TOPICAL FIRE REPORT SERIES Volume 11, Issue 10 / February 2011

Fire Risk to Older Adults in 2007

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 (USFA's) National Fire Incident Reporting System (NFIRS). 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

- The elderly continue to experience a disproportionate share of fire deaths: In 2007, older adults (aged 65 and older) represented 13 percent of the U.S. population but suffered more than 30 percent of all fire deaths.
- The relative risk of individuals aged 65 and over dying in a fire is 2.6 times greater than that of the general population. The risk worsens as age increases. The risk for adults ages 65 to 74 is 1.9, but soars to 4.4 for those over the age of 84.
- Older American Indians/Alaska Natives and African-Americans are at much greater risk of dying in a fire than their Asian/Pacific Islander or White fellow citizens. Older Asian/Pacific Islanders have nearly the same relative risk as the general population.
- Older males are 52 percent more likely to die in fires than older females.
- The elderly are 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.

Older Americans are burdened with the gravest fire risk in the United States and are consistently more threatened with injury or 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*, Vol. 7, Issue 7.

According to the National Center for Health Statistics (NCHS) data on mortality, nearly 4,000 deaths were caused by fire in 2007.[1] Older adults were disproportionately the victims—fire fatalities among persons aged 65 years or older in 2007 was 1,295, accounting for nearly 32 percent of all fire casualties that year.

Older adults comprise 13 percent of the U.S. population,[2] and their ranks are growing. It is estimated that the older population will rise sharply between 2010 and 2030, the years when the baby boom generation will be in retirement. By 2030, the Department of Health and Human Services' (HHS) Administration on Aging estimates adults ages 65 and over will comprise 19 percent of the U.S. population, and 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 close to one-third of total fire deaths, the number of older Americans who die in fires across the Nation is 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 does not address the magnitude of it 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]

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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] The result is a measure of how likely a group is to be affected.

For the general population, the relative risk is set at 1. From this report, the relative risk of dying in a fire for the total population of adults age 65 and over in comparison to the total population is 2.6. This is equivalent to the per capita fire death rate for adults age 65 and over (34.2 deaths per million population) divided by the per capita fire death rate for the entire population (13.2 deaths per million population[7]). Thus the relative risk of an adult age 65 and over dying from fire is 160 percent more than that of the total population.

Data Sources and Methodology

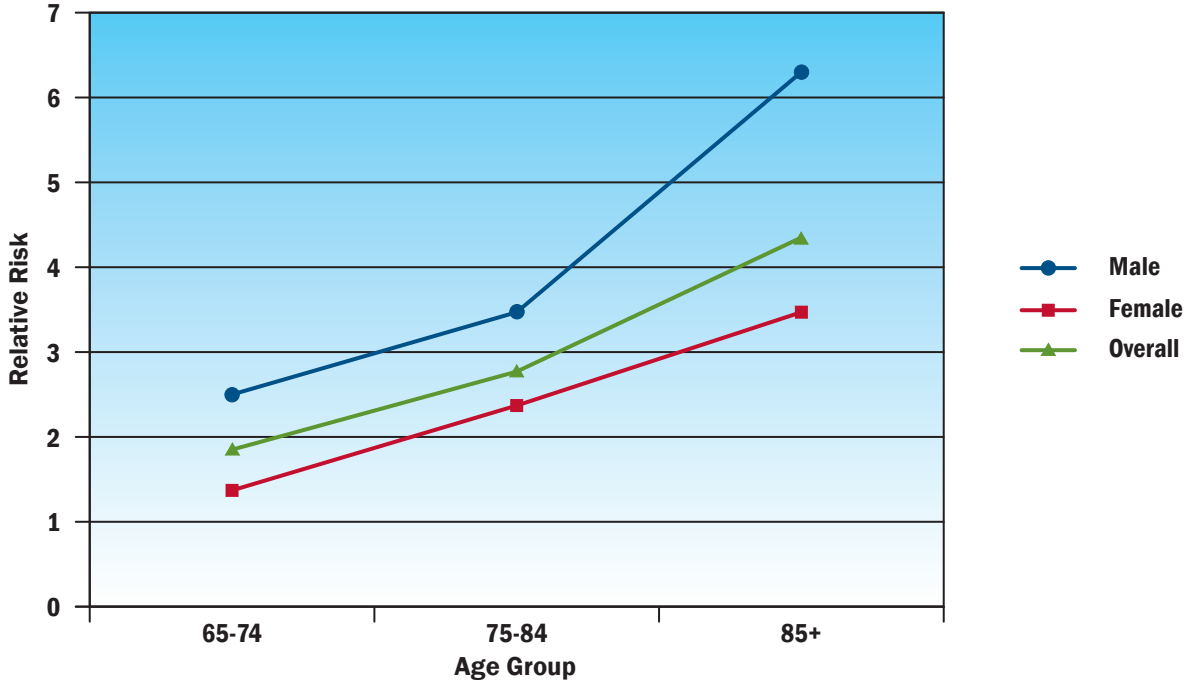
The findings in this report pertaining to deaths were taken from NCHS mortality data from 2007. For each reported death certificate in the United States, NCHS assigns International Classification of Disease (ICD) codes for all reported conditions leading to death. For this report, ICD codes F63.1, W39–W40, X00–X09, X75–76, X96–97, Y25–26, and Y35.1 within NCHS data were analyzed.[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 2007, which were released in late spring of 2010. For this reason, all analyses in this report and the other topical reports in the Risk Series (*Fire Risk in 2007*, Vol. 11, Issue 8, February 2011 and *Fire Risk to Children* in 2007, Vol. 11, Issue 9, February 2011) reference 2007 data for reasons of consistency.

