RESEARCH

Home Candle Fires

December 2017

Marty Ahrens

Abstract

Candles can enhance décor or be a source of light. However, they can also start fires.

National estimates of reported fires derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey show that candles were the heat source in an estimated average of 8,690 reported home fires annually during 2011-2015. These fires caused an average of 82 civilian deaths, 800 civilian injuries and $295 million in direct property damage per year.

More than one-third (37%) of home candle fires started in the bedroom. Three of every five (59%) fires occurred because the candle was too close to something that could burn. Candle fires are most common around the winter holidays. Candles used for light in the absence of electrical power appear to pose a particular risk of fatal fire. Home candle fires climbed through the 1990s but have fallen since the 2001 peak.

Despite the considerable progress made in reducing candle fires, they are still a problem. In 2011-2015, candle fires ranked second among the major causes in injuries per thousand fires and third in average loss per fire. Efforts to prevent these fires must continue.

Keywords: candle fires; home fires, fire causes, fire statistics

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about NFPA Research, go to www.nfpa.org/research or call 617-984-7450.

Copies of this analysis are available from:

National Fire Protection Association
Research, Data and Analytics Division
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
E-mail: research@nfpa.org
Phone: 617-984-7450

NFPA No. PKG34

FACT SHEET » RESEARCH

United States Home Candle Fires

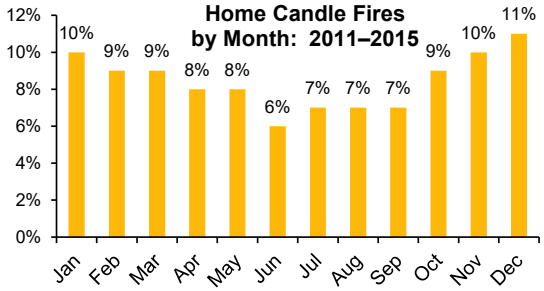
In 2011–2015, U.S. fire departments responded to an average of 8,690 home[1] structure fires started by candles, per year. These fires caused an annual average of 82 civilian fire deaths, 800 civilian fire injuries, and $295 million in direct property damage.

Overall, candles caused 2% of reported home fires, 3% of the home fire deaths, 7% of the home fire injuries, and 4% of the direct property damage in reported home fires during this period.

On average, 24 home candle fires were reported per day.

Candle fires are more common around the winter holidays

- Candle fires peaked in December (11%), and January and November ranked second, each with 10% of home candle fires.
- The top three days for home candle fires were Christmas, New Year's, and New Year's Eve.



Causes and Circumstances of Home Candle Fires

Three of every five (59%) candle fires started when something that could burn, such as furniture, mattresses or bedding, curtains, or decorations, was too close to the candle.

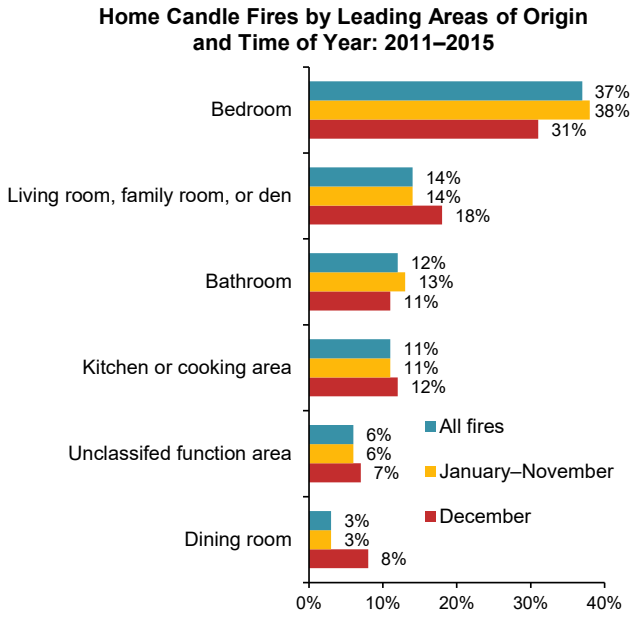
In 16% of the fires, the candles were unattended or abandoned.

Sleep was a factor in 11% of the fires and 21% of the candle fire deaths.

More than one-third (37%) of home candle fires began in the bedroom, although the National Candle Association found that only 13% of candle users most often burn candles in the bedroom.

Although bedrooms are still the most common area of origin, the pattern is somewhat different when candles become part of holiday decorating and celebrations.

- 18% of December candle fires started in the living room, family room, or den, and 8% started in the dining room compared to 14% and 3% for those areas during the rest of the year.
- 12% of December candle fires began with decorations. Only 4% of candle fires from January to November began with decorations.



[1]Homes include one- and two-family homes, manufactured housing, and apartments or other multi-family housing regardless of ownership.

Source: NFPA Research: www.nfpa.org/research
Contact information: 617-984-7451 or research@nfpa.org

NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

Table of Contents

List of Tables and Figures

Home Candle Fires

OVERVIEW

8,690 reported home structure fires per year, on average, were started by candles in 2011-2015. These fires caused an annual average of 82 civilian deaths, 800 civilian fire injuries, and $295 million in direct property damage. On average, 24 home candle fires were reported per day.

Figure 1. Percent of home structure fires started by candles: 2011-2015

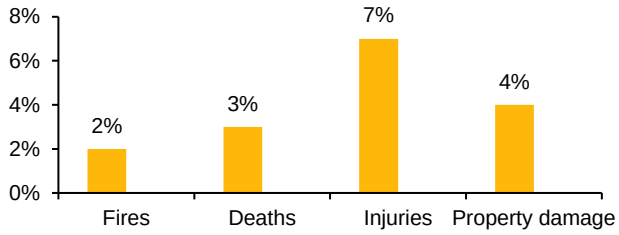
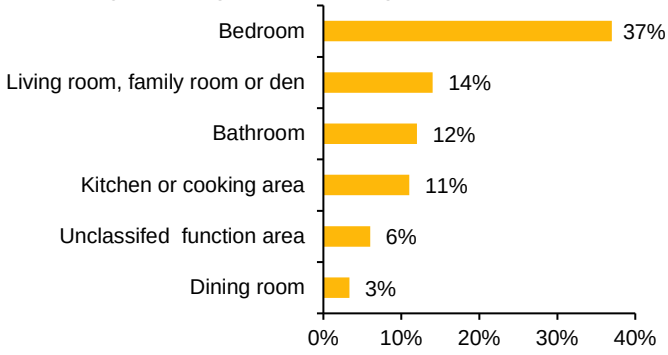


Figure 1 shows that candles caused 2% of total reported home fires, 3% of home fire deaths, 7% of home fire injuries, and 4% of associated direct property damage during this period. During 2011-2015, candles caused 9.4 deaths and 92.0 injuries per thousand fires, and an average loss of $34,000 per fire. In contrast, home structure fires overall caused 6.9 deaths and 36.1 injuries per thousand reported home fires with an average loss of $19,000 per fire.[1] Candle fires ranked second among the major causes in injuries per thousand fires and third in average loss per fire.

DETAILED PATTERNS OF REPORTED U.S. HOME CANDLE FIRES

Figure 2. Home Candle Fires by Leading Areas of Origin: 2011-2015



Where do candle fires start? The bedroom was the leading area of origin for home candle fires, even though candle are used more often in the living room. Figure 2 shows that more than one-third (37%) of home candle fires reported to local fire departments in 2011-2015 started in bedrooms. Table 1 shows that these fires caused more than one-third (36%) of the associated deaths and half (51%) of the associated injuries. The 14% of fires that started in living rooms, family rooms, or dens also 36% of the deaths and 17% of the injuries. Twelve percent of the candle fires started in bathrooms and 11% began in kitchens or cooking areas. (See Table 1.)

According to the National Candle Association, 42% of the candle users most often burned candles in the living room, 18% used candles most frequently in the kitchen, and 13% most commonly used them in the bedroom.[2]

[1] Marty Ahrens. *Home Structure Fires*, Quincy, MA: National Fire Protection Association, 2017, p. 19.
[2] National Candle Association. "Facts and Figures about Candles" accessed in October 2017.

Data Sources, Definitions and Conventions Used in this Report

Unless otherwise specified, the statistics in this analysis are national estimates of home structure fires reported to U.S. municipal fire departments in which candles were the heat source. Estimates exclude fires reported only to Federal or state agencies or industrial fire brigades. These estimates are projections based on the detailed information collected in Version 5.0 of the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS 5.0) and the National Fire Protection Association's (NFPA's) annual fire department experience survey. Except for property use and incident type, *fires with unknown or unreported data were allocated proportionally in calculations of national estimates. Candle fires were identified by NFIRS 5.0 heat source code 66.* These statistics include a proportional share of fires in which the heat source was undetermined or not reported, as well as proportional shares in which the heat source was an unclassified open flame or smoking material (heat source code 60). Homes include one- and two-family homes, manufactured housing, and apartments or other multi-family housing regardless of ownership.

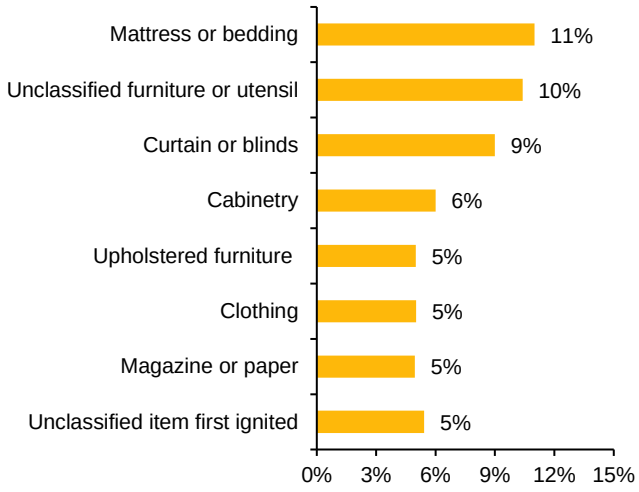
NFIRS 5.0, first introduced in 1999 and adopted gradually, includes a category of structure fires collectively referred to as "confined fires," identified by incident type. These include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires (incident type 113-118). Losses are generally minimal in these fires, which by definition, are assumed to have been limited to the object of origin. Although causal data is not required for these fires, it is sometimes present. *Confined and Non-confined fires were analyzed separately and summed for most fields studied.* The detailed estimates in this report were based on five-year raw *totals* of

a) 13,358 non-confined fires with candle reported as the heat source that resulted in 69 civilian deaths, 1,197 civilian injuries, and $326.2 million in direct property damage; and
b) 242 confined fires with no associated deaths, five civilian injuries, and $130,000 in direct property damage.

Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Except for the trend table, property damage has not been adjusted for inflation. In the trend tables, fires are rounded to the nearest hundred, civilian deaths and injuries to the nearest ten, and direct property damage to the nearest million. In non-trend tables, fires are rounded to the nearest ten, deaths and injuries to the nearest one, and property damage is rounded to the nearest hundred thousand dollars. Additional details on the methodology may be found in Appendix A.

What do candle fires ignite? Figure 3 shows that 11% of home candle fires began with a mattress or bedding; these fires caused 15% of the home candle fire deaths. An unclassified type of furniture or utensil was the item first ignited in 10% of these fires. Nine percent started when a curtain, blind or drapery ignited. Cabinetry was first ignited in 6% of these fires. Upholstered furniture was first ignited in 5% of the fires; these incidents caused 11% of the home candle fire deaths. Five percent of the fires began with unclassified items. Clothing was also first ignited in 5% of the fires, as were magazines, newspaper or writing paper. (See Table 2.)

Figure 3. Home Candle Fires by Leading Item First Ignited: 2011-2015



Decoration fires are unusually likely to begin with candles. During the same five-year period, candles were the heat source in more than one-third (36%) of home structure fires that began with decorations[3] and 8% of the home structure fires that began with Christmas trees.[4] In 2011-2015, candles were also the heat source in 9% of the home upholstered furniture fires[5] and 12% of the home mattress and bedding fires.[6]

How do home candle fires start? Ninety-five percent of the home candle fires were unintentional; 3% were intentional. (See Table 3.)

Table 4 shows that in three out of five (59%) home candle fires reported in 2011-2015, the fire started because the candle was too close to something that can burn. These fires caused 70% of the associated deaths and two-thirds (66%) of the injuries. The candle was unattended or abandoned in 16% of the incidents. Unclassified misuse of the material or product was a factor in 11% of these fires, an unclassified factor contributed in 5%, and 4% of the incidents were caused by people (typically children) playing with candles.

Table 5 shows that sleep was a human factor contributing to ignition in 11% of the home candle fires, one in five (21%) associated civilian deaths, and one-quarter (24%) of the injuries. In 18% of the fires, an unattended or unsupervised person was a factor. It is possible that in at least some of these fires, the "unattended" actually refers to the candle. The incident reports noted that no human factors contributed to 65% of the fires, half (50%) of the civilian deaths, and 54% of the civilian injuries. Note that multiple factors may be recorded for the same fire.

