TOPICAL FIRE REPORT SERIES Volume 14, Issue 9 / August 2013

Fire Risk to Older Adults in 2010

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

- Older adults continue to experience a disproportionate share of fire deaths. In 2010, older adults (age 65 or older) represented 13 percent of the United States population but suffered 35 percent of all fire deaths.
- The relative risk of individuals age 65 or over dying in a fire was 2.7 times greater than that of the general population. The risk worsened as age increased. The relative risk for adults ages 65 to 74 was 1.9, but soared to 4.6 for those over the age of 84.
- Older American Indians/Alaska Natives and African-Americans were at a much greater risk of dying in a fire than their Asian/Pacific Islander or white fellow citizens. Older Asian/Pacific Islanders had 20 percent less risk than the general population.
- Older males were 62 percent more likely to die in fires than older females.
- Older adults were more vulnerable in a fire than the general population due to a combination of factors including mental and physical frailties, greater use of medications, and elevated likelihood of living in a poverty situation.

In 2010, older Americans were burdened with the gravest fire risk in the U.S. and were consistently more threatened with death by fire than any other segment of society. While admirable strides have been made in lowering the overall U.S. fire death rate in the last decade, fewer gains have been realized among the oldest age groups. This Topical Fire Report explores the risk of fire deaths in the older adult population and is an update to "Fire Risk to Older Adults in 2007," Volume 11, Issue 10.

According to the National Center for Health Statistics (NCHS) data on mortality, 3,445 deaths were caused by fire in 2010. Older adults were disproportionately the victims — fire fatalities among people age 65 years or older in 2010 was 1,200, accounting for 35 percent of all fire deaths that year.[1] Older adults comprised 13 percent of the U.S. population in 2010,[2] 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 comprise 19 percent of the U.S. population, and they will reach 20 percent by 2040.[3] 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.[4]

At over one-third of total fire deaths, the number of older Americans who died in fires across the nation in 2010 was clearly high. The issue becomes even more concerning when the relative risk of fire death encountered by older Americans is compared to the rest of the adult population.

Defining Risk

The concept of "risk" with respect to fire casualties can be addressed in several ways: absolute numbers of deaths and injuries, proportions (percent) of these casualties, rates (per unit, usually fires or population), and relative risk. Each measure is useful, but each has its drawbacks as well. The absolute number of casualties is an important consideration — it is a concrete measure of the size or magnitude of the problem, but it does not address the magnitude relative to other aspects of the problem. In this case, proportions are used to compare the relative size of the problem. Yet these proportions do not convey the magnitude of the problem as does the absolute number of casualties. Neither of these two measures is useful for comparisons across different groups. For comparison across groups, a common basis is used to determine rates. These rates then account for any differences in group sizes that may affect the magnitude of the problem.[5]

In comparing fire rates, the relative risk of dying or being injured is a helpful measure. 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).[6]

For the general population, the relative risk is set at 1. From this report, in 2010, the relative risk of dying in a fire for the total population of adults age 65 or older in comparison to the total population was 2.7. This is equivalent to the per capita fire death rate for adults age 65 or older (29.6 deaths per million population) divided by the per capita fire death rate for the entire population (11.1 deaths per million population[7]). Thus the relative risk of adults age 65 or older dying from fire was 170 percent more than that of the total population.

Data Sources and Methodology

The findings in this report pertaining to deaths were taken from the 2010 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.[8] These codes include all deaths in which exposure to fire, fire products or explosion was the underlying cause of death or was 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.

Further, the latest NCHS mortality data available are from 2010, which were released in 2012 (release dates vary from year to year). For this reason, all analyses in this report and the other topical reports in the Risk Series ("Fire Risk in 2010," Volume 14, Issue 7, August 2013 and "Fire Risk to Children in 2010," Volume 14, Issue 8, August 2013) reference 2010 data for reasons of consistency.

Fire injury estimates in this report are based on data from the 2010 National Fire Incident Reporting System (NFIRS), version 5.0 and the 2010 National Fire Protection Association (NFPA) survey.

Who Is Affected

In 2010, 1,200 older adults age 65 or older died as a result of fires (Table 1).[9] These adults accounted for 35 percent of all fire deaths. Those ages 65 to 74 accounted for 39 percent of older adult fire deaths, and those ages 75 to 84 accounted for an additional 38 percent. While fire injuries affected an estimated 2,225 older adults, older adults accounted for 13 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.[10] The youngest segment of the older adults suffered the largest share of injuries — 54 percent of older adult injuries occurred to those ages 65 to 74. Both fire deaths and fire injuries declined with increasing age.

