



RESEARCH

Home Cooking Fires

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Key findings

Cooking is such a routine activity that it is easy to forget that the high temperatures used can easily start a fire. During 2013–2017, cooking was the leading cause of reported homeⁱ fires and home fire injuries and the second leading cause of home fire deaths.

Cooking caused an average of 173,200 reported home structure fires per year (49 percent of all reported home fires in the US). These fires resulted in an average of 550 deaths (22 percent of all home fire deaths) and 5,020 home fire injuriesⁱⁱ (45 percent of all reported home fire injuries) annually.

The vast majority of reported cooking fires were small. Cooking fires accounted for a much larger share of reported fires in apartments or other multifamily homes than in one- or two-family homes.

Ranges or cooktops were involved in 62 percent of reported home cooking fires, 89 percent of cooking fire deaths, and 79 percent of cooking fire injuries. Households that used electric ranges showed a higher risk of cooking fires and associated losses than those using gas ranges.

Unattended cooking was the leading cause of cooking fires and casualties. Clothing was the item first ignited in less than one percent of these fires, but clothing ignition led to 14 percent of the home cooking fire deaths.

Almost one-third of the people killed by cooking fires were asleep when the fire started. More than half of the non-fatal injuries occurred when people tried to control the fire themselves.

Some other fast facts from this report are shown below.

- Cooking caused more home fire deaths in 2013–2017 than in 1980–1984.
- An average of 470 home cooking fires were reported per day in 2017.
- The peak days for home cooking fires were Thanksgiving and Christmas.

According to the Consumer Product Safety Commission (CPSC), cooking is also the leading cause of unreported home fires.

Unless otherwise specified, the statistics presented in this report are estimates derived from the United States Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual Fire Experience Survey.

For more detailed information, see [Home Cooking Fires: Supporting Tables](#).

ⁱ The term *home* encompasses one- or two-family homes, including manufactured homes and apartments or other multifamily housing.

ⁱⁱ Death and injury estimates exclude firefighter casualties.

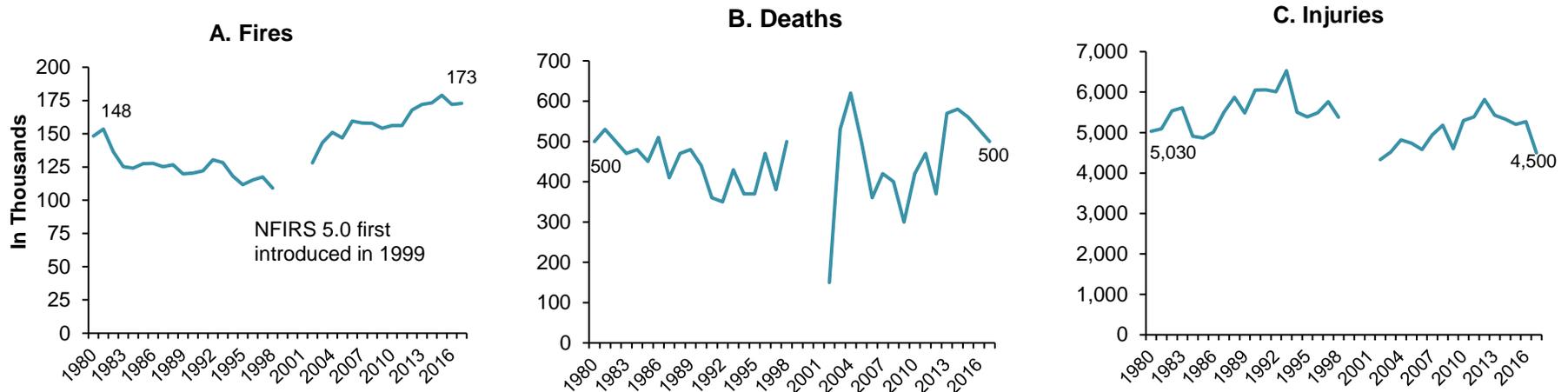
Trends in cooking fires and cooking fire casualties

Reported cooking fires started to decline in 1981 and then plateaued before falling again in the 1990s. NFIRS 5.0, first introduced in 1999, made it much easier to document minor cooking fires (referred to as *confined fires*) that did not spread beyond the pan, oven, or other container in which the fire started.ⁱⁱⁱ During the transition years of 1999-2001 — when NFIRS 5.0 was being introduced — less than half of the fire data was collected under the new rules and definitions. Consequently, those estimates were omitted from the trend graphs. The use of NFIRS 5.0 was accompanied by an increase in reported cooking fires. After leveling off for a few years, reported cooking fires hit consecutive new highs in 2012–2015. In 2016 and 2017, these fires fell

below the 2014 and 2015 levels, but they remained historically high. See Figure 1.

