

Fire Risk in 2013

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's National Fire Incident Reporting System. Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information.

Findings

- **Risk by age:** In 2013, adults age 50 or older had a greater relative risk of dying in fires than the general population. Those age 80 to 84 had the highest risk of fire death. While those 85 and older were at the greatest risk of fire injury, adults age 20 to 64 also had a relative risk of fire injury that was greater than the general population. In addition, while lower than the relative risk of the general population, children age 4 and under faced an elevated risk of both injury and death in a fire when compared with older children (age 5 to 14).
- **Risk by gender:** Males were 1.5 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 and injury from fire is not the same for everyone. In 2013, 3,470 deaths and 15,925 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. 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 2011,” Volume 15, Issue 8.

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 or death of a person or damage or loss of property as a result of fire.

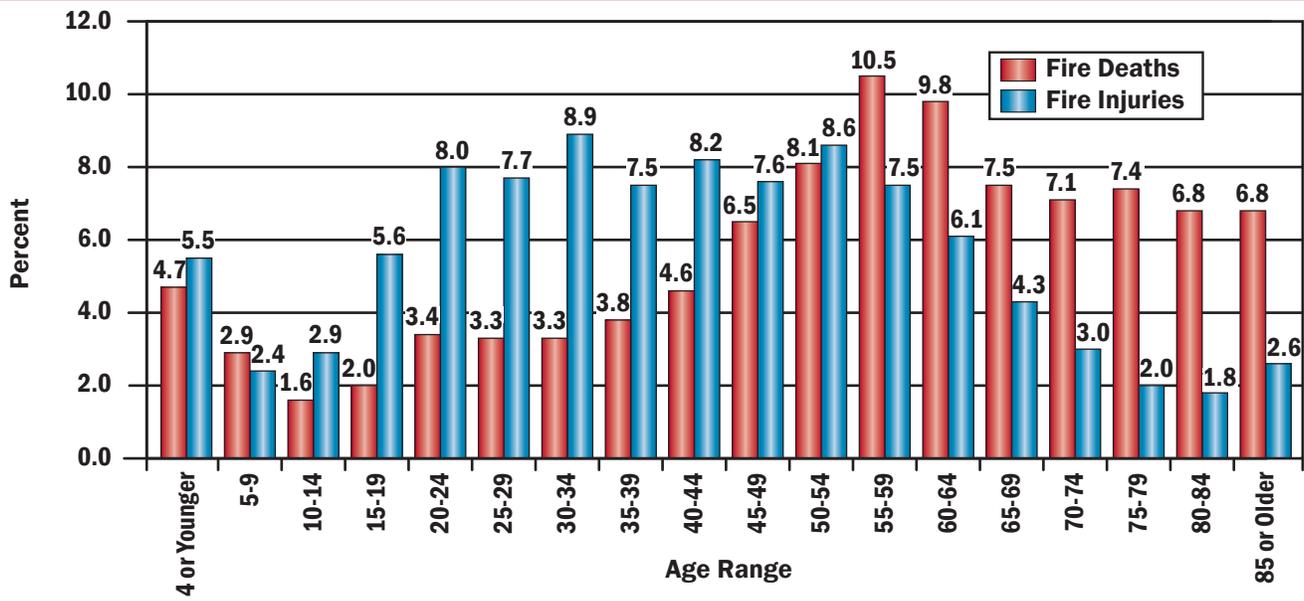
This topical report focuses on how fire risk, specifically the risk of death and injury, varies with age and how other demographic and socioeconomic factors weigh upon that risk.

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 age 50 or older were all at a higher risk from dying in a fire than the general population. The very young (age 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 did 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 in 2013, the number of fire deaths was greatest for white Americans and smallest for American Indians/Alaska Natives. In the case of age, percentages of fire deaths were greatest for those age 50 to 64, while 64 percent of fire injuries occurred among adults age 20 to 59 (Figure 1).



Figure 1. Percentage of Fire Deaths and Injuries by Age in 2013

Sources: 2013 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 2013 National Fire Incident Reporting System (NFIRS) 5.0 fire injury data.

Note: Data have been adjusted to account for deaths and injuries with unknown age. Age was not specified in less than 1 percent of fire deaths, and age was not specified in less than 1 percent of reported fire injuries. The total percentages for fire deaths and fire injuries do 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, there are far fewer American Indians/Alaska Natives, for example, than white Americans living in the U.S. 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.² Perhaps the most useful way to assess fire casualties across groups is to determine the relative risk of dying or being injured. 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 2013, the relative risk of dying in a fire for the total population of females in comparison to the total population was 0.8. This is equivalent to the per capita fire death rate for females (8.3 deaths per million population) divided by the per capita fire death rate for the entire population (11.0 deaths per million population³). Thus, the relative risk of a female dying from fire was 20 percent less than that of the total population.