[3] NFPA Research Fact Sheet: *Home Structure Fires that Began with Decorations*, Quincy, MA: NFPA, Research, Data and Analytics Division.
[4] Marty Ahrens. *Home Christmas Tree Fires*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2017, p. 6.
[5] Marty Ahrens. *Home Structure Fires that Began with Upholstered Furniture*, Quincy, MA: NFPA, Research, Data and Analytics Division, 2017, p. 5
[6] Ben Evarts. *Home Structure Fires that Began with Mattresses and Bedding*, Quincy, MA: NFPA, Fire Analysis and Research Division, 2011, p. 24.

Flame damage was confined to the room of origin in three-quarters of these fires. Table 6 shows the extent of flame damage in home candle fires. In 22% of the incidents, the fire either had a confined fire incident type or the damage was coded as confined to the object of origin. In half (52%) of the incidents, flame damage extended beyond the original object but was confined to the room of origin. Flame damage extended beyond the room of origin in only one-quarter (26%) of the fires.

WHO ARE THE VICTIMS OF HOME CANDLE FIRES?

Adults 75 and older had highest death risk from candle fires. Table 7 shows the age distribution of the general population, the age distribution of people killed and injured by reported home candle fires. The casualty rate per million population, and the relative risk of death or injury from home candle fires compared to the risk faced by the general population and other age groups. The relative risk was calculated by dividing the death or injury rate for each age group by the rates for the general population. A relative risk of 1.0 means that the risk was equal to the risk faced by the general population.

Children under five had a death rate that was 1.2 times that of the general population, while children ages five through nine had a rate that was 1.9 times as high. The rate for adults 75 to 84 was 2.4 times as high. The risk of death from a candle fire was 4.5 times as high for those 85 and older than it was for the general population.

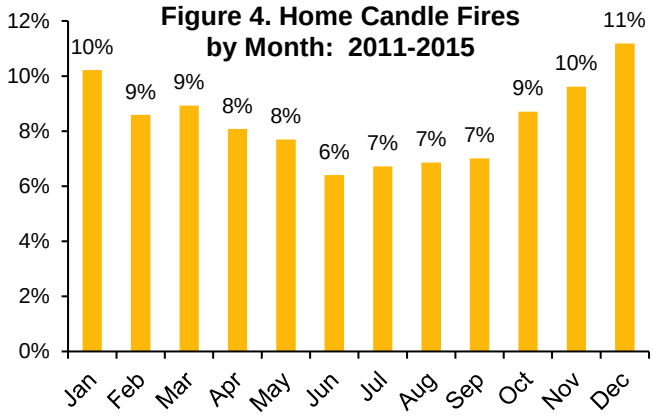
People in the 20-24 age group faced the highest risk of non-fatal *injury* from these fires. However, the difference between age groups was less pronounced for injuries than for deaths. Children and older adults actually had a lower risk of candle fire injury than did the general population.

Males accounted for 57% of 2011-2015 home fire fatalities and 54% of injuries from fires of all causes. However, 56% of the people killed and 52% of those injured by home candle fires in 2011-2015 were female.

WHEN DO CANDLE FIRES OCCUR?

Candle fires are more common on weekends and during the evening. Table 8 shows that home candle fires were most common on Saturdays (16%) and Sundays (15%). The peak time interval was from 6:00 p.m. to 9:00 p.m. (18%) Table 9 shows that the period from 9:00 p.m. to midnight (16%) ranked second and the interval from 3:00 p.m. to 6:00 p.m. was third (15%). The smallest shares of these fires were reported between 6:00 a.m. and 9:00 a.m. (8%) and between 3:00 a.m. and 6:00 a.m. (also 8%).

Winter holidays are the peak time for candle fires. Figure 4 and Table 10 show that 11% of home candle fires were reported in December. This was 1.4 times the 8.3% monthly average. January ranked second with 10%. According to the National Candle Association, roughly 35% of the candle business is seasonal around the Christmas holiday season.[7] These fires were less common in the warmer months that have longer days, with June, July, August and September having the smallest numbers reported.

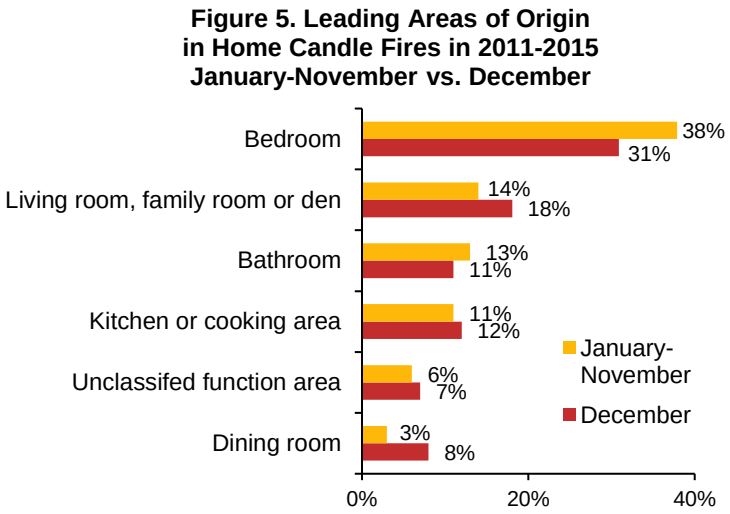


Christmas Day was the peak day for candle fires, with an estimated 70, or 0.8%, of the 8,690 home candle fires in 2011-2015. This was 2.8 times the daily average of 0.3% of candle fires. Table A shows that New Year's Day was the second most common day for these fires, and New Year's Eve ranked third.

Table A. Top Five Days for Reported Home Candle Structure Fires 2011-2015 Annual Averages

Rank	Date	Fires	Percent	Ratio to Average
1.	December 25	70	(0.8%)	2.8
2.	January 1	50	(0.6%)	2.1
3.	December 31	50	(0.5%)	1.9
4.	November 27	50	(0.5%)	1.9
5	December 24	40	(0.5%)	1.8

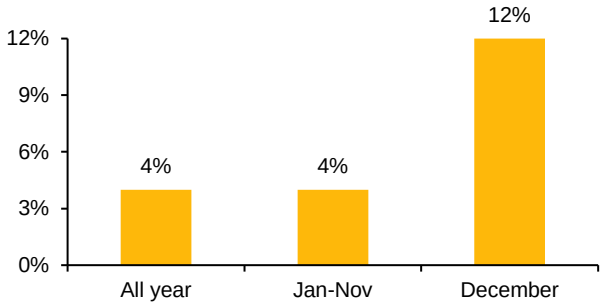
December candle fires follow a somewhat different pattern. As mentioned previously, candles are associated with Christmas and other December holidays, including Hanukkah, Kwanzaa, and New Year's. Although the bedroom was the leading areas of origin for home candle fires all year, Figure 5 shows that this pattern was not as pronounced in December. From January through November, 38% of the candle fires started in bedrooms. Only 31% of the December candle fires started there. In December, 18% of the home candle fires started in living rooms, family rooms, or dens, compared to 14% during the rest of the year. Eight percent of the December candle fires started in the dining room, compared to only 3% in the other 11 months.



[7] National Candle Association. "Facts and Figures about Candles" accessed October 25, 2017.

Decorations are the most common item first ignited in December candle fires. Table 11 and Figure 6 show that from January to November, decorations were first ignited in only 4% of the home candle fires. This jumped to 12% in December. This is consistent with the industry pattern of seasonal business. It suggests that seasonal candle fires often involve combustible decorations that would not have been present at other times of the year. In other words, the higher frequency of these fires around the winter holidays reflects a combination of increased candle use and a more combustible environment around those candles.

Figure 6. Percent of home candle fires beginning with decorations: 2011-2015



also

TRENDS

Home candle fires climbed through the 1990s but have fallen since the 2001 peak. During 2015, United States fire departments responded to an estimated 7,900 home structure fires started by candles. This was 4% less than the 8,200 in 2014. The 7,900 fires in 2015 caused an estimated 50 civilian deaths, 670 civilian injuries, and $278 million in direct property damage.

As Figure 7 shows, candles started an estimated 10,400 home fires in 1980. Candle fires generally declined through the 1980s, falling to a low of 6,800 in 1990. They started climbing in 1991. Candle fires peaked in 2001 at an estimated 18,900, before beginning a fairly steady decline through 2015. Candle fires have fallen 58% since 2001. Rolling five-year averages are shown by the solid line beginning with the 1980-1984 average above the 1982 column. Table 12 shows the candle fire and loss experience from 1980-2015.

Figure 7. Home Candle Fires (in Thousands) by Year: 1980-2015

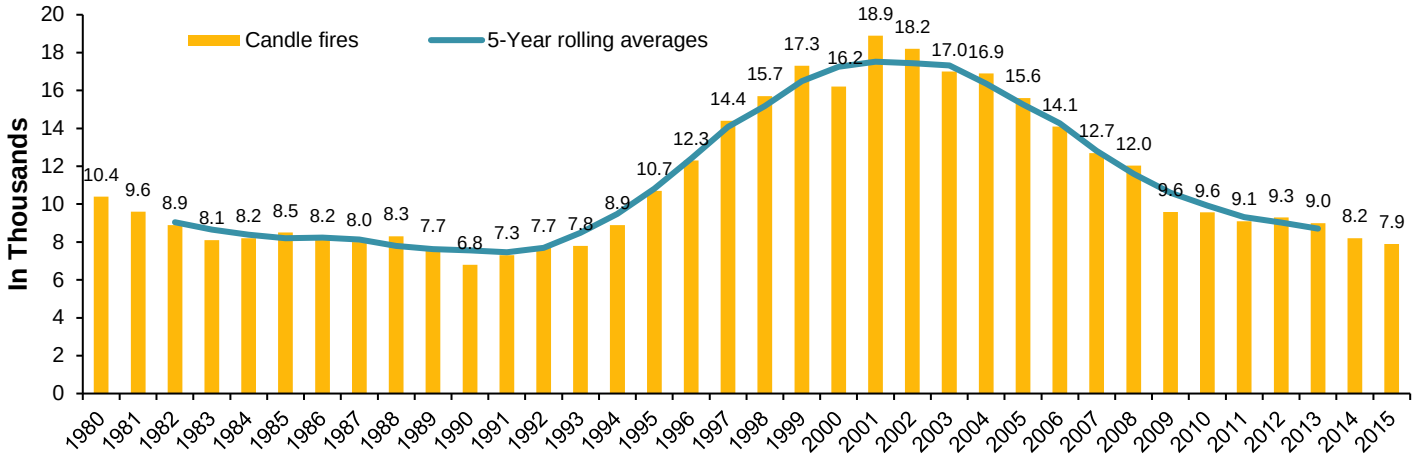


Figure 8 shows that the number of deaths has fluctuated considerably. These deaths tended to be more frequent from 1996 through 2007.