Table 1. Older Adult Fire Deaths and Injuries, 2010

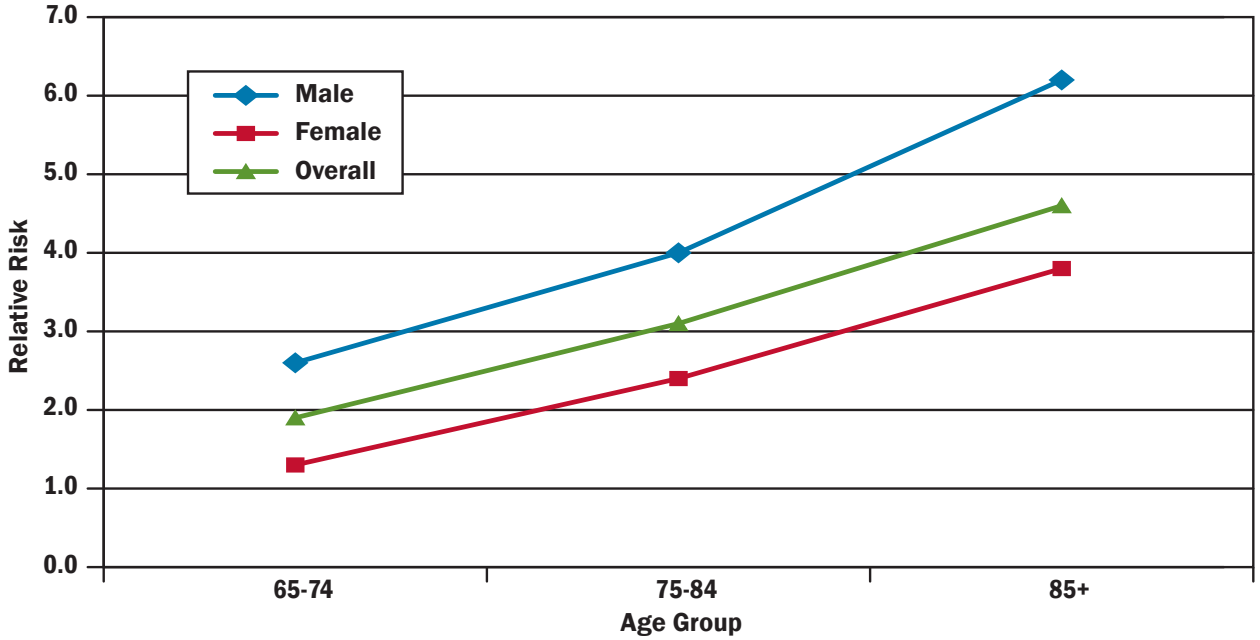
	Overall (Age 65 or Older)		Ages 65 to 74		Ages 75 to 84		Age 85 or Older	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Deaths	1,199	100.0	465	38.8	452	37.7	282	23.5
Injuries	2,229	100.0	1,195	53.6	709	31.8	325	14.6

Sources: 2010 NCHS Mortality Data File, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program; 2010 NFIRS 5.0 fire injury data; and 2010 NFPA fire injury estimates.

Elevated Risk for Older Adults

To be elderly is, in itself, a disadvantage in terms of fire risk. A disproportionate number of mature adults, age 65 years or older, die in fires each year. The relative risk of dying for mature adults — that is, the per capita deaths per population of mature adults — in a fire was 2.7 times higher than for the population as a whole. This statistic alone is troublesome, but when subcategories of mature adults were more closely evaluated, the situation worsened. The relative risk of dying in a fire rose substantially for the oldest segment (Figure 1 and Table 2). Individuals age 85 or older were 4.6 times more likely to die in a fire than the general population, while those adults ages 65 to 74 were only 1.9 times more likely to suffer fire-related deaths.

Figure 1. Age, Gender and Relative Risk of Fire Fatality, 2010



Source: derived from Table 2.