Data Sources and Methodology

The findings in this report pertaining to deaths were taken from the 2013 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-X09, X75-76, X96-97, Y25-26 and Y35.1.⁴ 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 not specified in less than 1 percent of fire deaths in 2013.

Further, the latest NCHS mortality data available at the time of analyses are from 2013. For this reason, all analyses in this report reference 2013 data for consistency.

Fire injury estimates in this report are based on data from 2013 NFIRS Version 5.0 and the 2013 National Fire Protection Association (NFPA) survey.

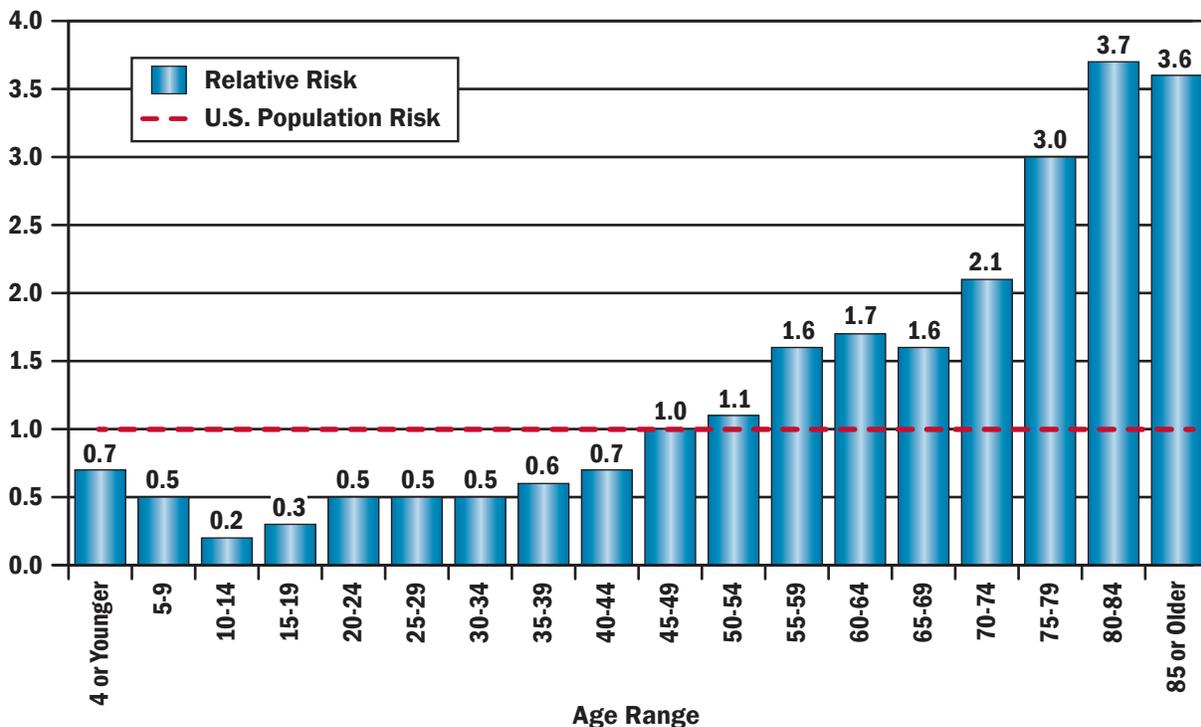
Age and Risk of Fire Casualty

When physical and cognitive abilities are limited, as is often the case for the very old, the risk of death from fire rises. In 2013, older adults (age 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 2.5 times higher than for the population as a whole and rose even more for the oldest segments (Figure 2). For the youngest, children age 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 matured and their cognitive and social abilities developed, the risk of fire death sharply dropped. After age 14, the risk of fire death

began to steadily increase. By age 50, in 2013, the risk of fire death was above the risk for the population as a whole, and in general, it 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 2013

