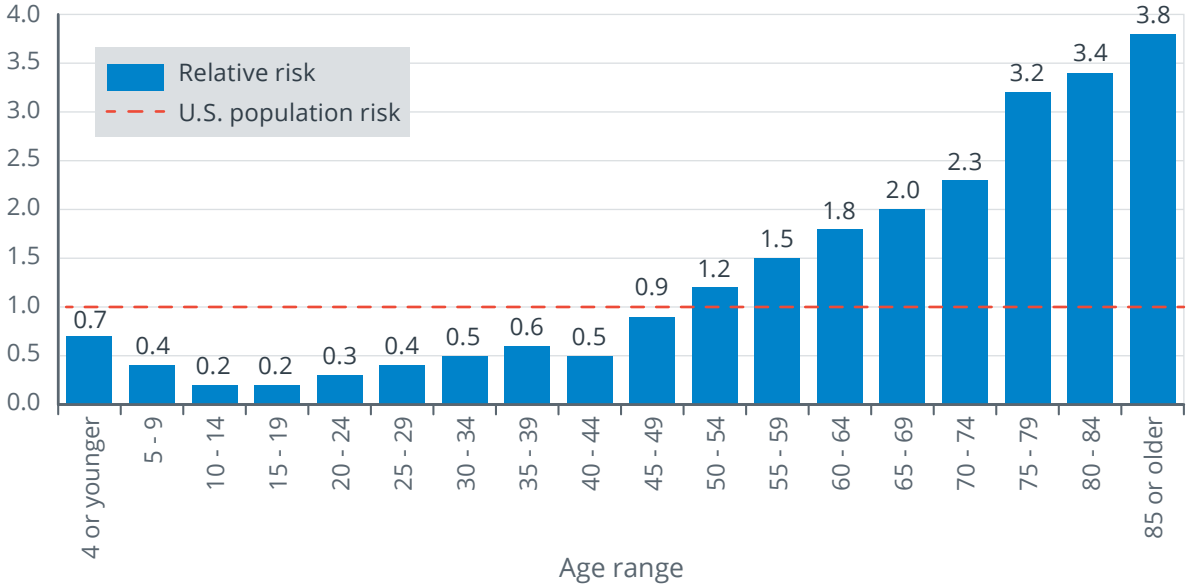
Further, the latest NCHS mortality data available at the time of analyses were from 2015. For this reason, all analyses in this report reference 2015 data for consistency.

Fire injury estimates in this report are based on civilian fire injury data from the 2015 NFIRS and the 2015 National Fire Protection Association's (NFPA's) Survey of Fire Departments for U.S. Fire Experience. By definition, in the NFIRS, civilian fire injuries involve people who are injured as a result of a fire and are not on active duty with a firefighting organization. Civilians also include emergency personnel who are not members of the fire department, such as police officers or utility workers. Fire injuries generally occur from activities of fire control, escaping from the dangers of fire, or sleeping.[6]

Age and risk of fire casualty

When physical and cognitive abilities are limited, as is often the case for the elderly, the risk of death from fire rises. In 2015, older adults (ages 65 or older) experienced large numbers of fire deaths that occurred in a small population group. As a result, the risk of dying in a fire for these older adults was 2.7 times higher than for the population as a whole and rose even more for the oldest segments (Figure 2). The oldest adults, those ages 85 and older, had a risk of dying in a fire that was 3.8 times higher than for the general population. For the youngest, children ages 4 or younger, the risk of fire death was 30 percent less than that of the general population. But the risk of death for this age group was greater than for older children, because as they mature and their cognitive and social abilities develop, the risk of fire death drops sharply. For those ages 10 to 14, the risk of fire death was 80 percent less than that of the general population and remained the same for 15- to 19-year-olds. After age 19, the risk of fire death began to steadily increase. By age 50, in 2015, the risk of fire death was above the risk for the population as a whole and continued to increase as the population aged. Although the overall numbers change, these profiles have remained relatively constant from year to year, according to the NCHS and U.S. Census Bureau data. The fire risk to children and older adults will be discussed in more detail in later sections of this report.

Figure 2. Relative risk of fire death by age in 2015

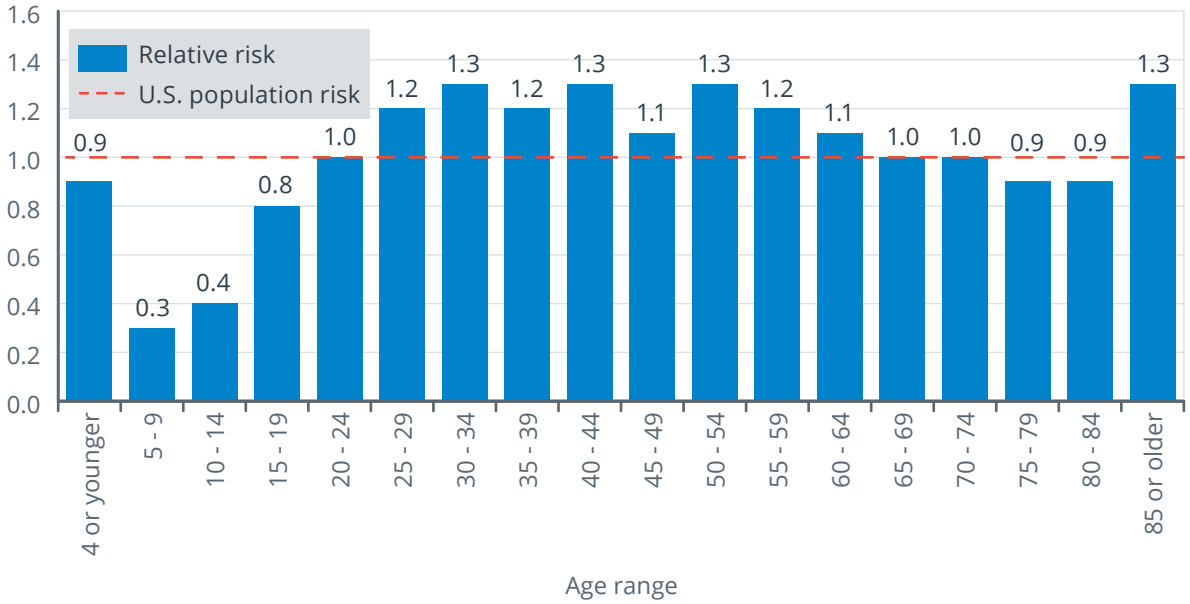


Sources: 2015 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program and U.S. Census Bureau population estimates.