Elevated Risk for Older Adults

To be elderly is, in itself, a disadvantage in terms of fire risk. A disproportionate number of mature adults, ages 65 years and older, die in fires each year. Mature adults can expect a relative risk of dying—that is, the per capita deaths per population of mature adults—in a fire that is 2.6 times higher than for the population as a whole. This statistic alone is troublesome, but when subcategories of mature adults are more closely evaluated, the situation worsens. The relative risk of dying in a fire rises substantially for the oldest segment (Figure 1 and Table 1). Individuals aged 85 or older are 4.4 times more likely to die in a fire than the general population, while those adults aged 65–74 are only 1.9 times more likely to suffer fire-related deaths.

Figure 1. Age, Gender, and Relative Risk of Fire Fatality, 2007



Source: Derived from Table 1.

Table 1. Relative Risk of Older Adult Fire Deaths by Age, Race, and Gender, 2007

Gender/Race	Population	Fire Deaths	Death Rate (per million population)	Relative Risk
All Older Adults (Ages 65 and Older)				
Total	37,867,145	1,294	34.2	2.6
Male	15,968,607	685	42.9	3.2
Female	21,898,538	609	27.8	2.1
White	32,935,481	1,000	30.4	2.3
African-American	3,231,682	264	81.7	6.2
American Indian/Alaska Native	208,343	15	72.0	5.4
Asian/Pacific	1,242,168	15	12.1	0.9
White Male	13,992,300	526	37.6	2.8
African-American Male	1,243,450	144	115.8	8.7
American Indian/Alaska Native Male	91,928	10	108.8	8.2
Asian/Pacific Male	534,311	5	9.4	0.7
White Female	18,943,181	474	25.0	1.9
African-American Female	1,988,232	120	60.4	4.6
American Indian/Alaska Native Female	116,415	5	42.9	3.2
Asian/Pacific Female	707,857	10	14.1	1.1

Gender/Race	Population	Fire Deaths	Death Rate (per million population)	Relative Risk
Ages 65-74				
Total	19,389,304	490	25.3	1.9
Male	8,911,783	297	33.3	2.5
Female	10,477,521	193	18.4	1.4
White	16,568,082	370	22.3	1.7
African-American	1,834,284	107	58.3	4.4
American Indian/Alaska Native	125,790	9	71.5	5.4
Asian/Pacific	719,580	4	5.6	0.4
White Male	7,696,192	218	28.3	2.1
African-American Male	765,473	71	92.8	7.0
American Indian/Alaska Native Male	58,759	6	102.1	7.7
Asian/Pacific Male	326,659	2	6.1	0.5
White Female	8,871,890	152	17.1	1.3
African-American Female	1,068,811	36	33.7	2.5
American Indian/Alaska Native Female	67,031	3	44.8	3.4
Asian/Pacific Female	392,921	2	5.1	0.4