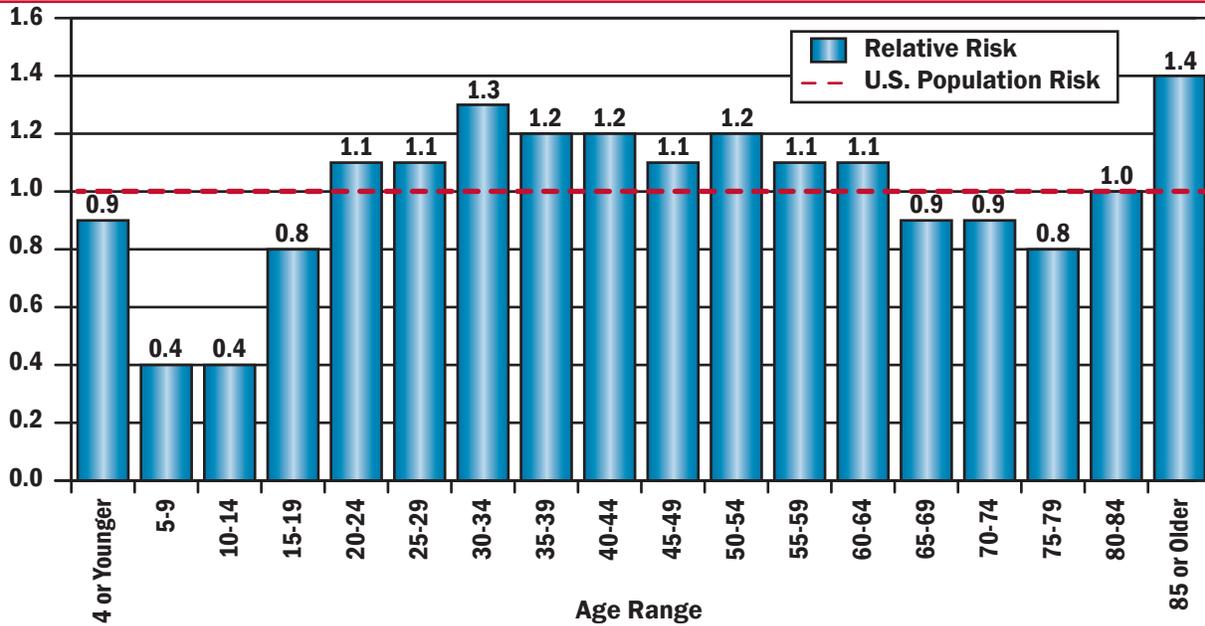


Sources: 2013 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program, and U.S. Census Bureau population estimates.
 Note: Data have been adjusted to account for deaths with unknown age. Age was not specified in less than 1 percent of fire deaths.

In general, the age profile of risk for fire injuries was different from that for deaths (Figure 3), with a much narrower range of risk quotients (0.4 to 1.4 versus 0.2 to 3.7 for fire deaths).⁵ This difference is thought to be the result of both cognitive and mobility issues that affect older adults. As a result, these adults were generally less likely to escape the effects of fire and thus more likely to suffer fatal injuries. While these older adults (age 65 to 84) had a relative risk of fire injury at or below the risk of the general population,

adults age 85 or older still had the greatest risk of injury from fire. While not as high as the risk for adults age 85 and older, in 2013 the relative risk of fire injury was greater than the general population for 20- to 64-year-olds, peaking for 30- to 34-year-olds (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 age 4 and under had a greater relative risk of injury from fire than older children (age 5 to 14).

Figure 3. Relative Risk of Fire Injury by Age in 2013



Sources: 2013 NFIRS 5.0 fire injury data, 2013 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 not specified in less than 1 percent of fire injuries.

Other Factors That Influence Risk

In the U.S. Fire Administration (USFA) report, “Socioeconomic Factors and the Incidence of Fire,”⁶ 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 stock.⁷ 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.⁸

Geographic location also has an effect. There was a greater risk of dying in a fire for people living in the South than for populations living in other regions (Table 1).⁹ 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 for heat. By their nature, such heating strategies are 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 slightly 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 Area in 2013

Region	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Northeast	56,028,220	528	9.4	0.9
Midwest	67,567,871	840	12.4	1.1
South	118,522,802	1,530	12.9	1.2
West	74,378,638	570	7.7	0.7
U.S. overall	316,497,531	3,468	11.0	1.0

Sources: 1. 2013 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, 2013, population estimates from Table 1. Annual Estimates of the Resident Population for the U.S., Regions, States and Puerto Rico: April 1, 2010 to July 1, 2014 (NST-EST2014-01). Release date: December 2014.
 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 virtually 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 2013, males were 1.5 times more likely to die in fires than females (Table 2). USFA data from NFIRS also showed that males, overall, were also about 1.5 times more likely to suffer injuries than their female counterparts. The reasons for these findings are subject to speculation. Men may be more willing to take risks than women, and this behavior could account for some of the difference.