Note: Data have been adjusted to account for deaths with unknown age. Age was specified in 99.9 percent of fire deaths.

In general, the age profile of risk for fire injuries was different than that for deaths (Figure 3), with a more narrow range of risk quotients (0.3 to 1.3 for fire injuries versus 0.2 to 3.8 for fire deaths).[7] This difference is thought to be the result of both cognitive and mobility issues that affect older adults. As a result, most older adults were generally less likely to escape the effects of fire and more likely to suffer fatal injuries. In fact, older adults ages 65 to 84 had a relative risk of fire injury at or below the risk of the general population. Adults ages 85 or older, however, had 30 percent more risk of injury from fire than the general population. In 2015, the relative risk of fire injury was also greater for 25- to 64-year-olds than for the general population (Figure 3). The risk of injury was below average for children and adults younger than 20. In addition, while less than the total population, children ages 4 and younger had a greater relative risk of injury from fire than older children (ages 5 to 14).

Figure 3. Relative risk of fire injury by age in 2015



Sources: 2015 NFIRS fire injury data, 2015 NFPA fire injury estimates, and U.S. Census Bureau population estimates.
Note: Data have been adjusted to account for injuries with unknown age. Age was specified in 99.8 percent of reported fire injuries.

Other factors that influence risk

In the U.S. Fire Administration (USFA) report "Socioeconomic Factors and the Incidence of Fire,"[8] socioeconomic studies show an inverse relationship between fire risk and income. The poorer population groups have the highest risk of fire injury or death, while the wealthiest have the lowest. Many older adults live alone on meager incomes, often in substandard housing.[9] Closely tied to income is level of education. Numerous studies, including those associated with the No Child Left Behind legislation, have demonstrated that groups living in persistent poverty — that is, with income levels below the poverty line for long periods of time — score poorly in educational testing, have higher high-school dropout rates, and have reduced employment opportunities. Further, research shows that fire death rates are higher in states with larger percentages of people who are African-American, poor and smokers; have less formal education; and live in rural areas. Many of these states tend to be in the southeastern U.S.[10]

Geographic location also affects risk. The risk of dying in a fire was greatest for people living in the South when compared to populations living in other regions (Table 1).[11] This, in part, may be attributed to the intermittent need for occasional heating. Rather than including central heating systems, as in northern areas, many households in the South use portable heating devices, which may be more likely to lead to a fire problem. In addition, people living in the Midwest had a greater risk of dying in a fire than the general population — though less than in the South. Conversely, the West had a much lower risk of fire death. This reduction may be due, in part, to the role of heating (or lack thereof) in fire deaths, housing stock characteristics, and other factors.

Table 1. Relative risk of fire death by geographic region in 2015

Region	Population	Fire deaths	Death rate (per million population)	Relative risk
Northeast	56,184,737	521	9.3	0.9
Midwest	67,838,387	813	12.0	1.1
South	121,039,206	1,512	12.5	1.2
West	75,834,288	516	6.8	0.6
U.S. overall	320,896,618	3,362	10.5	1.0

Sources: 1. 2015 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program.
2. U.S. Census Bureau, Population Division. July 1, 2015, population estimates from Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010, to July 1, 2016 (NST-EST2016-01). Release date: December 2016.

Note: Relative risk may not compute due to rounding.

Like age, gender plays a role in the risk of death or injury from fire. For all age groups and race categories, males were more likely to die in a fire-related incident than females (Table 2, Table 4 and Table 6). Overall, in 2015, males were 1.7 times more likely to die in fires than females (Table 2). This is an increase from 2014 when males were 1.5 times more likely to die in fires than females. Data from the NFIRS and the NFPA showed that males, overall, were about 1.6 times more likely to suffer injuries than their female counterparts.[12]

Race,[13] which may be related to societal factors, cannot be ignored. African-Americans and American Indians/Alaska Natives had higher fire death rates per capita than the national average. African-Americans constituted a large and disproportionate share of total fire deaths, accounting for 21 percent of fire deaths in 2015, but only 13 percent of the U.S. population.[14] In 2015, African-Americans had a 60 percent greater risk of dying in a fire than the general population. Although this was 10 percent higher than in 2014, this risk is down from 80 percent more risk in 2007. For American Indians/Alaska Natives, in 2015, the relative risk was 40 percent higher than the risk of the general population, a decrease from 2014 when their risk was 50 percent higher. By contrast, Asian/Pacific Islander Americans were 60 percent less likely to die in a fire than the overall population.

Table 2. Relative risk of fire death by race and gender in 2015, overall population

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Total	320,896,618	3,362	10.5	1.0
Male	157,960,035	2,083	13.2	1.3
Female	162,936,583	1,279	7.8	0.7
White	247,543,007	2,532	10.2	1.0
African-American	42,574,478	692	16.3	1.6
American Indian/Alaska Native	4,005,645	59	14.7	1.4
Asian/Pacific Islander	18,540,360	79	4.3	0.4
White male	122,642,690	1,566	12.8	1.2
African-American male	20,377,675	425	20.9	2.0
American Indian/Alaska Native male	2,020,628	44	21.8	2.1
Asian/Pacific Islander male	8,856,259	48	5.4	0.5
White female	124,900,317	966	7.7	0.7
African-American female	22,196,803	267	12.0	1.1
American Indian/Alaska Native female	1,985,017	15	-	-
Asian/Pacific Islander female	9,684,101	31	3.2	0.3

Source: See notes at the end of the report.