Table 2. Relative Risk of Older Adult Fire Deaths by Age, Race and Gender, 2010

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
All Older Adults (Age 65 or Older)				
Total	40,477,304	1,199	29.6	2.7
Male	17,471,907	667	38.2	3.4
Female	23,005,397	532	23.1	2.1
White	34,966,685	965	27.6	2.5
African-American	3,512,217	212	60.4	5.4
American Indian/Alaska Native	235,536	9	38.2	3.4
Asian/Pacific Islander	1,466,824	13	8.9	0.8
White Male	15,223,760	541	35.5	3.2
African-American Male	1,381,440	117	84.7	7.6
American Indian/Alaska Native Male	105,168	4	38.0	3.4
Asian/Pacific Islander Male	634,212	5	7.9	0.7
White Female	19,742,925	424	21.5	1.9
African-American Female	2,130,777	95	44.6	4.0
American Indian/Alaska Native Female	130,368	5	38.4	3.4
Asian/Pacific Islander Female	832,612	8	9.6	0.9

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Ages 65 to 74				
Total	21,855,676	465	21.3	1.9
Male	10,167,852	295	29.0	2.6
Female	11,687,824	170	14.5	1.3
White	18,585,394	374	20.1	1.8
African-American	2,060,658	83	40.3	3.6
American Indian/Alaska Native	150,940	5	33.1	3.0
Asian/Pacific Islander	879,110	3	3.4	0.3
White Male	8,737,226	237	27.1	2.4
African-American Male	878,981	56	63.7	5.7
American Indian/Alaska Native Male	70,975	1	14.1	1.3
Asian/Pacific Islander Male	398,751	1	2.5	0.2
White Female	9,848,168	137	13.9	1.2
African-American Female	1,181,677	27	22.8	2.1
American Indian/Alaska Native Female	79,965	4	50.0	4.5
Asian/Pacific Islander Female	480,359	2	4.2	0.4

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Ages 75 to 84				
Total	13,077,323	452	34.6	3.1
Male	5,493,404	247	45.0	4.0
Female	7,583,919	205	27.0	2.4
White	11,421,723	375	32.8	2.9
African-American	1,062,263	71	66.8	6.0
American Indian/Alaska Native	65,213	3	46.0	4.1
Asian/Pacific Islander	441,768	3	6.8	0.6
White Male	4,856,070	205	42.2	3.8
African-American Male	393,119	37	94.1	8.5
American Indian/Alaska Native Male	27,466	3	109.2	9.8
Asian/Pacific Islander Male	181,454	2	11.0	1.0
White Female	6,565,653	170	25.9	2.3
African-American Female	669,144	34	50.8	4.6
American Indian/Alaska Native Female	37,747	0	0.0	0.0
Asian/Pacific Islander Female	260,314	1	3.8	0.3

Gender/Race	Population	Fire Deaths	Death Rate (per Million Population)	Relative Risk
Age 85 or Older				
Total	5,544,305	282	50.9	4.6
Male	1,810,651	125	69.0	6.2
Female	3,733,654	157	42.0	3.8
White	4,959,568	216	43.6	3.9
African-American	389,296	58	149.0	13.4
American Indian/Alaska Native	19,383	1	51.6	4.6
Asian/Pacific Islander	145,946	7	48.0	4.3
White Male	1,630,464	99	60.7	5.5
African-American Male	109,340	24	219.5	19.7
American Indian/Alaska Native Male	6,727	0	0.0	0.0
Asian/Pacific Islander Male	54,007	2	37.0	3.3
White Female	3,329,104	117	35.1	3.2
African-American Female	279,956	34	121.4	10.9
American Indian/Alaska Native Female	12,656	1	79.0	7.1
Asian/Pacific Islander Female	91,939	5	54.4	4.9

Sources: 2010 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:
1. Table 1. Annual Estimates of the Population for the United States, Regions, States and Puerto Rico: April 1, 2010 to July 1, 2011 (NST-EST2011-01). Release date: December 2011.
2. Table 1. Annual Estimates of the Resident Population by Sex and Five-Year Age Groups for the United States: April 1, 2010 to July 1, 2011 (NC-EST2011-01). Release date: May 2012.
3. Monthly Postcensal Resident Population by Single Year of Age, Sex, Race and Hispanic Origin for the United States: July 1, 2010 to December 1, 2010 (NC-EST2011-ALLDATA-R-File02). Release date: May 2012.

Note: The overall male and female estimates include individuals with "2+ races" per the census. The "2+ races" category accounts for 2.3 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.