Gender/Race	Population	Fire Deaths	Death Rate (per million population)	Relative Risk
Ages 75-84				
Total	13,213,485	498	37.7	2.8
Male	5,420,783	251	46.3	3.5
Female	7,792,702	247	31.7	2.4
White	11,621,409	398	34.2	2.6
African-American	1,059,959	92	86.8	6.6
American Indian/Alaska Native	62,136	4	64.4	4.9
Asian/Pacific	391,595	4	10.2	0.8
White Male	4,815,094	203	42.2	3.2
African-American Male	387,496	45	116.1	8.8
American Indian/Alaska Native Male	26,351	3	113.8	8.6
Asian/Pacific Male	159,475	0	0.0	0.0
White Female	6,806,315	195	28.6	2.2
African-American Female	672,463	47	69.9	5.3
American Indian/Alaska Native Female	35,785	1	27.9	2.1
Asian/Pacific Female	232,120	4	17.2	1.3

Gender/Race	Population	Fire Deaths	Death Rate (per million population)	Relative Risk
Ages 85 and Older				
Total	5,264,356	306	58.1	4.4
Male	1,636,041	137	83.7	6.3
Female	3,628,315	169	46.6	3.5
White	4,745,990	232	48.9	3.7
African-American	337,439	65	192.6	14.5
American Indian/Alaska Native	20,417	2	98.0	7.4
Asian/Pacific	130,993	7	53.4	4.0
White Male	1,481,014	105	70.9	5.4
African-American Male	90,481	28	309.5	23.4
American Indian/Alaska Native Male	6,818	1	146.7	11.1
Asian/Pacific Male	48,177	3	62.3	4.7
White Female	3,264,976	127	38.9	2.9
African-American Female	246,958	37	149.8	11.3
American Indian/Alaska Native Female	13,599	1	73.5	5.6
Asian/Pacific Female	82,816	4	48.3	3.6

Source: National Center for Health Statistics, 2007 Mortality data and U.S. population estimates from the Population Division, U.S. Census Bureau (Release Date: June 2010)

- Table 1: Annual Estimates of the Population for the United States, Regions, and States and for Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-01);
- Table 1: Annual Estimates of the Population by Five-Year Age Groups and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-01);
- Table 3: Annual Estimates of the Population by Sex, Race, and Hispanic or Latino Origin for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-03);
- Table 4: Annual Estimates of the White Alone Population by Age and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2006-09-WA);
- Table 4: Annual Estimates of the Black or African-American Alone Population by Age and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-04-BA);
- Table 4: Annual Estimates of the American Indian and Alaska Native Alone Population by Age and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-04-IA);
- Table 4: Annual Estimates of the Asian Alone Population by Age and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-04-AA); and
- Table 4: Annual Estimates of the Native Hawaiian and Other Pacific Islander Alone Population by Age and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-04-NA)

Note: The overall male and female estimates include individuals with "2+ races" per the Census. The "2+ races" category accounts for 1.7 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 the elderly 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 the elderly.

Older persons also tend to have physical disabilities or ailments that hinder their mobility. Many are confined to wheelchairs. Such infirmities make it difficult for the elderly 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 and older receive 35 percent of all prescribed medications in this country.[9] Moreover, 88 percent of older adults (60 and over) use at least one prescription drug, while 37 percent of adults over 60 concurrently use 5 or more prescriptions.[10] 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 elderly adults. According to the National Survey on Drug Use and Health, 39 percent of adults 65 years and older reported current use of alcohol (at least one drink in the past 30 days) in 2009.[11] Further, 29 percent of those 75 years and older would consider themselves "current regular" drinkers, having had at least 12 drinks in the past year.[12] 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. Seventy percent of home health-care patients are over the age of 65.[13] Home health care for the elderly is accompanied by an elevated fire risk. While no one factor is solely responsible for the increased fire risk to elderly persons receiving home health care, smoking in the presence of oxygen is recognized as one important problem.