Notes:
1. The overall male and female estimates include individuals with "2+ races" per the census. The "2+ races" category accounts for 2.6 percent of the population. The NCHS does not include this race category. Thus, the population estimates for the individual race categories will not sum to the total population estimate. Relative risk may not compute due to rounding.
2. Because they are considered highly variable, fire death rates and relative risk were not computed when there were fewer than 20 deaths per category.

Fire risk to children in 2015

While the relative risk of death or injury from fire for children under age 15 was lower than the general population, the very young will always remain inherently vulnerable for a variety of reasons. Escaping from a fire can be difficult for children. A child age 4 or younger is usually too young to independently escape from a fire. Children this age generally lack the mental faculties to understand the need and the means of quickly escaping from a burning structure. Even in their own homes, very young children lack an understanding of how to escape.

Physiologically, young children are susceptible to severe injury or death from fire. A young child's skin is quite thin and delicate compared with that of adults and older children. As a result, young children suffer burns more quickly and deeper than adults.[15,16] In addition, smoke inhalation from the toxic gases released by fires (and often in conjunction with burns suffered in the fires) accounted for 79 percent of all reported fire deaths in 2015. Young children (ages 4 or younger) were also susceptible to this danger. Smoke inhalation accounted for 82 percent of fire deaths to children ages 4 or younger.[17]

In addition to not recognizing the danger, young children are curious and will touch and manipulate most items left within their reach. This includes matches, cigarette lighters, candles, stoves and fireworks — all items that will readily harm a young child. In 2015, children ages 9 or younger accounted for 26 percent of casualties where the cause of the residential building fire was due to "playing with a heat source," which includes matches and lighters.[18,19]

The home can potentially be a high-risk environment for the occurrence of child fire injuries and deaths. The majority of casualties to children under the age of 15 — 80 percent of fatalities and 81 percent of injuries — occurred in residential buildings in 2015.[20] Inside these residences, smoke alarms are credited with saving thousands of lives each year. Some studies, however, have questioned the efficacy of these alarms to alerting children. According to

research conducted in Australia and Canada in the late 1990s, sleeping children do not respond appropriately to smoke alarms. A group of Australian researchers found that the risk factor changed when there was an adult around to wake the children, but many of the children remained groggy for some time and had slowed responses.[21] Further studies have shown an increased response to alarms that use parental voices in lieu of the standard tone alarm.[22] While a limited number of voice-recordable alarms are available on the market, experts note that having a family fire and emergency exit plan is critical to saving lives in a fire.

In 2015, 270 children younger than age 15 died as a result of fires (Table 3).[23] These children accounted for 8 percent of fire deaths. The youngest children were especially hit hard — 51 percent of child fire deaths affected children ages 4 or younger. For children younger than age 15, in 2014, exposure to smoke and fire was the second-leading specific cause of nontransportation accidental deaths (after drowning).[24]

In addition, in 2015, fire injuries affected an estimated 1,625 children.[25] Again, the youngest suffered a large share of injuries — 52 percent of child fire injuries occurred to children ages 4 or younger. As in previous years, fire deaths declined with increasing age. Fire injuries, however, declined sharply between the young preschoolers (ages 4 or younger) and the younger school-aged children (ages 5 to 9), but rose for older children (ages 10 to 14). With these three age groups combined, children accounted for 10 percent of all fire injuries. This profile of deaths and injuries of children ages 14 and younger in 2015 is comparable to the profile of child fire deaths and injuries in 2011, 2013 and 2014.[26]

Table 3. Child fire deaths and injuries in 2015

	Overall (ages 0 to 14)		Ages 0 to 4		Ages 5 to 9		Ages 10 to 14	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Deaths	271	100.0	137	50.6	83	30.6	51	18.8
Injuries	1,626	100.0	851	52.3	341	21.0	434	26.7

Sources: 2015 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program; 2015 NFIRS fire injury data; and 2015 NFPA fire injury estimates.

In determining fire risk, age, gender and socioeconomic factors of children and the households where they live also come into play, as they do for the total population. Because the numbers of fire deaths decreased as the age of the child increased, the likelihood of dying in a fire also decreased (Table 4). In 2015, as previously discussed, children ages 4 or younger had 30 percent less risk of dying in a fire than the general population. These children, however, had a higher risk of dying in a fire than older children. In fact, the relative risk of dying in a fire for children ages 5 to 9 was 60 percent less than that of the general population. By the time a child reached the 10 to 14 age group, the relative risk of dying in a fire dropped to 80 percent less than that of the general population.

Overall, boys tended to be at a greater risk than girls. In addition, African-Americans constituted a large and disproportionate share of total fire deaths, accounting for 33 percent of fire deaths among children in 2015 but only 15 percent of the population. Moreover, African-American children ages 4 or younger still had a relative risk of dying that was 1.6 times higher than the general population and 2.4 times higher than for all children in that age group.