Race,¹⁰ 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 19 percent of fire deaths in 2013 but only 13 percent of the U.S. population.¹¹ In 2013, African-Americans had a 40 percent greater risk of dying in a fire than the general population. Although still high, this risk is down from 50 percent more risk in 2011, and down from 80 percent more risk in 2007. For American Indians/Alaska Natives in 2013, the relative risk was also elevated; it was 20 percent higher than the risk of the general population, the same risk as in 2011, but down from 30 percent higher risk in 2007. By contrast, Asian/Pacific Islander Americans were much less likely than the overall population to die in a fire.

Table 2. Relative Risk of Fire Death by Race and Gender in 2013, Overall Population

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Total	316,497,531	3,468	11.0	1.0
Male	155,741,368	2,126	13.7	1.2
Female	160,756,163	1,342	8.3	0.8
White	245,593,078	2,695	11.0	1.0
African-American	41,713,518	662	15.9	1.4
American Indian/Alaska Native	3,909,025	51	13.0	1.2
Asian/Pacific Islander	17,528,697	60	3.4	0.3
White male	121,636,085	1,676	13.8	1.3
African-American male	19,945,997	381	19.1	1.7
American Indian/Alaska Native male	1,973,581	32	16.2	1.5
Asian/Pacific Islander male	8,368,638	37	4.4	0.4
White female	123,956,993	1,019	8.2	0.8
African-American female	21,767,521	281	12.9	1.2
American Indian/Alaska Native female	1,935,444	19	-	-
Asian/Pacific Islander female	9,160,059	23	2.5	0.2

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 2.4 percent of the population. 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 2013

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 of 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.^{12, 13} In addition, smoke inhalation from the toxic gases released by fires (and often in conjunction with burns suffered in the fires) accounted for 80

percent of all reported fire deaths in 2013. Young children (age 4 or younger) were also susceptible to this danger. Smoke inhalation accounted for 88 percent of fire deaths to children age 4 or younger.¹⁴

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 2013, children age 9 or younger accounted for 50 percent of deaths and 35 percent of injuries where the cause of the residential building fire was due to “playing with a heat source,” which includes matches and lighters.¹⁵

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 — 83 percent of fatalities and 83 percent of injuries — occurred in residential buildings in 2013.¹⁶ Inside these residences, smoke alarms are credited with saving thousands of lives each year. Some studies, however, have questioned the efficacy of these alarms in 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

their responses were slowed.¹⁷ Further studies have shown an increased response to alarms that use parental voices in lieu of the standard tone alarm.¹⁸ 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 2013, 320 children younger than 15 died as a result of fires (Table 3).¹⁹ These children accounted for 9 percent of fire deaths. The youngest children were especially hard hit — 51 percent of child fire deaths affected children age 4 or younger. For children younger than 15 in 2013, exposure to smoke and fire was the second leading cause of nontransportation accidental deaths, after drowning.²⁰

In addition, in 2013, fire injuries affected an estimated 1,700 children.²¹ Again, the youngest suffered a large share of injuries — 51 percent of child fire injuries occurred to children age 4 or younger. As in previous years, fire deaths declined with increasing age. Fire injuries, however, declined between the young preschoolers (age 4 or younger) and the younger school-aged children (age 5 to 9) but rose slightly for older children (age 10 to 14). With these three age groups combined, children accounted for 11 percent of all fire injuries. This profile of deaths and injuries of children age 14 and younger is similar to the profile of child fire deaths and injuries in 2011.

Table 3. Child Fire Deaths and Injuries in 2013

	Overall (Age 0 to 14)		Age 0 to 4		Age 5 to 9		Age 10 to 14	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Deaths	320	100.0	163	50.9	102	31.9	55	17.2
Injuries	1,702	100.0	868	51.0	377	22.2	457	26.9

Sources: 2013 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program; 2013 NFIRS 5.0 fire injury data; and 2013 NFPA fire injury estimates.