Figure 8. Home Candle Fire Deaths by Year: 1980-2015

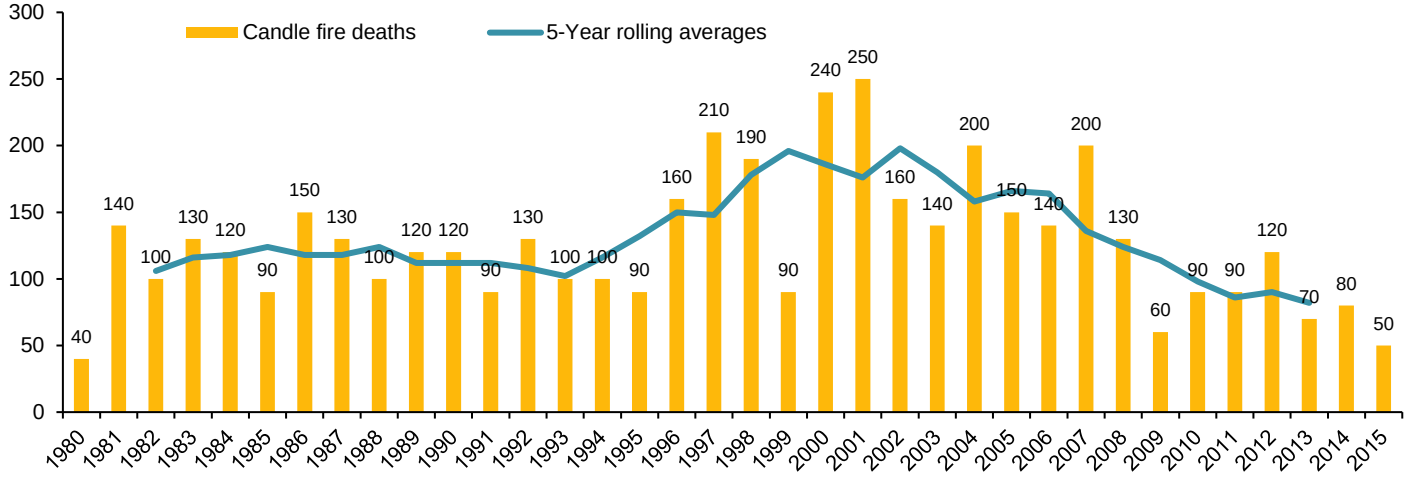
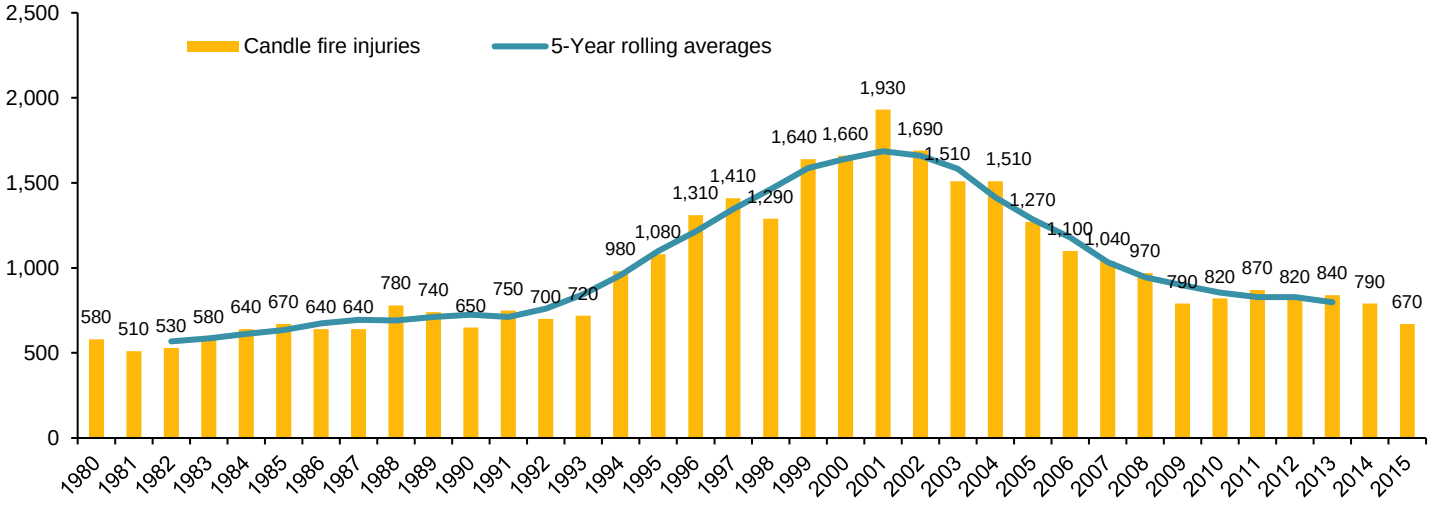


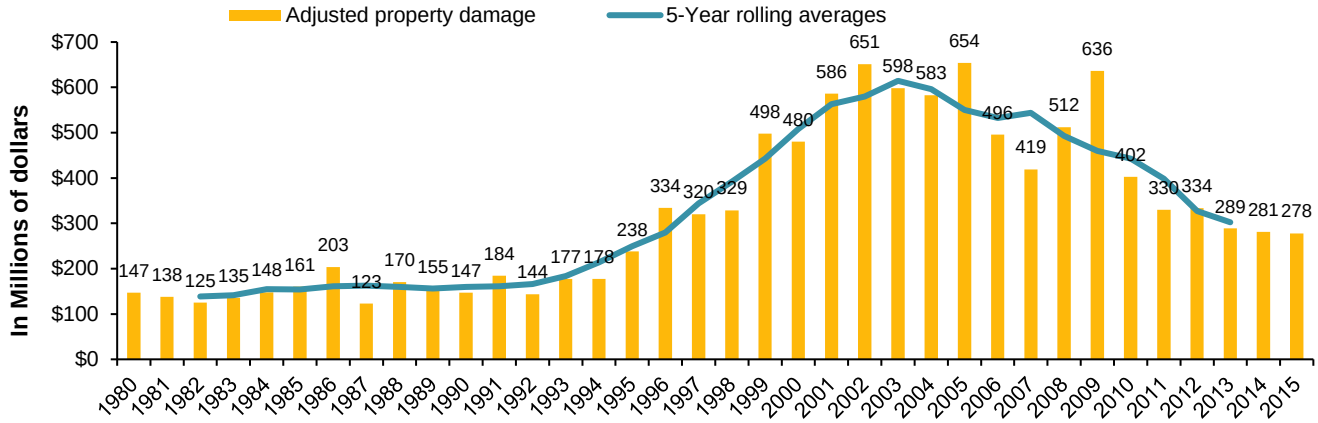
Figure 9 shows that civilian injuries caused by home candle fires have fallen sharply since the turn of the century but remain higher than in the early 1980s. NFPA's estimates of candle fire injuries are based only on injuries reported to the fire service. Some injured individuals may be transported from the scene before the fire department arrives or without fire department involvement.

Figure 9. Home Candle Fire Injuries by Year: 1980-2015



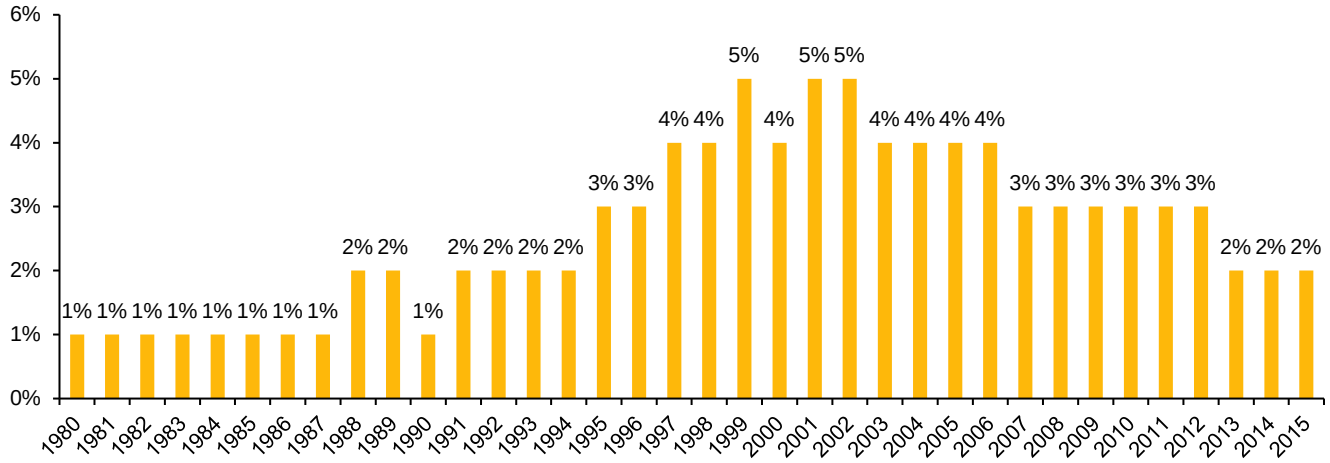
Direct property damage from home candle fires, adjusted for inflation, fell 1% from an estimated $281 million in 2014 to $278 million in 2015. Table 12 and Figure 10 show that direct property damage in real dollars was fairly stable through the 1980s and early 1990s and started to climb as candle fires increased. Property damage has been on a generally downward trend in the past several years despite a spike in 2009.

Figure 10. Property Damage in Home Candle Fires by Year: 1980-2015



The share of home fires started by candles has been falling but is still higher than in the 1980s and early 1990s. Partly because total home fires have declined so much since 1980 and partly because candle fires increased so much over the course of the 1990s through the earliest years of this century, the share of home structure fires started by candles climbed from 1% in the early 1980's to 5% in 1999, 2001, and 2002. Figure 11 shows that the share fell to 4% from 2003 to 2006, inclusive. In 2007, the share dropped to 3%, where it remained through 2012. (See Table 13.) Since 2013, candles caused 2% of home fires. In 2015, candle fires caused 2% of the civilian home fire deaths, 6% of the civilian home fire injuries, and 4% of the direct property damage in reported home fires.

Figure 11. Percent of Reported Home Fires Started by Candles, by Year: 1980-2015



CPSC estimated 465,000 unreported home candle fires occur per year in 2004-2005. The 2004-2005 CPSC's Residential Fire Survey asked about all fires, including incidents that were not attended by the fire service.[8] They estimated that U.S. households experienced 7.2 million home fires per year that were not attended by the fire service. Candles started 465,000, or 6% of these unreported fires. This survey has not been updated. Consequently, the current estimates of unreported candle fires and the percentage of unreported fires started by candles are unknown. Unfortunately, no updated information is available on unreported candle fires.

[8] Michael A. Greene and Craig Andres. *2004-2005 National Sample Survey of Unreported Residential Fires.* U.S. Consumer Product Safety Commission, July 2009, pp. 142-143.

CANDLES USED FOR LIGHT

When candles are used for light in the absence of electricity, there is additional risk of fatal fire. NFPA's Fire Incident Data Organization (FIDO) provides more detail on certain fires. While the collection is not complete or representative, information is available through FIDO that is not available through NFIRS. When fires of note are brought to NFPA's attention, additional information on the causes and circumstances is requested from fire departments. Files on 117 fatal home candle fires between January 1, 2005 and December 31, 2010 were reviewed to determine the role that electrical power outages or shut-off played in candle fire fatalities. These fires caused a total of 177 deaths. Unless power was specifically mentioned, it was assumed to be operational.

According to reports from the fire service, fire investigators, or the newspapers, the home was without power in 30, or one-quarter (26%) of the fatal candle fires studied. These fires resulted in 60, or one-third (34%) of the associated deaths. The reason for the lack of power was mentioned in 25 of the fires and 50 of the deaths. Percentages in the discussion below were based on incidents in which the reason for the lack of power was known.

In 17 (68%) fires resulting in 31 deaths (62%), the power had been shut off or the home lacked utilities. In six fires (24%) resulting in six deaths (12%), candles were used during a temporary power outage. In two fires (8%) resulting in 13 deaths (26%), new occupants were moving in and the power had not yet been turned on.

Some of the candle fires from *NFPA Journal's* "Firewatch" series and most of the catastrophic (multiple fire death) candle fires at the back of this report involve candles used for light due to lack of power, due to either a temporary situation or a termination of service.

In a survey done for NFPA in the fall of 2004, 24% of the 77% of the respondents who said they use candles, or 18% of the total respondents, reported that they used candles when the power goes out.[9] A review of the candle fires included in NFPA's studies of catastrophic fires found that candles had been used in the absence of electrical power in 10 of the 13 (three-quarters) catastrophic home candle fires from 1992 to 2010. These fires killed at least five people each. Two examples are shown below. Details about other home candle fires are found in Appendix B.

- In December 2006, a candle used for light burned down to, and then ignited, the living room coffee table in a two-story Ohio single-family dwelling. Power had been shut off before the fire occurred. Five people died in this fire.[10]
- In March 2005, a family that had just moved into a Louisiana townhouse was using candles for light because the electricity had not yet been turned on. One of the candles ignited bedding. Attempts to move the burning mattress were unsuccessful. Eleven people died in this fire. [11]

[9] Harris Interactive, *Fire Prevention Week Survey*, conducted for National Fire Protection Association (Public Affairs Division), Fall 2004, pp. 22-23.

[10] Badger, Stephen G. "U.S. Multiple-Death Fires for 2006," *NFPA Journal*, 101, no. 5 (2006), pp. 59-60.

[11] Badger, Stephen G. "U.S. Multiple-Death Fires for 2005," *NFPA Journal*, 100, no. 5 (2006), p. 60.

Health Canada focus groups found candles were used differently in power outages. The focus groups in the study done for Health Canada were asked about their use of candles in power outages. Many had a stash of candle stubs, often from tapers, or ugly candles that they would use in blackouts. Most would light candles in several rooms to make movement easier and to reduce the danger of falls. If the candles were placed in "safe and stable" holders, they felt that the candles were safe. Most avoided walking around with lit candles but some had special candle holders that they considered safe to use for this purpose. People with large numbers of decorative candles reported that power outages were a good time to use candles they no longer wanted and would light candles all over the house without moving the candle.[12] Because many decorative candles are placed as art objects, their location may be less than safe for actual use.