Socioeconomic factors also have an effect on the fire risk to the youngest and most dependent children. The danger of death or injury is closely tied to household income, and children in the poorest homes are exposed to the greater risk. A number of factors contribute to this elevated threat: the poor often live in substandard housing in crowded conditions. These children are more likely to be left alone than in affluent households, often because many of these children live in single-parent households where there are more children to supervise.[27]

Table 4. Relative risk of child fire deaths by age, race and gender in 2015 (ages 0 to 14)

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
All children (ages 0 to 14)				
Total	60,999,208	271	4.4	0.4
Male	31,147,323	153	4.9	0.5
Female	29,851,885	118	4.0	0.4
White	44,246,390	170	3.8	0.4
African-American	9,187,099	89	9.7	0.9
American Indian/Alaska Native	973,967	5	-	-
Asian/Pacific Islander	3,318,299	7	-	-

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Ages 0 to 4				
Total	19,912,499	137	6.9	0.7
Male	10,180,651	72	7.1	0.7
Female	9,731,848	65	6.7	0.6
White	14,291,392	81	5.7	0.5
African-American	3,033,119	50	16.5	1.6
American Indian/Alaska Native	320,478	4	-	-
Asian/Pacific Islander	1,085,504	2	-	-

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Ages 5 to 9				
Total	20,481,130	83	4.1	0.4
Male	10,455,213	47	4.5	0.4
Female	10,025,917	36	3.6	0.3
White	14,806,224	54	3.6	0.3
African-American	3,098,510	26	8.4	0.8
American Indian/Alaska Native	330,805	0	-	-
Asian/Pacific Islander	1,112,450	3	-	-

Table 4. Relative risk of child fire deaths by age, race and gender in 2015 (ages 0 to 14) — continued

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Ages 10 to 14				
Total	20,605,579	51	2.5	0.2
Male	10,511,459	34	3.2	0.3
Female	10,094,120	17	-	-
White	15,148,774	35	2.3	0.2
African-American	3,055,470	13	-	-
American Indian/Alaska Native	322,684	1	-	-
Asian/Pacific Islander	1,120,345	2	-	-

Source: See notes at the end of the report.

Notes:
1. The overall male and female estimates include individuals with "2+ races" per the census. The "2+ races" category accounts for 2.6 percent of the population. The NCHS does not include this race category. Thus, the population estimates for the individual race categories will not sum to the total population estimate. Relative risk may not compute due to rounding.
2. Because they are considered highly variable, fire death rates and relative risk were not computed when there were fewer than 20 deaths per category.

Fire risk to older adults in 2015

To be elderly is, in itself, a disadvantage in terms of fire risk. With advancing age, physical and mental capabilities decline, making it more difficult for older adults to clearly see, smell and hear. Decreased senses increase the risk of death or injury from fire. When two or more senses are diminished, the fire risk for an individual dramatically increases. To compound this problem, older adults are more inclined to accidentally start a fire than younger adults. Oftentimes, older adults are close to the source of a fire — a cooking fire or a cigarette fire — and their clothes or bedding ignites. Because the aging process affects the senses, older adults typically have diminished sensation to pain, and thus they often do not seek timely treatment. All of these factors combine to increase the risk of death from fire for older adults.

Older people also tend to have physical disabilities or ailments that hinder their mobility. Many are wheelchair users. Such infirmities make it difficult for older adults to react to a fire threat the way a younger adult could, and thus they exacerbate the fire risk to this segment of the population. Alzheimer's, dementia and other disorders that affect mental functions (rational thought and actions) can increase the fire risk through erratic or even dangerous behavior and the inability to recognize a hazard.

Adults ages 65 or older accounted for more than one-third of total outpatient spending on prescription medications in this country.[28] Moreover, 91 percent of older adults (65 or older) used at least one prescription drug in the past 30 days, while 41 percent of older adults concurrently used five or more prescriptions.[29] Some medications cause drowsiness or affect judgment; others do not combine well with alcohol. This latter observation is important, as alcohol use is prevalent among older adults. According to the National Survey on Drug Use and Health, 42 percent of adults ages 65 or older reported current use of alcohol (at least one drink in the past 30 days) in 2013.[30] Further, 30 percent of those ages 75 or older would consider themselves "current regular" drinkers, having had at least 12 drinks in the past year.[31] Alcohol alone can impair mental acuity, and older adults who combine medications and alcohol, or who abuse alcohol, face an even higher risk of starting a fire, not responding quickly enough to extinguish one, or not escaping the premises where a fire is in progress.

Older adults often elect to remain at home rather than confront long-term stays in health care facilities. Of home health care patients, 83 percent are ages 65 or older.[32] Home health care for older adults is accompanied by an elevated fire risk. While no one factor is solely responsible for the increased fire risk to older adults receiving home health care, smoking in the presence of oxygen is recognized as one important problem.

In addition, as they age, Americans may be more likely to live in assisted living and nursing facilities than nursing homes. In 2010, 3.5 percent of people 65 years or older lived in nursing facilities,[33] and that number may rise as people grow even older. For each year, from 2012 to 2014, an estimated 2,700 nursing home fires were reported to fire departments in the U.S.[34]

When poverty and infirmity accompany old age, the fire risk is compounded. Older adults often live on fixed incomes. Older adults who reside alone live in poverty more often than those who live with a spouse or other people. Many in this category are women who have outlived their husbands. In 2015, 9 percent of older adults lived below the poverty level.[35]

Housing for the poor is often substandard. Typically, such housing has not been well-maintained. Building structures can be compromised, and building systems, such as electrical and mechanical, are often outdated, inadequate or not operational. The result is a higher likelihood of damaged or fraying electrical wiring, faulty heating, and worn-out household appliances. Heating in particular represents an elevated fire danger to older adults, who frequently feel cold. When the central heating source of a home does not work properly, older adults will often rely on temporary sources of heat, such as portable space heaters, fireplaces or even cooking ovens. This problem is especially severe in southern locales, which experience only intermittent demands for heating. Indeed, many residences in the South do not have central heating, and occupants are forced to rely solely on alternative heating.

Smoke alarms have saved many lives since the mid-1970s when their use was widely encouraged for the first time. The number of older adults living in housing without smoke alarms, or with alarms that do not work, is not well-documented. Nonetheless, even in homes with operable smoke alarms, older adults with impaired hearing are at an elevated risk of not responding in a timely manner.