As they age, Americans are more likely to live in assisted living and nursing facilities than nursing homes. In 2007, 3.3 percent of people 65 years and older lived in nursing facilities, while that number rose to 14 percent in reference to adults 85 years and older. The number of older residents living in nursing homes has increased slightly, but with the older population rising, along with the number of nursing facility beds, there has been a slight decline in the nursing facility occupancy rate of .7 percent.[14]

Poverty

When poverty and infirmity accompany old age, the fire risk is compounded. Elderly persons often live on fixed incomes. Older adults who reside alone live in poverty more often than those who live with a spouse or other persons. Many in this category are women who have outlived their husbands. Nearly 1 in 10 older adults live below the poverty level.[15]

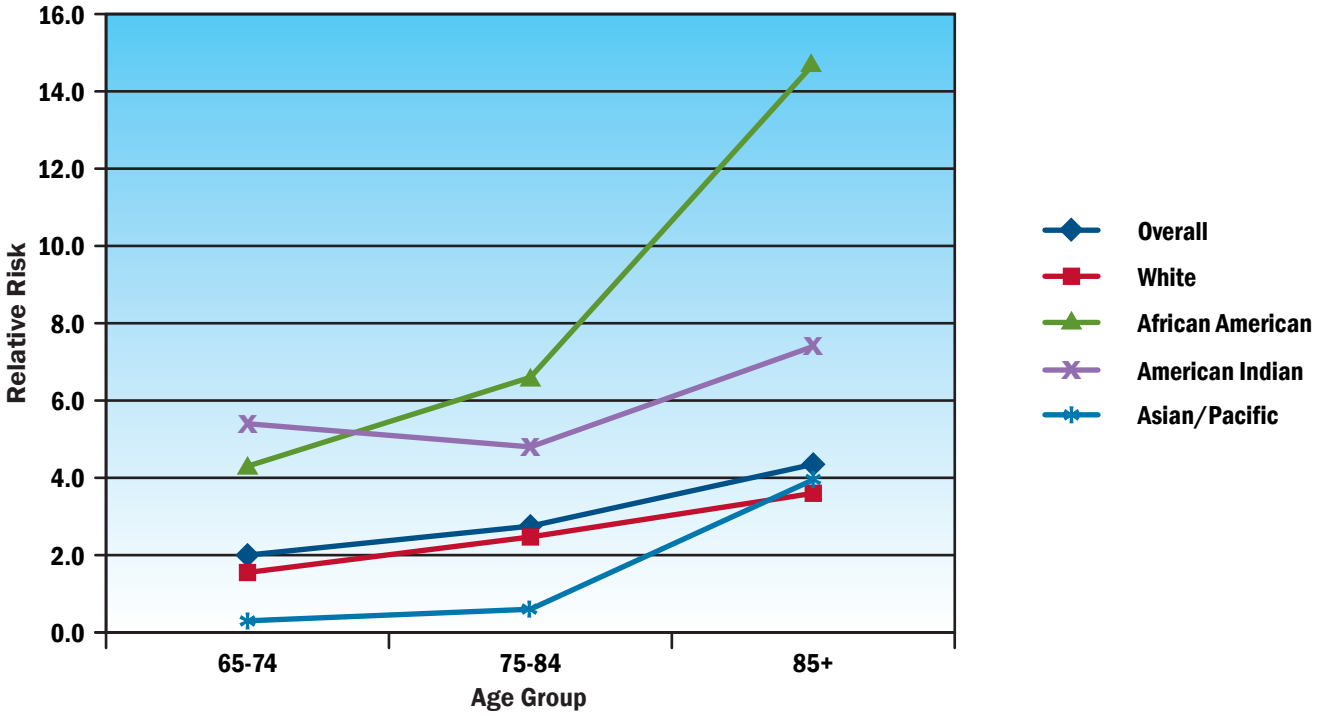
Housing for the poor is often substandard. Typically, such housing has not been well maintained. Building structures can be compromised, and building systems such as electrical and mechanical are often outdated, inadequate, or not operational. The result is a higher likelihood of damaged or fraying electrical wiring, faulty heating, and worn out household appliances. Heating in particular represents an elevated fire danger to the elderly, who frequently feel cold. When the central heating source of a home does not work properly, the elderly 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, an elderly person with impaired hearing is 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 casualties 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 substantially more severe for African-Americans and American Indians/Alaska Natives (see *Fire Risk in 2007*, Vol. 11, Issue 8, February 2011). American Indians/Alaska Natives, as a whole, have a 30 percent elevated risk for fire death and their older populations are even more vulnerable. Older American Indians/Alaska Natives have over five times the risk of fire death as the overall population (Table 1). As a group, African-Americans have 1.8 times the relative risk of dying from fire than the general population. But it is the African-American elderly, those ages 85 or over, who are most at risk—elderly African-American males had over 23 times greater the risk of dying in a fire than that of the general population and over 5 times the risk of all elderly in this age group; elderly African-American females have 11 times the risk of the general population and over 2.5 times the risk of all elderly 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.[16] African-American elderly face 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, 2007