Advice for using candles safely and special additional advice for situations in which candles must be used as emergency light sources are found on page 19. However, people who cannot afford to pay their electric bills may also have difficulty affording flashlights and batteries. Prolonged power outages may exhaust battery supplies. Developing strategies to address this problem is a challenge for all life safety educators, and a particular challenge for fire safety groups such as NFPA.

ADDITIONAL INFORMATION

CPSC has issued numerous recalls of candles and candle-related products because of fire danger. According to a 2006 CPSC Briefing Package which examined the candle industry and the 118 recalls issued between 1993 and May 2006, the leading problems were secondary ignitions (often of items embedded in or decorating a candle), excessively high flames, and candleholders that overheated or ignited.[13] Candles and candle holders are still occasionally recalled, although such recalls are much less common than in the past. To report a problem with a candle or find out about recalls of specific products, see www.saferproducts.gov.

More than 400 companies or organizations manufacture candles. According to the National Candle Association (NCA), retail candle sales in the United States are estimated at $3.2 billion per year, excluding accessories such as holders. In the United States, more than 400 commercial, religious and institutional organizations manufacture candles. NCA members produce roughly 80% of the candles manufactured in the U.S. Women make 90% of all candle purchases. The three most popular consumer candles are votives, container candles, and pillar candles. About three-quarters of candle users burn candles for four hours or less at a time. [14]

Candle safety rules were often not followed when entertaining, according to Canadian focus groups. In 2005, Health Canada commissioned the Environics Research Group to conduct Intensive/Interactive Workshop focus groups with three groups of people between 18 and 30 years old and three groups with people between 31 and 71 years of age. The groups were asked about fire safety awareness, candle usage, and product labeling. A total of 42 people participated.

---

[12] Environics Research Group Limited. *Canadians' Behaviour Surrounding Candle Use and Fire Safety, A qualitative Exploration: Final Report*, Toronto, Ontario, Canada. Study *prepared* for Health Canada, January 2006, pp. 25-27.
[13] U.S. Consumer Product Safety Commission Candle Petition Product Team. *Petition CP 04-1 HP 04-1 Requesting Mandatory Fire Safety Standards for Candles and Candle Accessories* Briefing Package, July 2006, accessed online at on October 25, 2017.
[14] National Candle Association, "Facts and Figures about Candles" accessed on October 25, 2017.

All said candles were used in their homes at least once a month. Some were deeply interested in candles, some used them as romantic signals, some found candlelight relaxing, and some used them for odor management or to reduce bugs outside. Candles were also used in power outages. Candles in the living room were burned at night for appearance and scent. Decorative candles in the living room were treated like art and rarely burned. Candles were used in the kitchen for odor control and atmosphere. Women were more likely than men to take baths by candlelight.

A few participants used floating candles in the tub. In the bedroom, candles set romantic and/or relaxing moods. A few participants like to read by candlelight before going to sleep. Some admitted to falling asleep while candles were burning; most knew that this was dangerous.

Parents of teens and young adult women expressed concern about how this group used candles as they sometimes found wax on dressers. Many use candles differently when young children are present. Many feel that they minimize the risk of candle fire by choosing proper candle holders, safer types of candles and a non-flammable surface. However, when they entertain, they often leave candles burning throughout the house. In social situations, candles are burned when children are present even when no one is providing direct supervision of either the children or the candles. Less attention seems to be paid to safety when candles are used outside, with candles placed in a wide variety of locations, at times including steps and paths. Citronella candles are used to keep mosquitoes away. Some people use candles when camping.[15]

In March 2006, Health Canada's Consumer Product Safety Commission engaged Decima Research, Inc. to conduct an online survey of Canadian's candle usage practices, related fire safety issues and labeling preferences. Roughly 1,100 people completed the survey. Eighty-four percent used candles regularly, most often in either the living room or den or in the dining room. Those who recalled seeing warning labels on candles were more likely to use safe practices. The same survey found that 3% of Canada's candle users had a candle-related fire or injury in the previous year. The most common scenario involved a candle igniting something nearby. One-third of these incidents were reported to the fire department [16]

Incident descriptions provide more details.
A collection of home candle fire incident descriptions that were included in *NFPA Journal's* "Firewatch" column or in NFPA's studies of catastrophic or large-loss fires may be found in Appendix B. These fires tend to be more serious and should not be considered typical. However, they do help draw a clearer picture of how these fires can occur.

[15] Environics Research Group Limited. *Canadians' Behaviour Surrounding Candle Use and Fire Safety, a Qualitative Exploration: Final Report*, Toronto, Ontario, Canada. Study prepared for Health Canada, January 2006.
[16] Decima Research. Canadians' Behaviour Surrounding Candle Use and Fire Safety: A Quantitative Exploration. Study done for Health Canada, March 2006.

Safety Information

ASTM's voluntary standards address candles and accessories. The ASTM subcommittee F15.45 was created to address candle safety issues in 1997. Since then, it has issued a variety of candle-safety standards, including standards addressing terminology, fire safety labeling, glass candle containers, visible emissions, and fire safety for candles and candle accessories. These standards can be incorporated into law, contracts, codes and procedures.

NFPA has safety tips and resources. The Educational Messages Advisory Committee (EMAC) to NFPA's Public Education Division developed a collection of safety tips for a wide variety of activities, including the use of candles. New tips have been added for candle use in home worship. Fire and life safety educators can download the Educational Messages Desk Reference - 2017 Edition to find consistent safety messaging.

NFPA also has safety resources to help consumers protect themselves from candle fires and other dangers.

Table 1.
Home Candle Structure Fires, by Area of Origin
2011-2015 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Bedroom	3,220	(37%)	29	(36%)	404	(51%)	$132	(45%)
Non-confined	3,110	(36%)	29	(36%)	400	(50%)	$132	(45%)
Confined	110	(1%)	0	(0%)	4	(1%)	$0	(0%)
Living room, family room or den	1,230	(14%)	29	(36%)	140	(17%)	$50	(17%)
Non-confined	1,170	(13%)	29	(36%)	140	(17%)	$49	(17%)
Confined	60	(1%)	0	(0%)	0	(0%)	$0	(0%)
Lavatory or bathroom	1,080	(12%)	0	(0%)	46	(6%)	$17	(6%)
Non-confined	980	(11%)	0	(0%)	46	(6%)	$17	(6%)
Confined	90	(1%)	0	(0%)	0	(0%)	$0	(0%)
Kitchen or cooking area	940	(11%)	1	(1%)	43	(5%)	$20	(7%)
Non-confined	700	(8%)	1	(1%)	36	(5%)	$19	(7%)
Confined	240	(3%)	0	(0%)	6	(1%)	$0	(0%)
Unclassified function area	540	(6%)	7	(9%)	62	(8%)	$26	(9%)
Non-confined	520	(6%)	7	(9%)	62	(8%)	$26	(9%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Dining room	300	(3%)	5	(6%)	16	(2%)	$6	(2%)
Non-confined	280	(3%)	5	(6%)	16	(2%)	$6	(2%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Closet	140	(2%)	1	(1%)	10	(1%)	$6	(2%)
Non-confined	140	(2%)	1	(1%)	10	(1%)	$6	(2%)
Confined	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Other known area of origin	1,230	(14%)	9	(11%)	80	(10%)	$39	(13%)
Non-confined	1,070	(12%)	9	(11%)	80	(10%)	$39	(13%)
Confined	160	(2%)	0	(0%)	0	(0%)	$0	(0%)
Total	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Non-confined	7,970	(92%)	82	(100%)	789	(99%)	$295	(100%)
Confined	720	(8%)	0	(0%)	11	(1%)	$0	(0%)
Despite being the area of origin for fewer than 2% of the fires, at least 2% of the civilian deaths resulted from fires								
Garage or vehicle storage area*			2	(3%)				
Hallway			1	(2%)				
Unclassified structural space			1	(2%)				
Storage of supplies or tools or dead storage			1	(2%)				

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from Non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 2.
Home Candle Structure Fires, by Item First Ignited
2011-2015 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Mattress or bedding	990	(11%)	12	(15%)	177	(22%)	$48	(16%)
Non-confined	960	(11%)	12	(15%)	177	(22%)	$48	(16%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified furniture or utensil	870	(10%)	8	(9%)	72	(9%)	$32	(11%)
Non-confined	850	(10%)	8	(9%)	72	(9%)	$32	(11%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Curtains, blinds, drapery or tapestry	760	(9%)	5	(6%)	74	(9%)	$31	(10%)
Non-confined	750	(9%)	5	(6%)	74	(9%)	$31	(10%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Cabinetry	560	(6%)	0	(0%)	32	(4%)	$18	(6%)
Non-confined	530	(6%)	0	(0%)	32	(4%)	$18	(6%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)
Upholstered furniture	460	(5%)	9	(11%)	75	(9%)	$27	(9%)
Non-confined	450	(5%)	9	(11%)	72	(9%)	$27	(9%)
Confined	10	(0%)	0	(0%)	3	(0%)	$0	(0%)
Clothing	460	(5%)	6	(8%)	52	(6%)	$14	(5%)
Non-confined	440	(5%)	6	(8%)	52	(6%)	$14	(5%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Magazine, newspaper or writing paper	450	(5%)	6	(8%)	31	(4%)	$14	(5%)
Non-confined	370	(4%)	6	(8%)	28	(4%)	$14	(5%)
Confined	80	(1%)	0	(0%)	3	(0%)	$0	(0%)
Unclassified item first ignited	430	(5%)	5	(5%)	33	(4%)	$11	(4%)
Non-confined	340	(4%)	5	(5%)	33	(4%)	$11	(4%)
Confined	90	(1%)	0	(0%)	0	(0%)	$0	(0%)
Decoration	390	(4%)	2	(2%)	22	(3%)	$7	(2%)
Non-confined	360	(4%)	2	(2%)	22	(3%)	$7	(2%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)
Interior wall covering, excluding drapes	370	(4%)	4	(5%)	18	(2%)	$12	(4%)
Non-confined	370	(4%)	4	(5%)	18	(2%)	$12	(4%)
Confined	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Linen other than bedding	340	(4%)	0	(0%)	20	(2%)	$8	(3%)
Non-confined	320	(4%)	0	(0%)	20	(2%)	$8	(3%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Floor covering rug, carpet, or mat	300	(3%)	3	(4%)	24	(3%)	$7	(3%)
Non-confined	280	(3%)	3	(4%)	24	(3%)	$7	(3%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Multiple items first ignited	290	(3%)	3	(4%)	30	(4%)	$11	(4%)
Non-confined	260	(3%)	3	(4%)	30	(4%)	$11	(4%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)

Table 2.
Home Candle Structure Fires, by Item First Ignited
2011-2015 Annual Averages, (Continued)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified soft goods or wearing apparel	240	(3%)	0	(0%)	16	(2%)	$6	(2%)
Non-confined	240	(3%)	0	(0%)	16	(2%)	$6	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Rubbish, trash, or waste	240	(3%)	0	(0%)	13	(2%)	$4	(1%)
Non-confined	130	(2%)	0	(0%)	13	(2%)	$4	(1%)
Confined	110	(1%)	0	(0%)	0	(0%)	$0	(0%)
Appliance housing or casing	180	(2%)	2	(2%)	13	(2%)	$4	(1%)
Non-confined	150	(2%)	2	(2%)	13	(2%)	$4	(1%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)
Box, carton, bag, basket, or barrel	180	(2%)	0	(0%)	10	(1%)	$3	(1%)
Non-confined	150	(2%)	0	(0%)	10	(1%)	$3	(1%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)
Flammable or combustible liquids or gases, piping or filter	150	(2%)	1	(2%)	18	(2%)	$5	(2%)
Non-confined	120	(1%)	1	(2%)	18	(2%)	$5	(2%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Other known item first ignited	1,030	(12%)	16	(19%)	72	(9%)	$34	(11%)
Non-confined	890	(10%)	16	(19%)	67	(8%)	$34	(11%)
Confined	140	(2%)	0	(0%)	5	(1%)	$0	(0%)
Total	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Non-confined	7,970	(92%)	82	(100%)	789	(99%)	$295	(100%)
Confined	720	(8%)	0	(0%)	11	(1%)	$0	(0%)

Despite being the item first ignited for fewer than 2% of the fires, at least 2% of the civilian deaths resulted from fires starting with the following items:		
Christmas tree	4	(5%)
Structural member or framing	2	(2%)
Goods not made up, including fabric	2	(2%)
Decoration	2	(2%)
Light vegetation, including grass	2	(2%)
Unclassified organic material	2	(2%)
Interior ceiling cover or finish	1	(2%)

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.
Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 3.
Home Candle Structure Fires, by Cause of Ignition
2011-2015 Annual Averages