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

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 fire deaths decreased as the age of the child increased, the likelihood of dying in a fire also decreased (Table 4). In 2013, as previously discussed, children age 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 age 5 to 9 was 50 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 slightly greater risk than girls. In addition, African-Americans constituted a large and disproportionate share of total fire deaths, accounting for

31 percent of fire deaths among children in 2013 but only 15 percent of the population. Moreover, African-American children age 4 or younger still had a relative risk of dying that was 1.9 times higher than the general population and 2.6 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. Children in the poorest homes are exposed to the greatest risk. A number of factors contribute to this elevated threat: The poor often live in substandard housing in crowded conditions, and 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.²²

Table 4. Relative Risk of Child Fire Deaths by Age, Race and Gender in 2013 (Age 0 to 14)

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
All Children (Age 0 to 14)				
Total	61,101,044	320	5.2	0.5
Male	31,206,389	182	5.8	0.5
Female	29,894,655	138	4.6	0.4
White	44,569,207	219	4.9	0.4
African-American	9,208,514	99	10.8	1.0
American Indian/Alaska Native	974,111	1	-	-
Asian/Pacific Islander	3,205,220	1	-	-

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 0 to 4				
Total	19,867,849	163	8.2	0.7
Male	10,149,449	91	9.0	0.8
Female	9,718,400	72	7.4	0.7
White	14,294,261	99	6.9	0.6
African-American	3,024,940	64	21.2	1.9
American Indian/Alaska Native	321,470	0	-	-
Asian/Pacific Islander	1,055,436	0	-	-

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 5 to 9				
Total	20,575,077	102	5.0	0.5
Male	10,507,782	60	5.7	0.5
Female	10,067,295	42	4.2	0.4
White	15,011,855	74	4.9	0.4
African-American	3,072,753	27	8.8	0.8
American Indian/Alaska Native	332,182	1	-	-
Asian/Pacific Islander	1,090,334	0	-	-

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 10 to 14				
Total	20,658,118	55	2.7	0.2
Male	10,549,158	31	2.9	0.3
Female	10,108,960	24	2.4	0.2
White	15,263,091	46	3.0	0.3
African-American	3,110,821	8	-	-
American Indian/Alaska Native	320,459	0	-	-
Asian/Pacific Islander	1,059,450	1	-	-

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 2.4 percent of the population. 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 2013

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. Lessened 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 age 65 or older accounted for more than one-third of total outpatient spending on prescription medications in this country.²³ Moreover, 90 percent of older adults (65 or older) used at least one prescription drug in the past 30 days, while 39 percent of older adults concurrently used five or more prescriptions.²⁴ 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 age 65 or older reported current use of alcohol (at least one drink in the past 30 days) in 2013.²⁵ Further, 30 percent of those age 75 or older would consider themselves "current regular" drinkers, having had at least 12 drinks in the past year.²⁶ 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, 69 percent are over the age of 65.²⁷ 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,²⁸ and that number may rise as people grow even older.

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 2013, 10 percent of older adults lived below the poverty level.²⁹

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 2013, 1,230 older adults age 65 or older died as a result of fires (Table 5).³⁰ These adults accounted for 35 percent of all fire deaths; however, older adults constituted only 14 percent of the U.S. population in 2013,³¹ and their ranks are growing. It is estimated that the older population will rise sharply between now and 2030, the years when the baby-boom generation will be in retirement. By 2030, the U.S. Census Bureau estimates that adults age 65 or older will constitute 21 percent of the U.S. population, which will increase to 24 percent by 2060.³² 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.³³

Adults age 65 to 74 accounted for 41 percent of older adult fire deaths, and those age 75 to 84 accounted for an additional 40 percent. Older adults age 85 or older accounted for the remaining 19 percent of older adult fire deaths.

While fire injuries affected an estimated 2,175 older adults, older adults accounted for 14 percent of all fire injuries, and the relative risk of older adults, age 65 or older, being injured in a fire was equal to that of the general population.³⁴ The youngest segment of the older adults suffered the largest share of injuries — 53 percent of older adult injuries occurred to those age 65 to 74. The number of both fire deaths and fire injuries declined with increasing age.

Table 5. Older Adult Fire Deaths and Injuries in 2013

	Overall (Age 65 or Older)		Age 65 to 74		Age 75 to 84		Age 85 or Older	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Deaths	1,231	100.0	504	40.9	491	39.9	236	19.2
Injuries	2,171	100.0	1,154	53.2	604	27.8	413	19.0