There were more cooking fire deaths in 2013–2017 than in 1980–1984, even though total home fire deaths fell 46 percent from the earlier period. It appears that less progress has been made in reducing deaths from home cooking fires than deaths from most other fire causes. See Figure 2. Although the reasons are unclear, features to prevent cooking oil ignitions have only been required on new ranges since June 2018. The vast majority of homes do not yet have ranges with this protection.

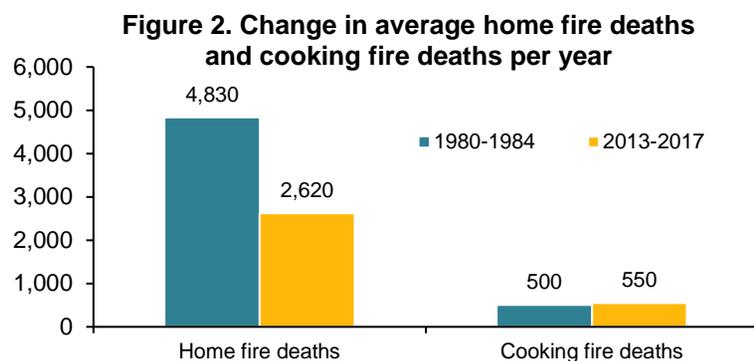
Figure 1. Reported home cooking fires^{iv} by year: 1980–2017



ⁱⁱⁱ Causal information is not required for structure fires with the six confined fire incident types, including confined cooking fires. Structure fires that do not have these incident types are referred to as *non-confined fires*, even though fire spread is sometimes limited to the object of origin. In this analysis, confined

cooking fires were analyzed separately from non-confined fires and the results were summed.

^{iv} Estimates for the NFIRS transition years of 1999–2001 are unstable and not shown.



Causes and circumstances of reported home cooking fires

Unattended cooking was by far the leading factor in cooking fires and cooking fire casualties. See Figure 3. Abandoned or discarded material, which may have been related to unattended cooking equipment, ranked second in the causes of cooking fires and third in cooking fire deaths and injuries.

- A fatal fire in Maine single-family home began when a male occupant fell asleep in an adjacent room while cooking oil was being heated on the stove. Investigators believe that when he woke to the burning oil, he threw water on the fire. This caused the fire to spread.

The victim was found in the kitchen with burn and smoke inhalation injuries.¹

In another common scenario, combustible materials such as wrappers, potholders, or clothing caught fire when they were left by or came too close to hot cooking equipment.