Cause of Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	8,260	(95%)	71	(87%)	773	(97%)	$282	(95%)
Non-confined	7,620	(88%)	71	(87%)	762	(95%)	$282	(95%)
Confined	640	(7%)	0	(0%)	11	(1%)	$0	(0%)
Intentional	220	(3%)	1	(2%)	14	(2%)	$5	(2%)
Non-confined	170	(2%)	1	(2%)	14	(2%)	$5	(2%)
Confined	50	(1%)	0	(0%)	0	(0%)	$0	(0%)
Failure of equipment or heat source	130	(1%)	5	(6%)	11	(1%)	$2	(1%)
Non-confined	110	(1%)	5	(6%)	11	(1%)	$2	(1%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified cause	70	(1%)	4	(5%)	2	(0%)	$6	(2%)
Non-confined	70	(1%)	4	(5%)	2	(0%)	$6	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Act of nature	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Non-confined	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Confined	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Total	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Non-confined	7,970	(92%)	82	(100%)	789	(99%)	$295	(100%)
Confined	720	(8%)	0	(0%)	11	(1%)	$0	(0%)

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from Non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 4.
Home Candle Structure Fires, by Factor Contributing to Ignition
2011-2015 Annual Averages

Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	5,160	(59%)	57	(70%)	528	(66%)	$176	(60%)
Non-confined	4,840	(56%)	57	(70%)	523	(65%)	$176	(60%)
Confined	320	(4%)	0	(0%)	5	(1%)	$0	(0%)
Abandoned or discarded material or product	1,170	(13%)	12	(14%)	73	(9%)	$38	(13%)
Non-confined	1,040	(12%)	12	(14%)	70	(9%)	$38	(13%)
Confined	130	(1%)	0	(0%)	3	(0%)	$0	(0%)
Unclassified misuse of material or product	960	(11%)	8	(10%)	88	(11%)	$27	(9%)
Non-confined	810	(9%)	8	(10%)	85	(11%)	$27	(9%)
Confined	140	(2%)	0	(0%)	3	(0%)	$0	(0%)
Unclassified factor contributed to ignition	400	(5%)	0	(0%)	30	(4%)	$13	(4%)
Non-confined	370	(4%)	0	(0%)	30	(4%)	$13	(4%)
Confined	30	(0%)	0	(0%)	0	(0%)	$0	(0%)
Playing with heat source	330	(4%)	5	(6%)	19	(2%)	$13	(5%)
Non-confined	280	(3%)	5	(6%)	19	(2%)	$13	(5%)
Confined	50	(1%)	0	(0%)	0	(0%)	$0	(0%)
Equipment unattended	260	(3%)	2	(2%)	16	(2%)	$8	(3%)
Non-confined	240	(3%)	2	(2%)	16	(2%)	$8	(3%)
Confined	20	(0%)	0	(0%)	0	(0%)	$0	(0%)
Collision, knock down, run over, or turn over	210	(2%)	5	(6%)	25	(3%)	$7	(2%)
Non-confined	200	(2%)	5	(6%)	25	(3%)	$7	(2%)
Confined	10	(0%)	0	(0%)	0	(0%)	$0	(0%)
Other known factor contributing to ignition	660	(8%)	2	(2%)	55	(7%)	$31	(11%)
Non-confined	600	(7%)	2	(2%)	55	(7%)	$31	(11%)
Confined	60	(1%)	0	(0%)	0	(0%)	$0	(0%)
Total fires	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Non-confined	7,970	(92%)	82	(100%)	789	(99%)	$295	(100%)
Confined	720	(8%)	0	(0%)	11	(1%)	$0	(0%)
Total factors	9,140	(105%)	90	(110%)	836	(104%)	$314	(106%)
Non-confined	8,380	(96%)	90	(110%)	825	(103%)	$313	(106%)
Confined	760	(9%)	0	(0%)	11	(1%)	$0	(0%)
Despite being a factor contributing to ignition for fewer than 2% of the fires, at least 2% of the civilian deaths resulted from fires with the following factor:								
Animal			2	(2%)				

* Multiple entries are allowed which can result in sums higher than totals.
Note: Sums may not equal totals due to rounding errors. Fires in which the factor contributing to ignition was coded as "none," unknown, or not reported have been allocated proportionally among fires with known factor contributing to ignition. Confined structure fires (NFIRS incident type 113-118) were analyzed separately from Non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.
Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 5.
Home Candle Structure Fires, by Human Factor Contributing to Ignition
2011-2015 Annual Averages

Human Factor Contributing to Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unattended or unsupervised person	1,580	(18%)	7	(9%)	105	(13%)	$48	(16%)
Asleep	950	(11%)	18	(21%)	194	(24%)	$38	(13%)
Age was a factor	350	(4%)	7	(9%)	29	(4%)	$15	(5%)
Possibly impaired by alcohol or drugs	180	(2%)	12	(15%)	43	(5%)	$10	(3%)
Possibly mentally disabled	110	(1%)	4	(5%)	20	(3%)	$5	(2%)
Multiple persons involved	60	(1%)	0	(0%)	5	(1%)	$3	(1%)
Physically disabled	30	(0%)	4	(5%)	22	(3%)	$2	(1%)
None	5,610	(65%)	41	(50%)	431	(54%)	$184	(62%)
Total fires*	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Total factors*	8,880	(102%)	93	(114%)	848	(106%)	$306	(103%)

* Multiple entries are allowed which can result in sums higher than totals.

Note: Sums may not equal totals due to rounding errors. Confined structure fires other than chimney or flue fires (NFIRS incident type 113, and 115-118) were analyzed separately from Non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 6.
Home Candle Structure Fires, by Extent of Fire Spread
2011-2015 Annual Averages

Extent of Fire Spread	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined fire identified by incident type	720	(8%)	0	(0%)	11	(1%)	$0	(0%)
Confined to object of origin	1,220	(14%)	2	(3%)	56	(7%)	$9	(3%)
Confined to room of origin	4,530	(52%)	19	(23%)	392	(49%)	$79	(27%)
Confined to floor of origin	710	(8%)	16	(19%)	115	(14%)	$51	(17%)
Confined to building of origin	1,390	(16%)	40	(49%)	201	(25%)	$140	(47%)
Beyond building of origin	140	(2%)	5	(6%)	25	(3%)	$17	(6%)
Total	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 7.
Home Candle Structure Fire Deaths and Injuries, by Age of Victim
2011-2015 Annual Averages

Age group	2011 Population in Millions		Civilian Deaths		Deaths per Million	Relative Risk	Civilian Injuries		Injuries per Million	Relative Risk
Under 5	19.9	6%	6	7%	0.3	1.2	35	4%	1.8	0.7
5-9	20.5	6%	10	12%	0.5	1.9	27	3%	1.3	0.5
10-14	20.7	7%	2	3%	0.1	0.5	28	4%	1.4	0.5
15-19	21.4	7%	2	3%	0.1	0.4	42	5%	2.0	0.8
20-24	22.6	7%	2	3%	0.1	0.4	79	10%	3.5	1.4
25-34	42.9	14%	6	7%	0.1	0.5	136	17%	3.2	1.3
35-44	40.7	13%	8	10%	0.2	0.8	114	14%	2.8	1.1
45-54	43.9	14%	6	7%	0.1	0.5	141	18%	3.2	1.3
55-64	39.4	12%	13	16%	0.3	1.3	100	12%	2.5	1.0
65-74	25.1	8%	11	13%	0.4	1.6	60	7%	2.4	0.9
75-84	13.5	4%	8	10%	0.6	2.4	23	3%	1.7	0.7
85+	5.9	2%	7	8%	1.2	4.5	15	2%	2.6	1.0
Total	316.5	100%	82	100%	0.3	1.0	800	100%	2.5	1.0
Selected age groups:										
14 and under	61.1	19%	18	23%	0.3	1.2	90	11%	1.5	0.6
65 and over	44.6	14%	26	31%	0.6	2.2	98	12%	2.2	0.9

Note: Civilian deaths and injuries are rounded to the nearest one. Sums may not equal totals due to rounding errors. See Appendix A. for methodology.

Source: NFIRS, NFPA's fire experience survey and U.S. Census Bureau, 2011-2015 American Community Survey 5-year estimates.

Table 8.
Home Candle Structure Fires, by Day of Week
2011-2015 Annual Averages
(Includes both non-confined and confined fires)

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	1,330	(15%)	13	(16%)	120	(15%)	$43	(15%)
Monday	1,190	(14%)	16	(19%)	111	(14%)	$41	(14%)
Tuesday	1,220	(14%)	13	(16%)	103	(13%)	$44	(15%)
Wednesday	1,140	(13%)	7	(9%)	110	(14%)	$35	(12%)
Thursday	1,210	(14%)	7	(9%)	99	(12%)	$41	(14%)
Friday	1,220	(14%)	14	(17%)	131	(16%)	$45	(15%)
Saturday	1,380	(16%)	12	(14%)	125	(16%)	$46	(16%)
Total	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Average per day of week	1,240	(14%)	12	(14%)	114	(14%)	$42	(14%)

Table 9.
Home Candle Structure Fires, by Time Period
2011-2015 Annual Averages
(Includes both non-confined and confined fires)

Time Period	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	920	(11%)	20	(25%)	112	(14%)	$36	(12%)
3 - 6 a.m.	700	(8%)	14	(17%)	108	(14%)	$30	(10%)
6 - 9 a.m.	650	(8%)	9	(11%)	82	(10%)	$26	(9%)
9 a.m. - Noon	920	(11%)	3	(4%)	101	(13%)	$29	(10%)
Noon - 3 p.m.	1,190	(14%)	6	(7%)	81	(10%)	$39	(13%)
3 - 6 p.m.	1,330	(15%)	6	(7%)	83	(10%)	$45	(15%)
6 - 9 p.m.	1,590	(18%)	5	(6%)	110	(14%)	$49	(16%)
9 p.m. - midnight	1,370	(16%)	18	(22%)	121	(15%)	$42	(14%)
Total	8,690	(100%	82	(100%)	800	(100%)	$295	(100%)
Average per time	1,090	(13%)	10	(13%)	100	(13%)	$37	(13%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 10.
Home Candle Structure Fires, by Month
2011-2015 Annual Aver ages
(Includes both non-confined and confined fires)

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	890	(10%)	11	(13%)	84	(11%)	$31	(10%)
February	750	(9%)	10	(13%)	88	(11%)	$30	(10%)
March	780	(9%)	6	(7%)	82	(10%)	$26	(9%)
April	700	(8%)	12	(15%)	67	(8%)	$25	(8%)
May	670	(8%)	5	(6%)	68	(8%)	$23	(8%)
June	560	(6%)	6	(7%)	47	(6%)	$18	(6%)
July	580	(7%)	1	(1%)	46	(6%)	$18	(6%)
August	600	(7%)	3	(4%)	41	(5%)	$20	(7%)
September	610	(7%)	7	(9%)	52	(6%)	$21	(7%)
October	760	(9%)	1	(2%)	70	(9%)	$22	(7%)
November	840	(10%)	13	(16%)	69	(9%)	$32	(11%)
December	970	(11%)	6	(7%)	86	(11%)	$31	(10%)
Total	8,690	(100%)	82	(100%)	800	(100%)	$295	(100%)
Average per month	720	(8%)	7	(8%)	67	(8%)	$25	(8%)

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 11.
Home Candle Structure Fires, by Item First Ignited: January-November and December
2011-2015 Annual Averages
(Includes both non-confined and confined fires)

January-November	Fires		December	Fires	
Mattress or bedding	900	(12%)	Decoration	120	(12%)
Unclassified furniture or utensil	760	(10%)	Unclassified furniture or utensil	100	(11%)
Curtains, blinds, drapery, or tapestry	690	(9%)	Mattress or bedding	90	(9%)
Cabinetry	510	(7%)	Curtains, blinds, drapery, or tapestry	80	(8%)
Clothing	410	(5%)	Cabinetry	60	(6%)
Upholstered furniture or vehicle seat	410	(5%)	Upholstered furniture or vehicle seat	50	(5%)
Magazine, newspaper, or writing paper	410	(5%)	Magazine, newspaper, or writing paper	40	(5%)
Unclassified item first ignited	390	(5%)	Clothing	40	(5%)
Interior wall covering, excluding drapes	350	(4%)	Linen other than bedding	40	(4%)
Linen other than bedding	300	(4%)	Unclassified item first ignited	40	(4%)
Decoration	270	(4%)	Rubbish, trash, or waste	30	(3%)
Floor covering rug, carpet, or mat	270	(3%)	Floor covering rug, carpet, or mat	30	(3%)
Multiple items first ignited	260	(3%)	Multiple items first ignited	30	(3%)
Unclassified soft goods or wearing apparel	220	(3%)	Interior wall covering, excluding drapes	30	(3%)
Rubbish, trash, or waste	210	(3%)	Unclassified soft goods or wearing apparel	20	(2%)
Appliance housing or casing	160	(2%)	Box, carton, bag, basket, or barrel	20	(2%)
Box, carton, bag, basket, or barrel	160	(2%)	Appliance housing or casing	20	(2%)
Flammable or combustible liquids or gases, piping or filter	140	(2%)	Other known item first ignited	130	(14%)
Other known item first ignited	910	(12%)			
			Total	970	(100%)
Total	7,720	(100%)			

Note: Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA fire department experience survey.