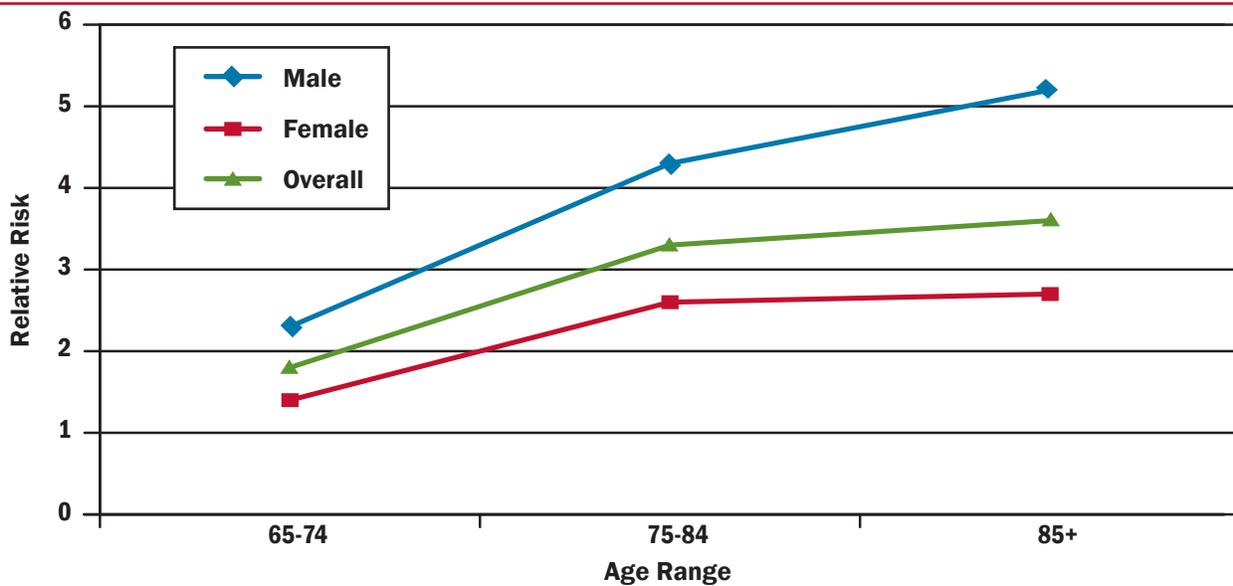
Sources: 2013 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program; 2013 NFIRS 5.0 fire injury data; and 2013 NFPA fire injury estimates.

In 2013, the relative risk of dying for older adults in a fire was 2.5 times higher than for the population as a whole (Table 6). This statistic alone is troublesome, but when sub-categories 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 age 85 or older were 3.6 times more likely to die in a fire than the general population, while those adults age 65 to 74 were only 1.8 times more likely to suffer fire-related deaths. This was an improvement from 2011, however, when

individuals age 85 and older were 4.5 times more likely to die in a fire than the general population, and adults age 65 to 74 were 2.0 times more likely to suffer fire-related deaths.

As previously discussed, the risk of fire death was not uniform across gender, and for the population as a whole in 2013, males were 50 percent more likely than females to be victims of fires. This disparity held for older adults as well (60 percent), increasing to 93 percent in the 85 or older age group.

Figure 4. Age, Gender and Relative Risk of Fire Fatality for Older Adults in 2013



Source: derived from Table 6.

In addition to gender, race also affects an older adult’s fire risk. The problem was more severe for African-Americans. As a group, African-Americans had 1.4 times the relative risk of dying from fire than the general population (Table 2). But it was the African-American elderly, particularly those age 85 or over, who were most at risk — African-Americans age

85 and older had a fire death risk almost seven times greater than that of the general population and almost two times the risk of all elderly people in this age group (Table 6). This is an improvement from 2011, however, when African-Americans age 85 and older had a fire death risk over 11 times greater than that of the general population.

**Table 6. Relative Risk of Older Adult Fire Deaths by Age, Race and Gender in 2013
(Age 65 or Older)**

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
All Older Adults (Age 65 or Older)				
Total	44,723,041	1,231	27.5	2.5
Male	19,604,245	680	34.7	3.2
Female	25,118,796	551	21.9	2.0
White	38,309,295	1,004	26.2	2.4
African-American	3,964,498	200	50.4	4.6
American Indian/Alaska Native	283,556	14	-	-
Asian/Pacific Islander	1,810,846	13	-	-

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 65 to 74				
Total	25,228,428	504	20.0	1.8
Male	11,797,442	293	24.8	2.3
Female	13,430,986	211	15.7	1.4
White	21,358,259	403	18.9	1.7
African-American	2,377,685	90	37.9	3.5
American Indian/Alaska Native	183,209	7	-	-
Asian/Pacific Islander	1,088,483	4	-	-