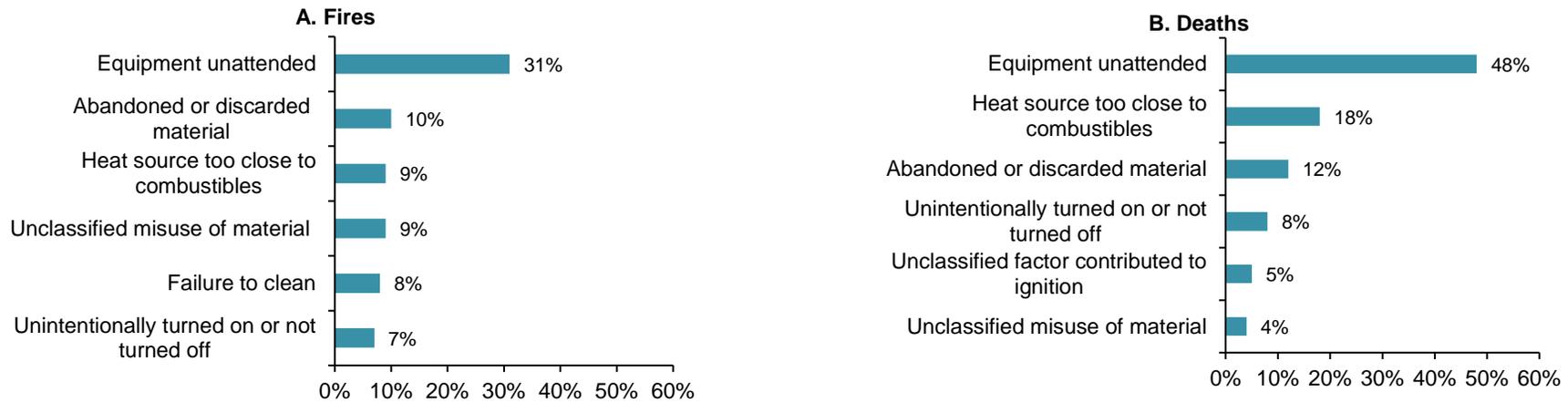
Reported home cooking fires in 2013–2017

During 2013–2017, local fire departments responded to an estimated average of 173,200 home cooking fires per year. These fires caused an average of 550 deaths; 5,020 injuries; and \$1.2 billion in direct property damage annually. Cooking caused almost half of the reported home fires (49 percent) and home fire injuries (45 percent) and more than one in five home fire deaths (22 percent). Cooking was the leading cause of reported home fires and home fire injuries and the second leading cause of home fire deaths^v

An average of 470 home cooking fires were reported per day.

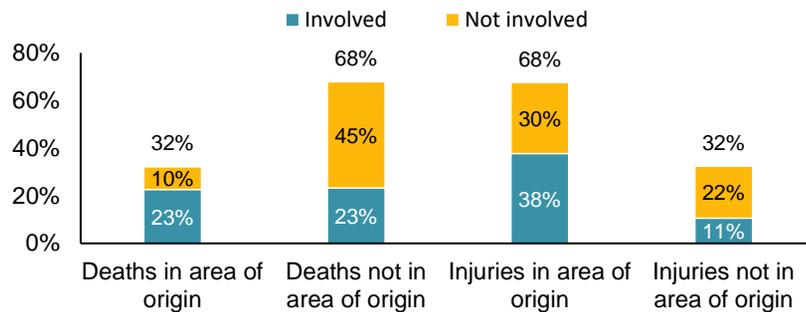
^v Death and injury estimates exclude firefighter casualties.

Figure 3. Leading factors in home cooking fires and cooking fire deaths: 2013–2017



One-third of the fatal cooking fire victims and two-thirds of the non-fatally injured were in the area of origin when the fire started. See Figure 4. With unattended cooking being the leading cause, it is not surprising that nearly one-quarter of the fatalities were people involved in the ignition who were not in the area of origin. These were likely cooks who had left the room.

Figure 4. Home Cooking Fire Casualties in or Not in Area of Origin and Involved in Ignition: 2013–2017



This data underscores that some types of cooking, such as frying and broiling, need continuous attention. When simmering, baking, or roasting, cooks should stay in the home and check on it regularly.

Not surprisingly, two-thirds (66 percent) of home cooking fires began with the ignition of cooking materials, including food. Cooking oil, fat, grease, and related substances were first ignited in half (52 percent) of the home cooking fires that began with cooking materials. Almost two-thirds (65 percent) of the civilian deaths and three-quarters of the civilian injuries (76 percent) and direct property damage (77 percent) associated with cooking material or food ignition resulted from these cooking oil or grease fires.

Death and injury rates per 1,000 fires are higher for food or cooking material fires that began with the ignition of cooking oil or grease than for other types of food or starch. The frequency and increased risk of oil and grease fires indicate a need for increased consumer awareness on how to deal with these fires. Flames from a small grease fire can be smothered by sliding a lid over the pan and turning off the burner. The pan should be kept covered until it is completely cool.

Clothing was the item first ignited in less than one percent of the reported home cooking fires, but clothing ignitions led to 14 percent of the home cooking fire deaths. Nine of every 10 (89 percent) of these victims were 65 or older; four of every ten (41 percent) were 85 or older. While it is important for all of those who cook to wear snug or short sleeves, this is especially critical for older adults.