Table 12.
Candle Fires in the Home by Year: 1980-2015

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions) As Reported	In 2015 Dollars
1980	10,400		40		580		$51	$147
1981	9,600		140		510		$53	$138
1982	8,900		100		530		$51	$125
1983	8,100		130		580		$57	$135
1984	8,200		120		640		$65	$148
1985	8,500		90		670		$73	$161
1986	8,200		150		640		$94	$203
1987	8,000		130		640		$59	$123
1988	8,300		100		780		$85	$170
1989	7,700		120		740		$81	$155
1990	6,800		120		650		$81	$147
1991	7,300		90		750		$106	$184
1992	7,700		130		700		$85	$144
1993	7,800		100		720		$108	$177
1994	8,900		100		980		$111	$178
1995	10,700		90		1,080		$153	$238
1996	12,300		160		1,310		$221	$334
1997	14,400		210		1,410		$217	$320
1998	15,700		190		1,290		$226	$329
1999	17,300	(16,800)	90	(90)	1,640	(1,640)	$350 ($348)	$498
2000	16,200	(15,800)	240	(240)	1,660	(1,660)	$349 ($349)	$480
2001	18,900	(18,000)	250	(250)	1,930	(1,900)	$438 ($437)	$586
2002	18,200	(17,600)	160	(160)	1,690	(1,690)	$494 ($494)	$651
2003	17,000	(15,700)	140	(140)	1,510	(1,510)	$464 ($462)	$598
2004	16,900	(15,600)	200	(200)	1,510	(1,490)	$464 ($462)	$583
2005	15,600	(14,900)	150	(150)	1,270	(1,270)	$539 ($538)	$654
2006	14,200	(13,000)	140	(140)	1,100	(1,090)	$422 ($422)	$496
2007	12,700	(11,900)	200	(200)	1,040	((1,020)	$367 ($367)	$419
2008	12,000	(10,900)	130	(130)	970	(960)	$465 ($465)	$512
2009	9,600	(8,900)	60	(60)	790	(790)	$576 ($576)	$636
2010	9,600	(8,700)	90	(90)	820	(800)	$370 ($369)	$402
2011	9,100	(8,400)	90	(90)	870	(870)	$313 ($312)	$330
2012	9,300	(8,700)	120	(120)	820	(790)	$323 ($323)	$334
2013	9,000	(8,300)	70	(70)	840	(820)	$284 ($284)	$289
2014	8,200	(7,400)	80	(80)	790	(790)	$281 ($281)	$281
2015	7,900	(7,100)	50	(50)	670	(660)	$278 ($278)	$278

Note: Numbers in parentheses exclude fires with incident types indicating specific confined fires, including confined cooking fires, chimney or flue fires, fuel burner or boiler fires, incinerator, compactor, or trash fires that did not spread to other contents or the structure itself. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.* Inflation adjustments were based on the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2015) and from NFPA fire department experience survey.

Table 13.
Candle Fires in the Home as a Share of All Home Structure Fires, 1980-2015

Year	Home Fires	Home Candle Fires	Percent of Home Fires Started by Candles
1980	734,000	10,400	(1%)
1981	711,000	9,600	(1%)
1982	654,500	8,900	(1%)
1983	625,500	8,100	(1%)
1984	605,500	8,200	(1%)
1985	606,000	8,500	(1%)
1986	565,500	8,200	(1%)
1987	536,500	8,000	(1%)
1988	538,500	8,300	(2%)
1989	498,500	7,700	(2%)
1990	454,500	6,800	(1%)
1991	464,500	7,300	(2%)
1992	459,000	7,700	(2%)
1993	458,000	7,800	(2%)
1994	438,000	8,900	(2%)
1995	414,000	10,700	(3%)
1996	417,000	12,300	(3%)
1997	395,500	14,400	(4%)
1998	369,500	15,700	(4%)
1999	371,000	17,300	(5%)
2000	368,000	16,200	(4%)
2001	383,500	18,900	(5%)
2002	389,000	18,200	(5%)
2003	388,500	17,000	(4%)
2004	395,500	16,900	(4%)
2005	381,000	15,600	(4%)
2006	396,000	14,100	(4%)
2007	399,000	12,700	(3%)
2008	386,500	12,000	(3%)
2009	362,500	9,600	(3%)
2010	384,000	9,600	(3%)
2011	370,000	9,100	(3%)
2012	365,000	9,300	(3%)
2013	369,500	9,000	(2%)
2014	367,500	8,200	(2%)
2015	365,500	7,900	(2%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Home fires are rounded to the nearest five hundred while home candle fires are rounded to the nearest hundred.

Source: Total home fires are based on the NFPA fire department experience survey. Candle fire estimates are derived from NFIRS and the NFPA fire department experience survey. See Appendix A for information on the methodology used.

Appendix A.
How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system through which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit https://www.usfa.fema.gov/data/nfirs/.

NFIRS has a wide variety of data elements and codes. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is not possible to tell the portion of each from the coded data.

Methodology may change slightly from year to year. NFPA is continually examining its methodology to provide the best possible answers to specific questions. From time to time, changes are made to methodologies or groupings. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.* Readers should use the latest report available and contact us if clarification is needed.

NFPA's fire department experience survey provides estimates of the big picture. Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 5,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments serving about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; 3) the number and nature of non-fire incidents; and (4) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*.

PROJECTING NFIRS TO NATIONAL ESTIMATES

As noted, NFIRS is a voluntary reporting system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample. But there is enough reason for concern so that a second database -- the NFPA's fire experience survey -- is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA's fire experience survey where its statistical design advantages are strongest.

Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios. Reports for incidents in which mutual aid was given are excluded from NFPA's analyses.

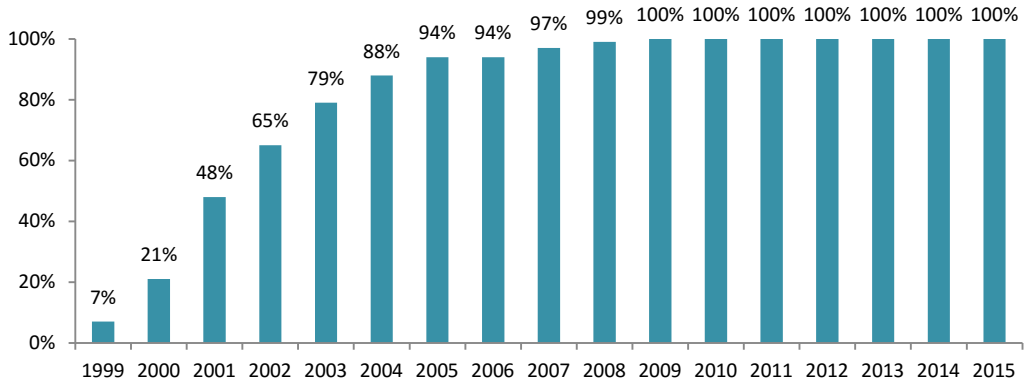
Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the analytical rules used in analyzing data from the two data sets. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others. The essentials of the approach described by Hall and Harwood are still used, but some modifications have been necessary to accommodate the changes in NFIRS 5.0. For 2002 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

$$\frac{\text{NFPA's fire experience survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed with extreme caution.

Figure A.1. Fires Originally Collected in NFIRS 5.0 by Year



NFIRS 5.0 introduced six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

Some analyses of structure fires show only non-confined fires. In these tables, percentages shown are of non-confined structure fires rather than all structure fires. This approach has the advantage of showing the frequency of specific factors in fire causes, but the disadvantage of possibly overstating the percentage of factors that are seldom seen in the confined fire incident types and of understating the factors specifically associated with the confined fire incident types. Other analyses include entries for confined fire incident types in the causal tables and show percentages based on total structure fires. In these cases, the confined fire incident type is treated as a general causal factor.

For most fields other than Property Use and Incident Type, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields. *Casualty and loss projections can be heavily influenced by the inclusion or exclusion of unusually serious fire.*

SPECIFIC DATA ELEMENTS

In the formulas that follow, the term "all fires" refers to all fires in NFIRS on the dimension studied. The percentages of fires with known or unknown data are provided for non-confined fires and associated losses, and for confined fires only.

Cause of Ignition: This field is used chiefly to identify intentional fires. "Unintentional" in this field is a specific entry and does not include other fires that were not intentionally set: failure of equipment or heat source, act of nature, or "other" (unclassified)." The last should be used for exposures but has been used for other situations as well. Fires that were coded as under investigation and those that were coded as undetermined after investigation were treated as unknown.

Factor Contributing to Ignition: In this field, the code "none" is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for "not reported" when no factors are recorded. "Not reported" is treated as an unknown, but the code "none" is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Although Factor Contributing to Ignition is only required when the cause of ignition was coded as: 2) unintentional, 3) failure of equipment or heat source; or 4) act of nature, data is often present when not required. Consequently, any fire in which no factor contributing to ignition was entered was treated as unknown.

In some analyses, all entries in the category of mechanical failure, malfunction (factor contributing to ignition 20-29) are combined and shown as one entry, "mechanical failure or malfunction." This category includes:

21. Automatic control failure;
22. Manual control failure;
23. Leak or break. Includes leaks or breaks from containers or pipes. Excludes operational deficiencies and spill mishaps;
25. Worn out;
26. Backfire. Excludes fires originating as a result of hot catalytic converters;
27. Improper fuel used; Includes the use of gasoline in a kerosene heater and the like; and
20. Mechanical failure or malfunction, other.

Entries in "electrical failure, malfunction" (factor contributing to ignition 30-39) may also be combined into one entry, "electrical failure or malfunction." This category includes:

31. Water-caused short circuit arc;
32. Short-circuit arc from mechanical damage;
33. Short-circuit arc from defective or worn insulation;
34. Unspecified short circuit arc;
35. Arc from faulty contact or broken connector, including broken power lines and loose connections;
36. Arc or spark from operating equipment, switch, or electric fence;
37. Fluorescent light ballast; and

30. Electrical failure or malfunction, other.

Heat Source. In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: "Heat from open flame or smoking material, other." NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range, shown below.

61. Cigarette;
62. Pipe or cigar;
63. Heat from undetermined smoking material;
64. Match;
65. Lighter: cigarette lighter, cigar lighter;
66. Candle;
67 Warning or road flare, fuse;
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping "smoking materials" includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

Equipment Involved in Ignition (EII). NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to "the piece of equipment that provided the principal heat source to cause ignition." However, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

$$\frac{\text{All fires}}{\text{(All fires – blank – undetermined – [fires in which EII =NNN and heat source <>40-99])}}$$

In addition, the partially unclassified codes for broad equipment groupings (i.e., code 100 - heating, ventilation, and air conditioning, other; code 200 - electrical distribution, lighting and power transfer, other; etc.) were allocated proportionally across the individual code choices in their respective broad groupings (heating, ventilation, and air conditioning;

electrical distribution, lighting and power transfer, other; etc.). Equipment that is totally unclassified is not allocated further. This approach has the same downside as the allocation of heat source 60 described above. Equipment that is truly different is erroneously assigned to other categories.

In some analyses, various types of equipment are grouped together.

Code Grouping	EII Code	NFIRS definitions
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove
	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	120	Fireplace or chimney
	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Fixed wiring and related equipment	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	213	Electric meter or meter box
	214	Wiring from meter box to circuit breaker
	215	Panel board, switch board or circuit breaker board
	216	Electrical branch circuit
	217	Outlet or receptacle
	218	Wall switch
	219	Ground fault interrupter
Transformers and power supplies	221	Distribution-type transformer
	222	Overcurrent, disconnect equipment
	223	Low-voltage transformer
	224	Generator
	225	Inverter

	226	Uninterrupted power supply (UPS)
	227	Surge protector
	228	Battery charger or rectifier
	229	Battery (all types)

Code Grouping	**EII Code**	**NFIRS definitions**
Lamp, bulb or lighting	230	Unclassified lamp or lighting
	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture
	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign
Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord
Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top broiler
	638	Waffle iron, griddle

639 Wok, frying pan, skillet
641 Breadmaking machine

Area of Origin. Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply "bedroom." Chimney is no longer a valid area of origin code for non-confined fires.

Item First Ignited. In most analyses, mattress and pillows (item first ignited 31) and bedding, blankets, sheets, and comforters (item first ignited 32) are combined and shown as "mattresses and bedding." In many analyses, wearing apparel not on a person (code 34) and wearing apparel on a person (code 35) are combined and shown as "clothing." In some analyses, flammable and combustible liquids and gases, piping and filters (item first ignited 60-69) are combined and shown together.