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 75 to 84				
Total	13,460,306	491	36.5	3.3
Male	5,764,639	270	46.8	4.3
Female	7,695,667	221	28.7	2.6
White	11,611,639	401	34.5	3.2
African-American	1,145,691	77	67.2	6.1
American Indian/Alaska Native	76,107	5	-	-
Asian/Pacific Islander	529,010	8	-	-

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 85 or Older				
Total	6,034,307	236	39.1	3.6
Male	2,042,164	117	57.3	5.2
Female	3,992,143	119	29.8	2.7
White	5,339,397	200	37.5	3.4
African-American	441,122	33	74.8	6.8
American Indian/Alaska Native	24,240	2	-	-
Asian/Pacific Islander	193,353	1	-	-

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 2.4 percent of the population. 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 very old are some of the nation's most vulnerable residents, and in 2013, 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 (age 65 or older) is expected to increase from its current 15 percent of the total population to 24 percent by 2060,³⁵ 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 age 65 or older is expected to be 98 million, more than double the amount in 2013. At the same time, the population age 85 or older is expected to more than triple, increasing from 6 million in 2013 to 19.7 million in 2060.³⁶ 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 15, and in 2013, their relative risk of death or injury was 50 percent lower than that of the general population. However, the youngest children (age 4 and under) faced an elevated risk of injury or deaths 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 with adults and older children. Children of this age also generally lack the mental faculties to understand the need and the means of quickly escaping 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 45 percent of fire deaths and 24 percent of fire injuries in 2013, and for the reasons stated previously, the USFA has been working toward the goal of reducing fire deaths and injuries to these populations. A number of resources to help address the fire problem for children and adults are available. For children, USFA provides outreach materials that provide parents 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,

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.

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

Nationally, only 3 percent of households lack smoke alarms.³⁷ Properly installed and maintained smoke alarms provide an early warning signal to household members in the event that a fire occurs. Smoke alarms help save lives and property. The USFA continues to partner with other government agencies and fire service entities to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, disposal and storage, training bulletins, and public education and outreach materials can be found at http://www.usfa.fema.gov/prevention/technology/smoke_fire_alarms.html.

Residential sprinkler systems help to reduce the risk of civilian and firefighter casualties, homeowner insurance premiums, and uninsured property losses. Yet many residences are unequipped with automatic extinguishing systems that are often installed in hotels and businesses. Sprinklers are required by code in hotels and many multifamily residences. There are major movements in the U.S. fire service to require or facilitate use of sprinklers in all new homes, which could improve the use of residential sprinklers in the future. At present, however, they are largely absent in residences nationwide.³⁸ 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 can be found 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.

To request additional information or to comment on this report, visit <http://www.usfa.fema.gov/contact.html>.

Notes:

Sources for Table 2, Table 4 and Table 6 are the 2013 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, <http://www.census.gov/popest/data/index.html>:

- Table 1. Annual Estimates of the Population for the U.S., Regions, States and Puerto Rico: April 1, 2010 to July 1, 2014 (NST-EST2014-01). Release date: December 2014.
- July 1, 2013, population estimates from the table, Annual Estimates of Resident Population by Sex, Age, Race, and Hispanic Origin for the U.S. and States: April 1, 2010 to July 1, 2014. Release date: June 2015.

¹2013 NCHS mortality data (deaths) and the 2013 NFPA survey estimates (injuries). The count of fire deaths cited in the text is rounded to the nearest five.

²Per 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 2013 was computed from the total number of female fire deaths (1,342) divided by the total female population (160,756,163) multiplied by 1,000,000 people. This rate is equivalent to 8.3 fire deaths per 1 million population.

³The per capita fire death rate for the total population in 2013 was computed from the total number of fire deaths (3,468) divided by the total population (316,497,531) multiplied by 1,000,000 people. This rate is equivalent to 11.0 fire deaths per 1 million population.

⁴The 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.

⁵Estimates of injuries by age are derived from 2013 NFIRS civilian fire casualty age data (Version 5.0) in conjunction with 2013 NFPA estimates of overall fire injuries.

⁶USFA, “Socioeconomic Factors and the Incidence of Fire,” FA 170, June 1997.

⁷USFA, “Socioeconomic Factors and the Incidence of Fire,” FA 170, June 1997.

⁸NFPA, Fire Analysis and Research Division, “Demographic and Other Characteristics Related to Fire Deaths or Injuries,” March 2010, <http://www.nfpa.org/~media/Files/Research/NFPA%20reports/Victim%20Patterns/ossocfactors.pdf> (accessed Sept. 16, 2015).