In 2015, 1,330 older adults ages 65 or older died as a result of fires (Table 5).[36] These adults accounted for 40 percent of all fire deaths. However, older adults constituted only 15 percent of the U.S. population in 2015,[37] and their ranks are growing. It is estimated that the older population will rise sharply between now and 2030 — the years when the baby-boomer generation will be in retirement. By 2030, the U.S. Census Bureau estimates that adults ages 65 or older will constitute 21 percent of the U.S. population, which will increase to 24 percent by 2060.[38] Better health care and new developments in medicine continue to increase American life expectancy. By their 65th birthday, on average, Americans can expect to live another 19 years.[39]

Adults ages 65 to 74 accounted for 46 percent of older adult fire deaths, and those ages 75 to 84 accounted for an additional 36 percent. Older adults ages 85 or older accounted for 19 percent of older adult fire deaths.[40]

While fire injuries affected an estimated 2,350 older adults, older adults accounted for 15 percent of all fire injuries, and the relative risk of older adults, ages 65 or older, being injured in a fire was equal to that of the general population.[41] The youngest segment of the older adults suffered the largest share of injuries — 57 percent of older adult injuries occurred to those ages 65 to 74. As in 2011, 2013 and 2014, the number of older adult fire deaths and fire injuries in 2015 declined with increasing age.[42]

Table 5. Older adult fire deaths and injuries in 2015

	Overall (ages 65 or older)		Ages 65 to 74		Ages 75 to 84		Ages 85 or older	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Deaths	1,330	100.0	609	45.8	473	35.6	248	18.6
Injuries	2,348	100.0	1,327	56.5	635	27.0	386	16.4

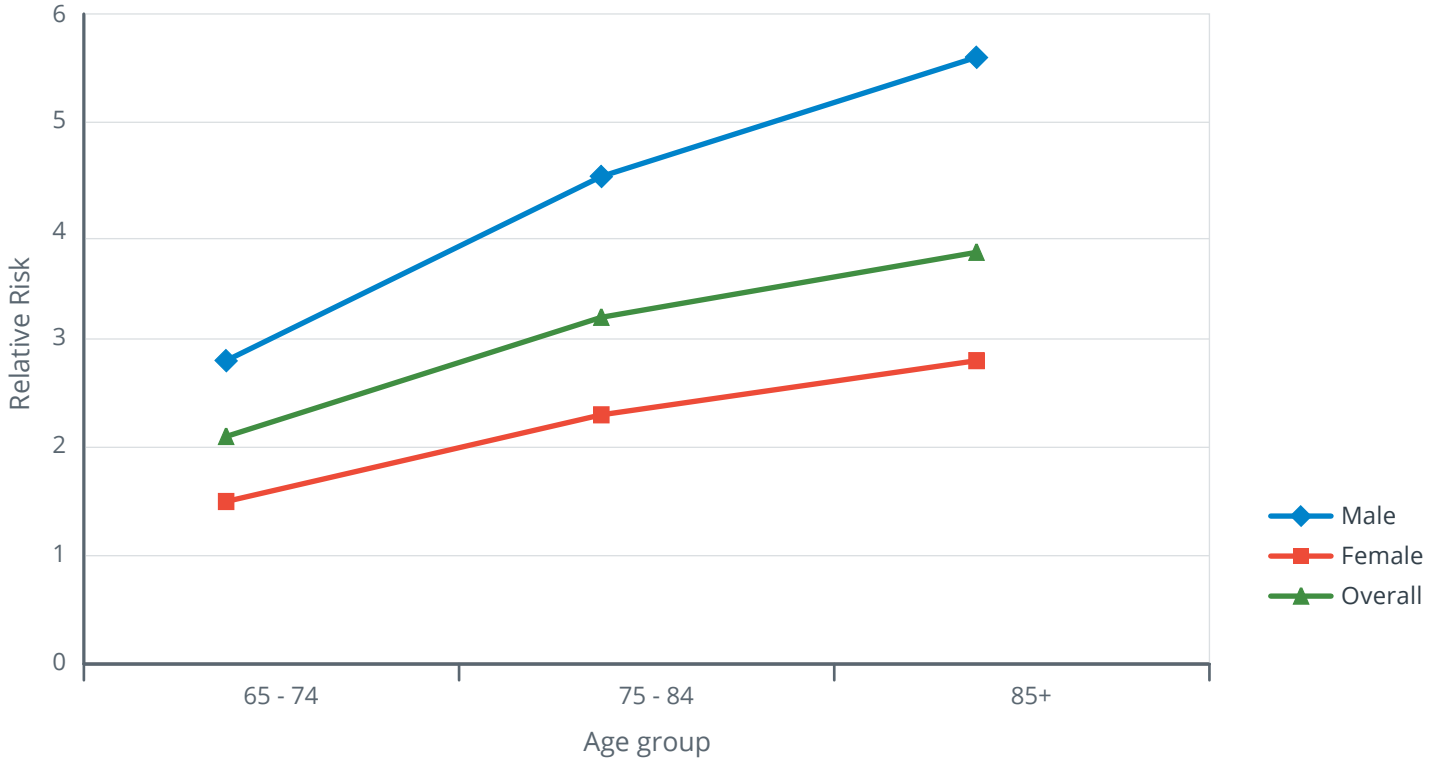
Sources: 2015 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program; 2015 NFIRS fire injury data; and 2015 NFPA fire injury estimates.

Note: Total percent of older adult fire injuries does not add to 100 percent due to rounding.

In 2015, the relative risk of dying in a fire for older adults was 2.7 times higher than for the population as a whole (Table 6). This statistic alone is troublesome, but when subcategories of older adults were more closely evaluated, the situation worsened. The relative risk of dying in a fire rose substantially for the oldest segment (Figure 4 and Table 6). Individuals ages 85 or older were 3.8 times more likely to die in a fire than the general population. While this is a decrease from 2014 when they were 4.1 times more likely to die in a fire than the general population, this is an increase from 2013 when they were 3.6 times more likely to die in a fire. Adults ages 65 to 74 were only 2.1 times more likely to suffer fire-related deaths than the general population. This is an increase from 2013 and 2014 when they were 1.8 and 2.0 times more likely to die in a fire, respectively.