Extent of Fire Spread. All structure fires with incident types indicating a confined fire were shown separately and are assumed to be confined to the object of origin. Fires that spread beyond the room of origin are calculated by summing fires with damage:

a) confined to the floor of origin (code 3),
b) confined to the building of origin (code 4), and
c) extending beyond building of origin (code 5).

Rounding and percentages. The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100% even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.

Inflation. Property damage estimates are not adjusted for inflation unless so indicated.

Appendix B.
Selected Published Incidents

The following are selected published incidents involving home candles. Included are short articles from the "Firewatch" columns in *NFPA Journal* and incidents from either the large-loss fires report or catastrophic fires report. It is important to remember that this is anecdotal information. Anecdotes show what can happen; they are not a source to learn about what typically occurs.

NFPA's Fire Incident Data Organization (FIDO) identifies significant fires through a clipping service, the Internet and other sources. Additional information is obtained from the fire service and federal and state agencies. FIDO is the source for articles published in the "Firewatch" column of the *NFPA Journal* and many of the articles in this report.

Resident dies in house fire started by candle, New York
An elderly woman with a mobility impairment died from smoke inhalation injuries sustained in a house fire that started when a candle ignited materials in the basement. Firefighters were summoned to the scene at 4:15 a.m. after the fire was detected by the victim's son, who also resided in the home.

Reports indicated that first-arriving crews encountered heavy smoke conditions as they arrived at the scene and that they found the victim in a back bedroom, already deceased.

According to newspaper reports, the victim's son and a neighbor attempted to enter the house through a side door but were driven back by intense smoke conditions. The reports indicated that the son was taken to the hospital and later released.

Investigators determined that a candle that was left burning in the basement ignited nearby combustibles, with the fire spreading through the basement and then up the stairs into the first floor.

A battery-operated smoke alarm inside the house was determined to be inoperable.

The single-story house was constructed with a wood frame and brick walls and had a wood roof deck covered with asphalt shingles. The structure occupied a ground-floor area of 1,073 square feet (100 square meters).

Richard Campbell, "Firewatch," *NFPA Journal*, July/Aug 2017.

One killed, one injured in apartment fire ignited by candle, Texas
An elderly man died and his wife was injured in a late-night apartment fire that began when a candle being used during a power outage ignited furniture in the bedroom and then spread throughout the room.

Firefighters were dispatched to the fire after a resident called 911 at 11:30 p.m. Crews arrived at the scene approximately five minutes after receiving the alarm. Crews began fighting the fire as

they entered the apartment and worked their way toward the bedroom. They reported that the victim was deceased when they reached the bedroom.

The fire took place in a large apartment complex containing 352 units. The victim's wife told investigators that she placed a candle on a bedroom nightstand for her husband, who had a mobility disability, then left the room, and that the nightstand was on fire when she returned. After unsuccessfully trying to remove her husband and to extinguish the fire with water, she exited the apartment and began calling for help.

After extinguishing the fire, crews performed ventilation, salvage, and overhaul operations.

EMS crews transported the victim's wife, who suffered burn injuries, to the emergency room for treatment.

Investigators noted the fire caused heat damage to the apartment's front door and to the living room and that damage worsened as they progressed to the bedroom. The fire caused extensive damage in the bedroom, including burn damage to ceiling joists above the sleeping area.

The apartment was equipped with a smoke alarm outside the bedroom, but investigators determined that it was not functioning. The apartment did not have an automatic extinguishing system.

The apartment complex was described in newspaper reports as a townhouse development. The fire did not spread beyond the apartment of fire origin, which was a two-story building. Information was not available on the size of the apartment.

The fire caused $10,400 in damage to the property and an additional $5,000 to its contents.

Richard Campbell, "Firewatch," *NFPA Journal*, March/April 2017.

Woman killed when candle lights clothing, Illinois

Police conducting a welfare check in an apartment complex found the body of a female resident who had suffered fatal burn and smoke inhalation injuries.

Police responded after a neighbor heard a smoke alarm sounding in the victim's unit and called 911. The fire department reported that the fire was extinguished prior to its arrival and that crews had little involvement in the incident.

Newspapers indicated that the victim, who had a mobility disability, lived alone. Investigators determined that the victim's clothing ignited while she was lighting a candle.

The apartment was protected by stand-alone smoke alarms but was not equipped with automatic extinguishing equipment.

The apartment experienced only smoke damage and minor damage to a small area of carpeting. No dollar estimates were provided on the damage.

Richard Campbell, "Firewatch," *NFPA Journal*, March/April 2017.

Candle fire extinguished when sprinkler system activates, Minnesota
Firefighters arrived at an apartment complex less than five minutes after being dispatched by an alarm company, but found that a fire in the bathroom of one unit had already been extinguished by an automatic sprinkler system.

The fire began at approximately 1:30 p.m. when a resident placed a paper towel on a bathroom counter, which ignited after coming in contact with a candle flame and spread to the paper towel roll and then to laundry items after the burning towels fell to the floor. The sprinkler system activated and suppressed the fire before it could spread further. The occupant sustained minor hand burns after throwing the burning materials into a bathtub.

Upon arrival, firefighters reported that there was no fire showing and that the building did not have to be evacuated. Crews assisted building management with contacting a sprinkler repair company and placing the alarm system in service.

The apartment complex was a two-story structure with a ground-floor area of 26,000 square feet (2,415 square meters). Common and private areas of the complex were protected by smoke detection and sprinkler systems.

The fire caused an estimated $1,500 in losses to the apartment contents and structure. The value of the structure was estimated at $2,500,000.

Richard Campbell, "Firewatch," NFPA Journal, Nov/Dec 2016.

One dies when candle starts fire in single-family home, Pennsylvania
An elderly man died in a home fire that was apparently caused by a candle.

Firefighters responding to a passerby's 911 call reached the scene of a house fire to find heavy fire conditions at 11:30 p.m. Crews began suppression efforts after being advised upon arrival that all residents had managed to evacuate the house. However, fire crews undertaking a primary search of the house while suppression was still underway located the body of an elderly male on a bedroom floor. The man was reported to be a victim of fatal smoke inhalation injuries.

Investigators determined that the fire began when a candle flame ignited a bathroom curtain on the north side of the house as wind blew through an open window. Residents located on the southeast side of the house did not notice the fire until it was well underway.

According to a newspaper report, the fire chief indicated that extensive renovation to the structure hampered the ability of firefighters to extinguish fire within the walls because shingles on the home's exterior trapped heat inside. Reports also indicated that one firefighter suffered an elbow injury as the result of a fall.

The frame, walls, and roof deck of the house were constructed with wood, and the roof was covered with asphalt shingles. It was not protected by smoke alarms or a sprinkler system. No information was provided on the size of the house or the estimate of losses.

Richard Campbell, "Firewatch," *NFPA Journal*, Nov/Dec 2016.

One dies in apartment fire after candle ignites bedding, California
An elderly woman with a mobility disability died in an apartment fire that began when a candle ignited bedding materials as she lay in the bed.

The fire department was dispatched to the scene at 9:35 p.m. following a 911 call from a passerby. Smoke was showing from the roof and rear windows of the structure upon arrival and a neighbor advised crews that there was a possible victim inside.

The crew of an engine company was assigned to undertake interior operations at the scene with the objective of search and rescue, while a second engine crew provided reinforcement with a back-up line.

The search-and-rescue team made a forcible entry through a locked front door and advanced a quick-attack hose line into the apartment. Crews located the victim on the floor by her bed during the primary search and carried her out the front door to a safe area for the administration of critical care before she was transported to the hospital, where she was later pronounced dead as a result of burns and smoke inhalation injuries.

While rescue efforts were underway, crews attacked the fire, which was contained to a rear room and adjoining attic, and also conducted an expanded primary search. After the fire was knocked down, crews initiated a secondary search and then secured the scene.

Investigators determined that the fire originated on the bed in the victim's bedroom. Based on physical evidence and an interview with a friend who had helped the victim into bed that evening, investigators concluded that the victim had used a candle that was inside a glass container to light smoking materials and had placed or dropped it on her bedding, causing the fire. Once the bedding ignited, the fire spread vertically and horizontally to nearby common combustibles in the room. The victim was unable to escape before becoming overcome by smoke and flames due to her mobility limitations.

Smoke alarms located in the apartment hallway reportedly were disabled.

The apartment building was one story in height, but no information was available on its size. The structure was constructed with a wood frame and stucco exterior, with concrete floor framing and asphalt shingles.

The apartment and its contents, valued at $55,000, were a total loss.

Richard Campbell, "Firewatch," *NFPA Journal*, Nov/Dec 2016.

Candle fire in manufactured home kills elderly resident, California
An early morning fire in a manufactured home claimed the life of an elderly female with a mobility disability, but her adult nephew was able to escape the blaze and call 911 after hearing a smoke alarm at 12:45 a.m.

The fire began while the victim was sleeping and a candle ignited loose combustibles in her bedroom. News reports indicated that flames were shooting out of the structure when firefighters

arrived just two minutes after notification. After extinguishing the fire, firefighters found the victim in a bathroom adjacent to her bedroom.

Investigators believe that the victim crawled from her bed into the bathroom in an effort to escape the flames. Firefighters were reported to have provided intensive advanced life support measures after extricating her from the structure, but the victim was pronounced dead at the scene.

The manufactured home had wood and metal walls, wood framing, and a metal roof and had a ground-floor area of 600 square feet (183 square meters).

Damage to the home, valued at $50,000, was estimated at $20,000. Damage to the contents, which were valued at $20,000, was estimated at $5,000.

Richard Campbell, "Firewatch," *NFPA Journal*, July/August 2016.

Candle causes fatal fire, Michigan
A 71-year-old woman with a mobility impairment died of smoke inhalation and burns in a fire that started when a candle that had been left burning unattended ignited combustible materials.

The two-story, wood-frame house, which was 51 feet (16 meters) long and 24 feet (7 meters) wide, had a battery-operated smoke alarm in the room of origin. There were no sprinklers.

The homeowner was outside in the garage when the victim called him on the phone from the house but the call was disconnected. As he walked towards the house to see what she wanted, he noticed the smoke. He ran in through the back door to the front porch, which had been converted into a bedroom for the victim, and tried to use a lift to get her out of the room. However, the increasing smoke and heat drove him from the house.

The homeowner's son, who was in his room on the second floor, called 911 to report the fire at 10:08 a.m. after he heard breaking glass and his room began to fill with smoke.

Firefighters arrived one minute after the alarm and found heavy fire and smoke coming from the house. They entered through the front door and found the obese victim, who was still in her bed. They dragged her to the front door where another crew helped move her outside, where he was attended to by EMS crews.

The homeowner's son managed to escape through his bedroom window onto the porch roof and make his way to the ground.

Investigators determined that the fire started in the dining room on the first floor near the victim's makeshift bedroom when a candle left burning unattended on the dining table ignited some nearby material.

Damage to the structure was estimated at $165,000: damage to its contents was estimated at $95,000.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, January/February 2015.

Candle starts fatal fire, Arkansas
A 72-year-old woman with an unspecified disability died of injuries she sustained in a fire started by a candle in her single-family home. Four other occupants, ranging in age from 16 to 41, were also injured but managed to escape from the house.

the wood-frame dwelling, which had a brick veneer and a wooden roof covered in asphalt shingles, had no smoke alarms or sprinklers.

One of the occupants discovered the blaze when he woke up and found his bedding on fire. After failing to extinguish the flames, he alerted the other residents, one of whom called 911 at 5:28 a.m. all but the victim managed to escape despite the fact that the fire was blocking the primary escape route.

When firefighting efforts were delayed while crews treated the injured and tried to establish a water supply.

Investigators determined that the fire began when the man fell asleep in the den, which had was using as a bedroom, leaving a candle burning.

The house, which was valued at $50,000, and its contents, valued at $20,000, were destroyed.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, May/June, 2014.

One Child Dies, Two Injured in House Fire, Minnesota
A 4-year-old boy died and two other children suffered burns and smoke inhalation injuries in a house fire that started as a result of children playing with a lit candle.

The two-story, wood-frame farmhouse, which was over 100 years old, had a wooden plank roof covered in asphalt shingles. Smoke alarms had been installed, but they did not work. There were no sprinklers.

The boys' father left his four sons, ages 4, 5, 14, and 15, home while he went to help their mother disconnect a trailer she was using to haul furniture to her retail store. The 15-year-old told investigators that he was doing schoolwork in the living room, where a scented candle was burning on a table that also contained artificial plants. He had stepped out of the room to make a phone call when he heard his younger brothers screaming.