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, men are approximately 50 percent more likely than women to be victims of fires (see *Fire Risk in 2007*, Vol. 11, Issue 8, February 2011). In 2007, this disparity holds for older adults as well (52 percent), increasing to nearly 79 percent in the 65–74 age group.

Conclusion

With an aging population, the U.S. demographic profile is rapidly changing. The elderly population is expected to increase from its current 13 percent of the total population to nearly 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 elderly persons 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 account for nearly a third of fire deaths and over 10 percent of fire injuries, 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.dhs.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 comment on this report, visit http://www.usfa.dhs.gov/applications/feedback/index.jsp

Notes:

[1] National Center for Health Statistics, 2007 Mortality data.

[2] Population Division, U.S. Census Bureau, Table 1: Annual Estimates of the Population by Five-Year Age Groups and Sex for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-01), Release Date: June 2010.

[3] Department of Health and Human Services, Administration on Aging, http://www.aoa.gov/AoARoot/Aging_Statistics/future_growth/docs/by_Age_65_And_Over.xls. Release Date: August 14, 2008.

[4] National Center for Health Statistics, *Health, United States 2009*, Table 24, http://www.cdc.gov/nchs/data/hus/hus09.pdf?bcsi_scan_EE45392F965C6772=0&bcsi_scan_filename=hus09.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 persons.

[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 persons.

[7] The per capita fire death rate for the total population is computed from the total number of fire deaths (3,994) divided by the total population (301,579,895) multiplied by 1,000,000 persons. This rate is equivalent to 13.2 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, Y35.1–Legal intervention involving explosives.

[9] National Institute on Drug Abuse, *Research Report Series – Prescription Drugs: Abuse and Addiction*, "Trends in prescription drug abuse," http://www.nida.nih.gov/ResearchReports/Prescription/prescription5.html#Trends.

[10] Centers for Disease Control and Prevention, *NCHS Data Brief, Number 42*. September 2010, http://www.cdc.gov/nchs/data/databriefs/db42.htm.

[11] Results from the 2009 National Survey on Drug Use and Health: National Findings, page 30, http://oas.samhsa.gov/NSDUH/2k9NSDUH/tabs/Sect2peTabs1to42.htm#Tab2.15B.

[12] Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, *Vital and Health Statistics, Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2009*, Table 27. http://www.cdc.gov/nchs/data/series/sr_10/sr10_249.pdf.

[13] National Center for Health Statistics, *Health, United States* 2005, Table 94. http://www.cdc.gov/nchs/data/hus/hus05.pdf#094.

[14] Gibson, Mary Jo, Wendy Fox-Grage, and Ari Houser, *Across the States: Profiles of Long Term Care and Independent Living, Eighth Edition,* 2009, Page 11. American Association for Retired Persons (AARP). http://assets.aarp.org/rgcenter/il/d19105_2008_ats.pdf.

[15] U.S. Census Bureau, *Income, Poverty, and Health Insurance Coverage in the United States:* 2009, *Current Population Reports, P60-238,* "Table 4. People and Families in Poverty by Selected Characteristics: 2008 and 2009" based on *Current Population Survey.* Released September 2010. http://www.census.gov/compendia/statab/2010/tables/10s0697.pdf.

[16] U.S. Fire Administration (USFA), *Socioeconomic Factors and the Incidence of Fire,* June 1997.