As previously discussed, the risk of fire death was not uniform across genders, and for the population as a whole, in 2015, males were 68 percent more likely than females to be victims of fires. This disparity held for older adults as well (81 percent), increasing to 99 percent in the 85 or older age group.

Figure 4. Age, gender and relative risk of fire fatality for older adults in 2015



Source: Derived from Table 6.

In addition to gender, race also affects an older adult's fire risk. As discussed, in 2015, the problem was more severe for African-Americans when, as an overall group, they had 1.6 times the relative risk of dying from fire than the general population (Table 2). But it was the African-American elderly, particularly those ages 85 or older, who were most at risk — African-Americans ages 85 and older had a fire death risk almost ten times greater than that of the general population and over two and a half times the risk of all elderly people in this age group (Table 6). This is a decrease from 2011 and 2014 when this group had a fire death risk of just over 11, and 10 times greater than the general population, respectively. This is an increase from 2013, however, when African-Americans ages 85 and older had a fire death risk almost 7 times greater than that of the general population.

Table 6. Relative risk of older adult fire deaths by age, race and gender in 2015 (ages 65 or older)

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
All older adults (ages 65 or older)				
Total	47,734,292	1,330	27.9	2.7
Male	21,070,712	783	37.2	3.5
Female	26,663,580	547	20.5	2.0
White	40,598,120	1,043	25.7	2.5
African-American	4,346,544	239	55.0	5.2
American Indian/Alaska Native	321,274	18	-	-
Asian/Pacific Islander	2,068,672	30	14.5	1.4

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Ages 65 to 74				
Total	27,527,022	609	22.1	2.1
Male	12,877,818	373	29.0	2.8
Female	14,649,204	236	16.1	1.5
White	23,158,156	494	21.3	2.0
African-American	2,658,582	96	36.1	3.4
American Indian/Alaska Native	208,329	9	-	-
Asian/Pacific Islander	1,250,302	10	-	-

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Ages 75 to 84				
Total	13,918,757	473	34.0	3.2
Male	6,020,188	283	47.0	4.5
Female	7,898,569	190	24.1	2.3
White	11,920,034	361	30.3	2.9
African-American	1,215,247	94	77.4	7.4
American Indian/Alaska Native	84,957	9	-	-
Asian/Pacific Islander	590,864	9	-	-

Table 6. Relative risk of older adult fire deaths by age, race and gender in 2015 (ages 65 or older) — continued

Gender/Race	Population	Fire deaths	Death rate (per million population)	Relative risk
Ages 85 or older				
Total	6,288,513	248	39.4	3.8
Male	2,172,706	127	58.5	5.6
Female	4,115,807	121	29.4	2.8
White	5,519,930	188	34.1	3.3
African-American	472,715	49	103.7	9.9
American Indian/Alaska Native	27,988	0	-	-
Asian/Pacific Islander	227,506	11	-	-

Source: See notes at the end of the report.

Notes: 1. The overall male and female estimates include individuals with "2+ races" per the census. The "2+ races" category accounts for 2.6 percent of the population. The NCHS does not include this race category. Thus, the population estimates for the individual race categories will not sum to the total population estimate. Relative risk may not compute due to rounding.

2. Because they are considered highly variable, fire death rates and relative risk were not computed when there were fewer than 20 deaths per category.

Conclusion

The elderly are some of the nation's most vulnerable residents, and in 2015, their risk of death in a fire remained high. In addition, with an aging population, the U.S. demographic profile is rapidly changing. The older adult population (ages 65 or older) is expected to increase from its current 15 percent of the total population to 24 percent by 2060,[43] with an assumed corresponding increase in fire deaths and injuries among older adults. According to U.S. Census Bureau projections, by 2060, the number of individuals ages 65 or older is expected to be 98 million — more than double the amount in 2015. At the same time, the population ages 85 or older is expected to more than triple, increasing from 6.3 million in 2015 to 19.7 million in 2060.[44] With advancing age, physical and mental capabilities of these older adults will likely decline, hindering their mobility and making it more difficult for them to clearly see, smell and hear. Lessened senses and decreased mobility increase the risk of death or injury from fire.

Improvements have been made in reducing fire deaths and injuries among children younger than age 15, and in 2015, their relative risk of fire death was 60 percent lower than that of the general population. However, the youngest children (ages 4 and younger) faced an elevated risk of injury or death in a fire when compared to older children. In addition, young children are physiologically susceptible to severe injury or death from fire. For example, a young child's skin is quite thin compared to adults and older children. Children this age also generally lack the means and mental faculties to understand the need to quickly escape from a burning structure. Further, while older children face a lower risk of death or injury in a fire and are more mobile than those in the youngest age group, they may still not have sufficient abilities to protect themselves. As a result, the young and old continue to merit special attention to reduce their risk of injury or death from fire.

Because children and older adults accounted for 48 percent of fire deaths and 25 percent of fire injuries in 2015, and for the reasons stated previously, the USFA has been working toward the goal of reducing fire deaths and injuries in these populations. A number of resources are available to help address the fire problem for children and adults. For children, the USFA provides outreach materials that provide parents and caregivers with information on home strategies, ranging from the control of matches and lighters to home escape planning to protect young children from fire (http://www.usfa.fema.gov/prevention/outreach/children.html). For adults, the USFA provides outreach materials that address lifestyle strategies of safe smoking, safe cooking and safe heating to reduce the incidence of fires that traditionally affect older adults (http://www.usfa.fema.gov/prevention/outreach/older_adults.html). For further information, see the USFA website (http://www.usfa.fema.gov), or contact your local fire department.

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.[45] If a fire occurs, properly installed and maintained smoke alarms provide an early warning signal to everyone in a home. Smoke alarms help save lives and property. The USFA continues to partner with other government agencies and fire service organizations to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, 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. Additionally, the USFA's position statement on smoke alarms is available at https://www.usfa.fema.gov/about/smoke_alarms_position.html.