⁹The 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).

¹⁰As required by the Office of Management and Budget, 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.

¹¹Statistics are based on U.S. Census Bureau population estimates for July 1, 2013.

¹²New 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 Sept. 16, 2015).

¹³American Burn Association, Community Fire and Burn Prevention Programs, Scald Injury Prevention Campaign, “Scald Injury Prevention (Educator’s Guide),” <http://www.ameriburn.org/Preven/ScaldInjuryEducator’sGuide.pdf> (accessed Sept. 15, 2015).

¹⁴NFIRS Version 5.0 data, 2013.

¹⁵NFIRS Version 5.0 data, 2013.

¹⁶NFIRS Version 5.0 data, 2013.

¹⁷Bruck, Dorothy, “Nonawakening in Children in Response to a Smoke Detector Alarm,” *Fire Safety Journal*, Vol. 32, Issue 4, June 1999, pp. 369-376.

¹⁸Smith, 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 Sept. 16, 2015).

¹⁹Numbers of fire deaths are extracted from 2013 NCHS mortality data using the ICD codes noted previously.

²⁰NCHS, 2013 Multiple Cause of Death Data File, which contains tables from the soon to be published “Deaths: Final Data for 2013” (“National Vital Statistics Reports,” Vol. 64, No. 2), Table 10, http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_02.pdf (accessed Sept. 16, 2015). This ranking excludes “other and unspecified nontransport” causes. As a group, “other and unspecified nontransport” causes are larger than the leading specified nontransport causes.

²¹Estimates 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.

²²USFA, “Socioeconomic Factors and the Incidence of Fire,” FA 170, June 1997.

²³U.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://d14rmgtrwz5a.cloudfront.net/sites/default/files/prescriptiondrugrrs_11_14.pdf (accessed Sept. 16, 2015).

²⁴NCHS, “Health, United States 2014,” Table 85. Prescription drug use in the past 30 days, by sex, age, race and Hispanic origin: United States, selected years 1988-1994 through 2009-2012, <http://www.cdc.gov/nchs/data/hsr/hsr14.pdf> (accessed Sept. 30, 2015).

²⁵DHHS, 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 Sept. 16, 2015).

²⁶Centers for Disease Control and Prevention, DHHS, Vital and Health Statistics, Series 10, No. 260, February 2014, “Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2012,” Table 25, http://www.cdc.gov/nchs/data/series/sr_10/sr10_260.pdf (accessed Sept. 16, 2015).

²⁷NCHS, National Health Statistics Reports, No. 38, “Home Health Care and Discharged Hospice Care Patients: United States, 2000 and 2007,” April 27, 2011, <http://www.cdc.gov/nchs/data/nhsr/nhsr038.pdf> (accessed Sept. 16, 2015).

²⁸Fox-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/home-garden/livable-communities/info-09-2012/across-the-states-2012-profiles-of-long-term-services-supports-AARP-ppi-ltc.html> (accessed Sept. 16, 2014).

²⁹U.S. Census Bureau, “Income and Poverty in the United States 2013,” Table 3. People in Poverty by Selected Characteristics: 2012 and 2013 based on “Current Population Survey Annual and Social Economic Supplement,” September 2014, <https://www.census.gov/hhes/www/poverty/data/incpovhlth/2013/table3.pdf> (accessed Sept. 16, 2015).

³⁰2013 NCHS mortality data. The count of fire deaths cited in the text is rounded to the nearest five.

³¹U.S. Census Bureau, Population Division, July 1, 2013, 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, 2014. Release date: June 2015, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2014_PEPASR6H&prodType=table (accessed Sept. 16, 2015).

³²U.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/population/projections/data/national/2014/summarytables.html> (accessed Sept. 16, 2015).

³³NCHS, “Health, United States, 2014,” Table 16. Life expectancy at birth, at age 65, and at age 75, by sex, race, and Hispanic origin: United States, selected years 1900-2013, <http://www.cdc.gov/nchs/data/hus/14.pdf> (accessed Sept. 16, 2015).

³⁴Estimates of fire injuries are calculated by determining the percent of injuries reported to 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.

³⁵U.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/population/projections/data/national/2014/summarytables.html> (accessed Sept. 16, 2015).

³⁶U.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/population/projections/data/national/2014/summarytables.html> (accessed Sept. 16, 2015).

³⁷Greene, 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.

³⁸Department 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://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2011_S01AO&prodType=table (accessed Sept. 17, 2015).