He quickly ran into the room where he found the two little boys standing near the burning plant arrangement. Grabbing the 5-year-old, he told his 4-year-old brother to follow him and yelled upstairs to tell his 14-year-old brother, who had been sleeping, to go out the window. Once outside, he put the little boy on the ground and tried unsuccessfully to go back inside for the 4-year-old. The 14-year-old managed to escape through a window and jumped off the porch roof to safety.

The children's father called 911 at 10:19 a.m. after he found two of his sons running down the driveway when he returned from helping his wife. By the time the fire department arrived, the house was collapsing into the basement, and firefighters were unable to enter it.

After crews extinguished the fire, they found the body of the 4-year-old, who had died of smoke inhalation and burns. The 5- and 15-year-old also suffered burns and smoke inhalation. The fire destroyed the house, which was valued at $154,000, and its contents, valued at $93,000.

Kenneth J. Tremblay, " Firewatch", *NFPA Journal*, November/December, 2013.

Man dies in house fire, Minnesota
A 64-year-old man died of acute carbon monoxide poisoning in an early morning fire that began in the living room of his single-family home.

The two-an-a-half story, balloon-style, wood-frame house covered an area of approximately 1,700 square feet (158 square meters). A fire department report noted that the house had smoke detectors but not how many or whether they were operational.

Firefighters received the alarm at 3:25 a.m. and arrived four minutes later to find heavy smoke showing from all levels and flames coming from all levels and flames coming from a second-floor window. When neighbors told them that an older man lived alone in the house, crews began an aggressive interior attack, but they were forced to retreat when the floor became unstable. Instead, they used ground ladders to advance pre-connected hose lines over the front porch and into the second floor.

Firefighters entered the living room through a picture window and found the victim's body near a recliner in which relatives reported he spent most of his days and often most of the night. The living room was separated from the rest of the house by pocket doors, which were closed at the time of the fire, confining the blaze to the room until enough heat built up to burn through the room's floor, walls, and ceiling.

Although investigators found several potential ignition sources, including electrical extension cords, portable heaters, candles, and smoking materials, they could not determine the ignition source.

Damage to the house and its contents was estimated at $200,000.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, September/October, 2013.

Unattended Candle Ignites Fatal Fire, Maryland
A 30-year-old man and his 60-year-old mother died in a fire started by an unattended candle in the bathroom of their single-family house.

The three-story, wood-frame house had brick walls. Investigators found a smoke detector mounting bracket on the wall in the first-floor stairwell, but the smoke alarm had been removed before the fire. There were no sprinklers.

Firefighters were called to the home at 3:39 p.m. and found the man kneeling under the window, dead as a result of smoke inhalation and burns. His mother was lying on the floor near another window, also dead of burns and smoke inhalation.

Investigators interviewed a 16-year-old girl who was on the first floor of the house when the fire started. She said that she had looked up the stairs and seen light from the fire in the bathroom. She alerted the man, who went upstairs to rescue his mother, but neither was able to escape.

The investigators discovered a tea light, a disposable lighter, and a makeshift ashtray on top of a small refrigerator in the second-floor bathroom. The girl told them that the bathroom light fixture did not work and the tea light was used for illumination. The investigators determined that the candle ignited a blanket hung over a window as a curtain and that the fire spread to wood paneling and other combustibles in the room. It then spread out of the room into the hallway and the other rooms on the second and third floors. The fire also spread out of several windows, damaging the houses on either side.

The house sustained $15,000 in damage, and its contents sustained $5,000. The homes on either side of the fire building had estimated damages of $500 each.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, January/February, 2013.

Candle Starts Fatal Fire during Power Outage, Minnesota

A 61-year-old man with a physical disability died in a fire in his manufactured home that started when heat from a burning candle ignited papers on which the candle was sitting.

The manufactured home, which was approximately 60 feet (18 meters) long and 30 feet (9 meters) wide, sat on a wooden foundation over a basement, creating a two-story, split-level home. There were no sprinklers, and the presence of smoke alarms or detectors was not determined.

An electrical power company employee working in the area saw the house on fire and called 911 at 1:06 a.m. Firefighters arrived 21 minutes later to find the home engulfed in flames and concentrated on preventing the fire from spreading to other homes. They discovered the victim near a rear door opening onto a deck.

Investigators determined that the man had been using candles for illumination because the area had lost power that evening, and he had left a candle burning on top of some papers. They also found evidence that a number of candles were being used throughout the manufactured home to light the interior.

Damage to the structure, valued at $110,000, was estimated at $75,000. The amount of damage to its contents was not reported.

Kenneth J. Tremblay, "Firewatch," *NFPA Journal*, September/October, 2012.

Woman Dies when Candle Ignites Clothing, Nevada

A 74-year-old women died of smoke inhalation and burns after a candle apparently ignited her clothing when she used it to provide illumination while she changed a light bulb in a closet.

The single-story, single-family, wood-frame house, which covered approximately 1,600 square feet (150 square meters), had a smoke alarm in the hallway that operated as designed. There were no sprinklers.

A passerby who saw smoke coming from the attic vents called 911 at 6:15 p.m. Firefighters arriving six minutes later initially saw nothing from outside the house, but they heard a smoke alarm operating and smelled something burning. They forced open the front door, found light smoke, and began a primary search for occupants and the fire. When they entered a bedroom, they found the victim, who lived alone, in the closet. The fire was extinguished in less than a minute.

Damage to the house and its contents, valued at $225,000, was estimated at $5,000.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, July/August, 2012.

Man with Mobility Challenges Dies in Fire, Michigan
A man who used a wheelchair died in a fire in his single-family home. Another occupant tried unsuccessfully to extinguish the fire and move the victim out of harm's way, but the intense smoke and heat made it impossible.

The single-story, wood-frame house, which was 32 feet (10 meters) long and 29 feet (9 meters) wide, had a wooden roof deck covered with asphalt shingles. The house did not have a sprinkler system, but there was a battery-operated smoke alarm in the main hallway.

Investigators determined that the fire started when a lighted candle fell onto a bed in one of the bedrooms and ignited the bedding.

The fire was confined to the bedroom, although the adjacent hallway sustained smoke and heat damage.

The smoke from the fire, which was reported at 12:06 a.m. by an occupant, did not activate the smoke alarm. Investigators could not determine why the alarm failed to go off, as its battery was connected and was sufficiently charged.
Eighty percent of the house and 90 percent of its contents were damaged.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, May/June, 2012.

Homeless Person Dies in Abandoned House Fire, Alabama
A 37-year-old man died in a fire in an abandoned single-family home in which he was living without utilities.

The single-story, wood-frame house, which was 33 feet (10 meters) long and 12 ½ feet (4 meters) wide, was dilapidated and had no smoke alarms or sprinklers.

A police officer on patrol reported the fire at 7:30 a.m., and arriving firefighters found the entire front of the house engulfed in flames. They first tried to fight the blaze from the rear, but couldn't gain access through the boarded-up rear door, so they moved back to the front. Once they had knocked the fire down, firefighters found the victim on the floor between the living room and the bedroom.

Investigators found candles in the living room, along with lawn mowing equipment and stored gasoline, which contributed to the blaze. The victim was seen some four hours before the fire in an impaired state, which may have contributed to his death. He was related to the property owners, who told officials that they were aware he was living there.

The home had no real value, and its contents, valued at less than $1,000, were destroyed.

Kenneth J. Tremblay, "Firewatch," *NFPA Journal*, November/December, 2010.

Unattended Candle Ignites Contents of Bedroom, Texas
A 4-year-old boy was fatally injured in a fire started by a candle left burning on a dresser in the master bedroom of his family's apartment. The apartment building had no sprinklers, and investigators could find no smoke alarms in the apartment.

After the candle ignited the dresser, flames spread to a mattress, then to the entire contents of the room. The body of the little boy was found in an adjacent bedroom.

Neighbors called 911 at 9:12 a.m., and firefighters arrived to extinguish the blaze, which did $10,000 in damage to the building and $8,000 in damage to the apartment's contents.

Ken Tremblay, "Firewatch", *NFPA Journal*, September/October, 2010.

Alcohol Contributes to Fire Death, Arizona
A 22-year-old man died in a fire investigators believe started when an unattended candle ignited combustibles on the coffee table in his apartment living room.

The 312-unit, two-story, wood-frame apartment building, which was 100 feet (30 meters) long and 50 feet (15 meters) wide, was unsprinklered. A battery-operated smoke alarm in the living room of the unit of origin provided local coverage.

A neighbor called 911 at 5:56 a.m. to report smoke coming from an adjacent apartment, and firefighters arrived 4 minutes later to find smoke coming from the second floor. When crews entered the apartment of origin, they found the victim near the front door with first-, second-,and third-degree burns to his body. Despite their attempts to resuscitate him, he died of burns and smoke inhalation.

Investigators determined that the fire smoldered for some time before it burst into flames, filling the apartment with smoke that activated the fire alarm, possibly waking the victim. Witnesses reported hearing a beeping sound but said they were unsure whether it was a smoke alarm or an alarm clock. Marks along the walls showed that the victim moved from the bedroom to the hall before collapsing by the front door. His blood alcohol level was 0.189, which contributed to his inability to respond to the emergency.

The building, valued at $500,000, sustained damages estimated at $30,000; its contents, valued at $7,200, sustained $1,500 in damage.

Ken Tremblay, "Firewatch", NFPA *Journal*, May/June, 2010.

Candle Fire Kills Man with Cognitive Disabilities, Vermont
A man with obsessive-compulsive disorder died of smoke inhalation in a fire that began when unsecured wall sconces holding lit candles fell onto his living room couch, igniting the upholstery, bedding, and a sleeping bag.

The single-family, one-story house had five single-station smoke alarms. There were no sprinklers.

A passerby called the fire department at 10:35 a.m., and responding firefighters heard the smoke alarms sounding inside the house. Crews extinguished the fire, but not before it nearly destroyed the house and its contents, valued at $225,000.

Investigators determined that the fire spread from the couch to other combustibles in the living room and eventually became starved of oxygen. Once a window broke, however, fresh air flowed into the room, and the rife re-ignited with intensity.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, March/April 2010.

Sprinkler Controls Fire in Home, Arizona
A sprinkler held a fire in a bedroom of a single-family home in check until firefighters arrived, preventing a significant fire loss. Investigators believe that the fire began when an unattended candle ignited furniture in the bedroom. No one was home at the time of the fire.

The one-story, wood-frame house, which covered an area of 2,000 square feet (186 square meters), was built on a concrete slab and had a tile roof. It was protected by smoke alarms, which were operating when firefighters responded to a neighbor's 911 call at 12:48 p.m.

The house, valued at $500,000, and its contents, valued at $50,000, sustained damages estimated at $20,000 and $5,000, respectively. There were no injuries.

Kenneth J. Tremblay, "Firewatch", *NFPA Journal*, January/February, 2010.

Multiple Death Fires Caused by Candles Used for Light

Candles Used for Light Cause Fire that Killed Five, Ohio
At 6:12 a.m. on a morning in December 2006, the fire department was notified of a fire in a two-story single-family home of unprotected wood-frame construction. This fire broke out in the first-story living room. Power to the house had been shut off prior to the fire and the occupants were using candles throughout the house for light. A candle on a coffee table burned down to the table and ignited it. The smoke and fire spread, blocking egress from the stairs. The fire department had found smoke alarms in the home on a previous inspection, but firefighters found no evidence of any at the time of the fire.

Investigators learned that a guest fell asleep in the living room, and the candle burned unattended. The guest and four occupants upstairs were killed.

Adapted from Stephen G. Badger's 2007 article, "U.S. Multiple-Death Fires for 2006", *NFPA Journal*, September/October.

Candle Fire in their New Home Kills 11 People, Louisiana
At 5:05 a.m. on a March 2005 morning, the fire department was notified of a fire in a two-story single-family townhouse of unprotected wood-frame construction. Because of the destruction, smoke alarm presence was unknown.

A candle ignited bedding in a second-story bedroom. Two occupants attempted to remove the mattress from the house. Having difficulties with the front door, they placed the mattress on some cardboard boxes while they worked on the lock, until the mattress began flaming. At this point, these two family members escaped out the rear door. Two others jumped out a second-story window. Some then went to the front door and kicked it open but by then the front room was fully engulfed with fire, and fire was spreading up the stairs to the second story.

The family was using candles for light, since they just moved into the house and the electricity had not yet been turned on. Instead of evacuating, occupants attempted to move the mattress out of the dwelling. The occupants were not familiar with the dead bolt lock on the front door. Escaping occupants left the rear door open, allowing the wind to spread the fire. Eleven people died in the fire, including three children under six years of age. The victims were found in second-story bedrooms and a bathroom.

Adapted from Stephen G. Badger's 2006 article, "U.S. Multiple-Death Fires for 2005," *NFPA Journal*, September/October.