Residential sprinkler systems help to reduce the risk of deaths and injuries, homeowner insurance premiums, and uninsured property losses. Yet many homes do not have automatic extinguishing systems, although they are often found in hotels and businesses. Sprinklers are required by code in hotels and many multifamily residences. There are major movements in the U.S. fire service to require sprinklers in all new homes. At present, however, they are largely absent in residences nationwide.[46]

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

To request additional information, visit http://www.usfa.fema.gov/contact.html. To comment on this specific report, visit http://apps.usfa.fema.gov/contact/dataReportEval?reportTitle=Fire%20Risk%20in%202015.

Notes:

Sources for Table 2, Table 4 and Table 6 are the 2015 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program, and U.S. population estimates from the U.S. Census Bureau, Population Division, https://www.census.gov/programs-surveys/popest/data/tables.html:

- Table 1. Annual Estimates of the Resident Population for the U.S., Regions, States and Puerto Rico: April 1, 2010, to July 1, 2016 (NST-EST2016-01). Release date: December 2016.
- July 1, 2015, population estimates from the table, Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the U.S. and States: April 1, 2010, to July 1, 2016. Release date: June 2017.

[1]2015 NCHS mortality data (deaths) and the 2015 NFPA survey estimates (injuries). The count of fire deaths cited in the text is rounded to the nearest five.
[2]The term "casualties" refers to both fire deaths and injuries.
[3]Per capita rates are determined by the number of deaths or injuries occurring to a specific population group, divided by the total population for that group. This ratio is then multiplied by a common population size. For the purposes of this report, per capita rates for fire deaths and injuries are measured per 1 million people. For example, the per capita fire death rate for the total female population in 2015 was computed from the total number of female fire deaths (1,279), divided by the total female population (162,936,583), multiplied by 1,000,000 people. This rate is equivalent to 7.8 fire deaths per 1 million population.
[4]The per capita fire death rate for the total population in 2015 was computed from the total number of fire deaths (3,362), divided by the total population (320,896,618), multiplied by 1,000,000 people. This rate is equivalent to 10.5 fire deaths per 1 million population.
[5]The ICD 10 codes used from the NCHS mortality data are as follows: F63.1 — Pathological fire-setting (pyromania); W39 — Discharge of firework; W40 — Explosion of other materials; X00 — Exposure to uncontrolled fire in building or structure; X01 — Exposure to uncontrolled fire, not in building or structure; X02 — Exposure to controlled fire in building or structure; X03 — Exposure to controlled fire, not in building or structure; X04 — Exposure to ignition of highly flammable material; X05 — Exposure to ignition or melting of nightwear; X06 — Exposure to ignition or melting of other clothing and apparel; X08 — Exposure to other specified smoke, fire and flames; X09 — Exposure to unspecified smoke, fire and flames; X75 — Intentional self harm (suicide) by explosive material; X76 — Intentional self harm (suicide) by smoke, fire and flames; X96 — Assault (homicide) by explosive material; X97 — Assault (homicide) by smoke, fire and flames; Y25 — Contact with explosive material, undetermined intent; Y26 — Exposure to smoke, fire and flames, undetermined intent; and Y35.1 — Legal intervention involving explosives.
[6]The USFA, "Civilian Fire Injuries in Residential Buildings (2013-2015)," Volume 18, Issue 5, July 2017, http://www.usfa.fema.gov/downloads/pdf/statistics/v18i5.pdf.