Physical and Mental Limitations

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. Often 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 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 confined to wheelchairs. Such infirmities make it difficult for older adults to react to a fire threat the way a younger adult could, and thus 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 65 years of age or older account for more than one-third of total outpatient spending on prescription medications in this country.[11] Moreover, 88 percent of older adults (60 or older) use at least one prescription drug, while 37 percent of adults over 60 concurrently use five or more prescriptions.[12] 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, 40 percent of adults 65 years or older reported current use of alcohol (at least one drink in the past 30 days) in 2011.[13] Further, 30 percent of those 75 years or older would consider themselves "current regular" drinkers, having had at least 12 drinks in the past year.[14] 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. Sixty-nine percent of home health care patients are over the age of 65.[15] 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,[16] and that number is likely to rise as people grow even older.

Poverty

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. Nearly 9 percent of older adults live below the poverty level.[17]

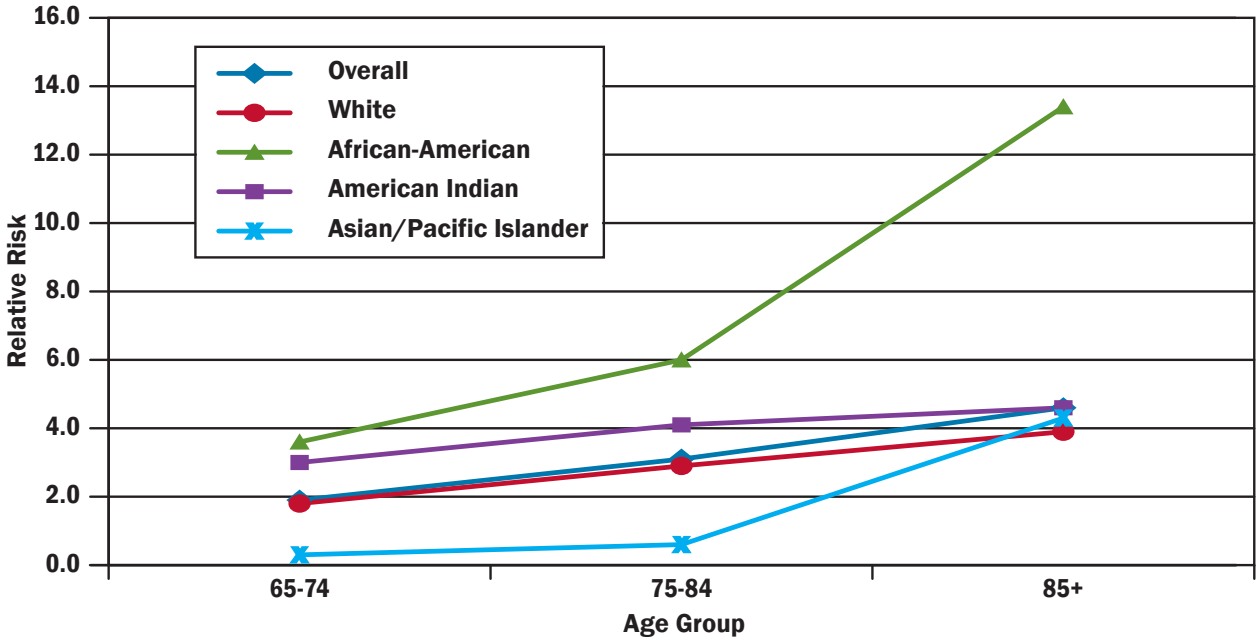
Housing for the poor is often substandard. Typically, such housing has not been well-maintained. Building structures can be compromised, and building systems such as electrical and mechanical are often outdated, inadequate or not operational. The result is a higher likelihood of damaged or fraying electrical 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.

Race as a Risk Factor

The risk of death or injury from fire is not uniform across the U.S. population, and in some ways, the distribution of deaths and injuries among older adults reflect this disparity. The disadvantages of age are compounded for some races, and both race and gender affect an older adult's fire risk. The problem is more severe for African-Americans and American Indians/Alaska Natives (see "Fire Risk in 2010," Volume 14, Issue 7, August 2013). American Indians/Alaska Natives, as a whole, had a 20 percent elevated risk for fire death, and their older populations were even more vulnerable. Older American Indians/Alaska Natives had over three times the risk of fire death as the overall population (Table 2). As a group, African-Americans had 1.5 times the relative risk of dying from fire than the general population. But it was the African-American elderly, those age 85 or over, who were most at risk — elderly African-American males had a fire death risk over 19 times greater than that of the general population and over four times the risk of all elderly people in this age group; elderly African-American females age 85 or older had almost 11 times the risk of the general population and over two times the risk of all elderly people in this age group. Although it is not likely that race itself predetermines a person's fire risk, poverty, access to adequate health care, and subsequent deteriorating health are recognized risk factors.[18] African-American older adults faced a higher fire fatality relative risk than other race-related groups, and that risk rises with age (Figure 2).