[7]Estimates of injuries by age are derived from 2015 NFIRS civilian fire casualty age data in conjunction with 2015 NFPA estimates of overall civilian fire injuries.
[8]USFA, "Socioeconomic Factors and the Incidence of Fire," FA 170, June 1997.
[9]USFA, "Socioeconomic Factors and the Incidence of Fire," FA 170, June 1997.
[10]NFPA, Fire Analysis and Research Division, "Demographic and Other Characteristics Related to Fire Deaths or Injuries," March 2010, http://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/demographics-and-victim-patterns/demographic-and-other-characteristics-related-to-fire-deaths (accessed July 19, 2017).
[11]The regions of the U.S. are defined by the U.S. Census Bureau as the **Northeast** (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont); **South** (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia); **Midwest** (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin); and **West** (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming).
[12]Unrounded values of relative risk were used for the computations in this paragraph.
[13]As required by the Office of Management and Budget (OMB), starting in 1997, the U.S. Census Bureau generates population estimates for the following race categories: white, black or African-American, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, or some other race (2+ race). "Hispanic or Latino" is considered an ethnicity and refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin **regardless** of race. As a result, "Hispanic or Latino" is not broken out as a separate race category in this report.
[14]Statistics are based on U.S. Census Bureau population estimates for July 1, 2015.
[15]New York State Department of Health, "Burn and Scald Prevention, Children Ages Five to Nine Years," https://www.health.ny.gov/prevention/injury_prevention/children/fact_sheets/older_children_5-9_years/burn_and_scald_prevention_5-9_years.htm (accessed July 19, 2017).
[16]American Burn Association, Community Fire and Burn Prevention Programs, Scald Injury Prevention Campaign, "Scald Injury Prevention (Educator's Guide)," http://ameriburn.org/wp-content/uploads/2017/04/scaldinjuryeducatorsguide.pdf (accessed July 19, 2017).
[17]NFIRS data, 2015.
[18]NFIRS data, 2015.
[19]The term "casualties" refers to both fire deaths and injuries.
[20]NFIRS data, 2015.
[21]Bruck, Dorothy, "Nonawakening in Children in Response to a Smoke Detector Alarm," Fire Safety Journal, Vol. 32, Issue 4, June 1999, pp. 369-376.
[22]Smith, Gary, et al., "Comparison of a Personalized Parent Voice Smoke Alarm With a Conventional Residential Tone Smoke Alarm for Awakening Children," Pediatrics, Vol. 118, No. 4, October 2006, pp. 1623-1632, http://pediatrics.aappublications.org/content/118/4/1623.full (accessed July 19, 2017).
[23]Numbers of fire deaths are extracted from 2015 NCHS mortality data using the ICD codes noted previously. The count of fire deaths cited in the text is rounded to the nearest five.
[24]NCHS, "Deaths: Final Data for 2014" ("National Vital Statistics Reports," Vol. 65, No. 4), Table 10, http://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_04.pdf (accessed July 19, 2017). This ranking excludes "other and unspecified nontransport" causes. As a group, "other and unspecified nontransport" causes are larger than the leading specified nontransport causes.
[25]Estimates of fire injuries are calculated by determining the percent of injuries reported to NFIRS and applying the percentage to the NFPA estimate of fire injuries. The fire injury estimate cited in the text is rounded to the nearest 25.
[26]The most recent years in which the USFA examined fire risk prior to this report are 2011, 2013 and 2014. The USFA did not examine fire risk in 2012.
[27]USFA, "Socioeconomic Factors and the Incidence of Fire," FA 170, June 1997.
[28]U.S. Department of Health and Human Services (DHHS), National Institutes of Health, National Institute on Drug Abuse, "Research Report Series — Prescription Drug Abuse," November 2014, p. 8, https://teens.drugabuse.gov/sites/default/files/prescriptiondrugrrs_11_14.pdf (accessed July 19, 2017).
[29]NCHS, "Health, United States, 2016," Table 79. Prescription drug use in the past 30 days, by sex, race and Hispanic origin, and age: United States, selected years 1988-1994 through 2011-2014, https://www.cdc.gov/nchs/data/hus/hus16.pdf (accessed July 19, 2017).
[30]DHHS, Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings, Section 3.1, http://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.pdf (accessed July 19, 2017).
[31]DHHS, Centers for Disease Control and Prevention, Vital and Health Statistics, "Summary Health Statistics: National Health Interview Survey, 2015," Table A-13b. Frequency distribution (in thousands) of alcohol drinking status among adults aged 18 and over, by selected characteristics: United States, 2015, https://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2015_SHS_Table_A-13.pdf (accessed July 19, 2017).
[32]NCHS, Vital and Health Statistics, Series 3, No. 38, "Long-Term Care Providers and Services Users in the United States: Data from the National Study of Long-Term Care Providers, 2013–2014," February 2016, Chapter 3, p. 35, http://www.cdc.gov/nchs/data/series/sr_03/sr03_038.pdf (accessed July 19, 2017).
[33]Fox-Grage, Wendy, Ari Houser, and Kathleen Ujvari, "Across the States: Profiles of Long Term Services and Supports, Ninth Edition, 2012, Page 40," American Association for Retired Persons, http://www.aarp.org/content/dam/aarp/research/public_policy_institute/ltc/2012/across-the-states-2012-full-report-AARP-ppi-ltc.pdf (accessed July 19, 2017).
[34]USFA, "Data Snapshot: Nursing Home Fires (2012-2014)," https://www.usfa.fema.gov/downloads/pdf/statistics/snapshot_nursing_home.pdf.
[35]U.S. Census Bureau, "Income and Poverty in the United States: 2015," Table 3. People in Poverty by Selected Characteristics: 2014 and 2015 based on "Current Population Survey, 2015 and 2016 Annual Social and Economic Supplements," September 2016, https://www.census.gov/content/dam/Census/library/publications/2016/demo/p60-256.pdf (accessed July 19, 2017).

[36]2015 NCHS mortality data. The count of fire deaths cited in the text is rounded to the nearest five.
[37]U.S. Census Bureau, Population Division, July 1, 2015, population estimates from the table Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States and States: April 1, 2010, to July 1, 2016. Release date: June 2017, https://www.census.gov/data/tables/2016/demo/popest/nation-detail.html (accessed July 19, 2017).
[38]U.S. Census Bureau, Population Division, Table 6. Percent Distribution of the Projected Population by Sex and Selected Age Groups for the United States: 2015 to 2060 (NP2014-T6). Release date: December 2014, https://www.census.gov/data/tables/2014/demo/popproj/2014-summary-tables.html (accessed July 19, 2017).
[39]NCHS, "Health, United States, 2016," Table 15. Life expectancy at birth, at age 65, and at age 75, by sex, race, and Hispanic origin: United States, selected years 1900-2015, https://www.cdc.gov/nchs/data/hus/hus16.pdf (accessed July 19, 2017).
[40]Total does not add up to 100 percent due to rounding.
[41]Estimates of fire injuries are calculated by determining the percent of injuries reported to the NFIRS and applying this percentage to the NFPA estimate of fire injuries. The fire injury estimate cited in the text is rounded to the nearest 25.
[42]The most recent years in which the USFA examined fire risk prior to this report are 2011, 2013 and 2014. The USFA did not examine fire risk in 2012.
[43]U.S. Census Bureau, Population Division, Table 6. Percent Distribution of the Projected Population by Sex and Selected Age Groups for the United States: 2015 to 2060 (NP2014-T6). Release date: December 2014, https://www.census.gov/data/tables/2014/demo/popproj/2014-summary-tables.html (accessed July 19, 2017).
[44]U.S. Census Bureau, Population Division, Table 3. Projections of the Population by Sex and Selected Age Groups for the United States: 2015 to 2060 (NP2014-T3). Release date: December 2014, https://www.census.gov/data/tables/2014/demo/popproj/2014-summary-tables.html (accessed July 19, 2017).
[45]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.
[46]U.S. Department of Housing and Urban Development and U.S. Census Bureau, American Housing Survey for the United States: 2011, September 2013, "Health and Safety Characteristics-All Occupied Units (National)," Table S-01-AO, https://www.census.gov/content/dam/Census/programs-surveys/ahs/data/2011/h150-11.pdf (accessed July 19, 2017).