Figure 2. Age, Race and Relative Risk of Fire Fatality, 2010



Source: derived from Table 1.

Gender as a Risk Factor

The risk of fire is not uniform across gender. For the population as a whole, in 2010, males were 50 percent more likely than females to be victims of fires (see "Fire Risk in 2010," Volume 14, Issue 7, August 2013). This disparity held for older adults as well (62 percent), increasing to 100 percent in the 65 to 74 age group.

Conclusion

With an aging population, the U.S. demographic profile is rapidly changing. The older adult population is expected to increase from its current 13 percent of the total population to 20 percent within a few decades. The assumption is that there will be a corresponding increase in fire deaths and injuries among older adults. Medical advances and improved health care could keep older adults vital for a longer time, but eventual physical and mental limitations are likely, and the increased risks of fire injury and death to this population merit special attention.

Because older adults accounted for 35 percent of fire deaths and 13 percent of fire injuries in 2010, the U.S. Fire Administration (USFA) has been working toward the goal of reducing fire deaths and injuries to older adults. One resource to help address the fire problem for adults, A Fire Safety Campaign for People 50-Plus (http://www.usfa.fema.gov/campaigns/50plus/), discusses lifestyle strategies of safe smoking, safe cooking and safe heating to reduce the incidence of fires that traditionally affect older adults.

To request additional information or to comment on this report, visit http://apps.usfa.fema.gov/feedback/.

Notes:

[1] 2010 NCHS mortality data. The count of fire deaths noted in the text is rounded to the nearest five.

[2] U.S. Census Bureau, Population Division, Table 1: Annual Estimates of the Resident Population by Sex and Five-Year Age Groups for the United States: April 1, 2010 to July 1, 2011 (NC-EST2011-01). Release date: May 2012.

[3] U.S. Census Bureau, Population Division, Table 3. Percent Distribution of the Projected Population by Selected Age Groups and Sex for the United States: 2010 to 2050 (NP2008-T3). Release date: August 14, 2008. http://www.census.gov/population/projections/data/national/2008/summarytables.html.

[4] NCHS, *Health, United States 2011*, Table 22, http://www.cdc.gov/nchs/data/hus/hus11.pdf.

[5] In the case of fire casualties, this common basis is a population of 1 million, which means that fire rates are measured by incidents, deaths or injuries per million people.

[6]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.

[7]The per capita fire death rate for the total population is computed from the total number of fire deaths (3,445) divided by the total population (309,330,219) multiplied by 1,000,000 people. This rate is equivalent to 11.1 fire deaths per 1 million population.

[8]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.

[9]2010 NCHS mortality data. The count of fire deaths noted in the text is rounded to the nearest five.

[10]Estimates of fire injuries are calculated by determining the percent of injuries from the NFIRS version 5.0 data and applying this percentage to the NFPA estimate of fire injuries. The fire injury estimate noted in the text is rounded to the nearest 25.

[11]National Institute on Drug Abuse, *Research Report Series – Prescription Drugs: Abuse and Addiction*, October 2011, page 8, http://www.drugabuse.gov/sites/default/files/rrprescription.pdf.

[12]Centers for Disease Control and Prevention (CDC), *NCHS Data Brief, Number 42. Prescription Drug Use Continues to Increase: U.S. Prescription Drug Data for 2007-2008*, September 2010, http://www.cdc.gov/nchs/data/databriefs/db42.htm.

[13]U.S. Department of Health and Human Services (DHHS), Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings, page 32, http://www.samhsa.gov/data/NSDUH/2k11Results/NSDUHresults2011.pdf.

[14]CDC, U.S. DHHS, Vital and Health Statistics, Series 10, Number 256, December 2012, *Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2011*, Table 27, http://www.cdc.gov/nchs/data/series/sr_10/sr10_256.pdf.

[15]NCHS, National Health Statistics Reports, Number 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.

[16]Wendy Fox-Grage, 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.

[17]U.S. Census Bureau, *Income, Poverty, and Health Insurance Coverage in the United States: 2011, Current Population Reports, P60-243*, "Table 3. People in Poverty by Selected Characteristics: 2010 and 2011" based on *Current Population Survey*. Released September 2012. https://www.census.gov/hhes/www/poverty/data/incpovhlth/2011/table3.pdf.

[18]USFA, *Socioeconomic Factors and the Incidence of Fire*, June 1997.