In one scenario, an elderly Oklahoma woman phoned for help, stating that her clothing was on fire and she could not get out of her home. When the fire department arrived, the fire was already out. They found the woman in the living room. She had been severely burned. She told the firefighters that she had been making coffee when her clothes were ignited by the gas burner on the range. The victim was transported to the hospital where she later died.²

The vast majority of reported cooking fires were small. Four out of five (79 percent) were confined to the object or pan of origin. Three percent of the cooking fire deaths and one-third (32 percent) of the reported cooking fire injuries resulted from these small fires. Thirty percent of the home cooking fire deaths and 82 percent of the home cooking fire injuries resulted from the 96 percent of fires that were confined to the room in which the fire began.

Less than one-third (31 percent) of reported home fires were in apartments or other multifamily housing, yet these properties accounted for almost half (46 percent) of the reported home cooking fires. Cooking caused 38 percent of the fires in one- or two-family homes and 72 percent of the fires in apartments or other multifamily homes.³ Minor fires in properties with monitored fire alarm systems may be more likely to trigger a fire department response, and such systems are more common in apartments than in one- or two-family homes. Three of every five (61 percent) apartment fires from all causes had incident types indicating a cooking fire that did not spread.⁴

Not surprisingly, cooking fires peaked between 5:00–8:00 p.m. when people were preparing dinner. The 12 percent of the fires reported between 11:00 p.m.–7:00 a.m. accounted for 44 percent of the deaths. Sleep and possible alcohol or drug impairment were more common factors in these late-night fires. See Figure 5. Cooking while overtired or under the influence is dangerous. Although an “unattended or unsupervised person” was a common factor, it is possible that many of these fires were actually caused by unattended cooking.

Table A shows that Thanksgiving is by far the leading day for home cooking fires. Christmas, another holiday associated with food, ranked second. Cooking increases during holiday celebrations. Guests, television, and other activities can distract attention from the kitchen.

Figure 5. Human factors contributing to ignition in home cooking fires by time of day: 2013–2017

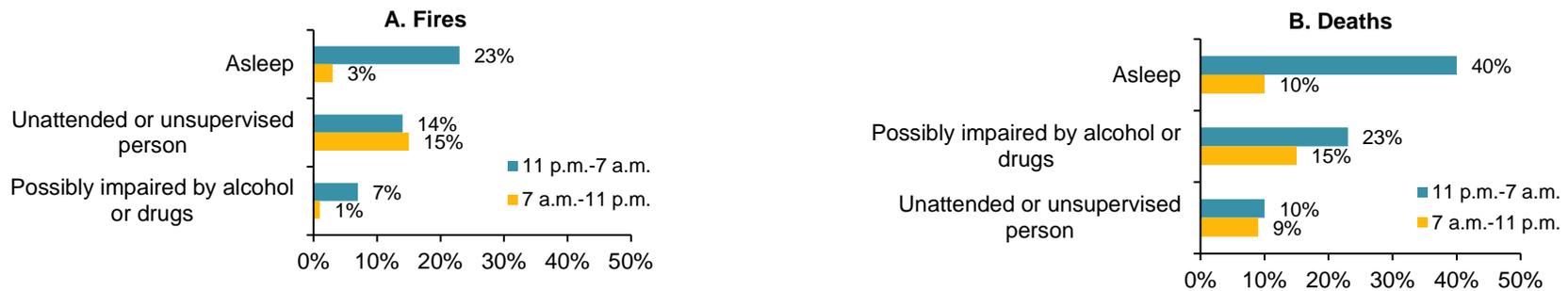


Table A. Leading Dates for 2017 Home Cooking Fires Reported to US Fire Departments

Date	Fires	Percent Above Average Daily Fires
November 23 (Thanksgiving)	1,600	(238%)
December 25 (Christmas Day)	800	(69%)
December 24 (Christmas Eve)	750	(58%)
November 22 (Day before Thanksgiving)	690	(51%)
April 16 (Easter)	700	(46%)
Daily average in 2017	470	

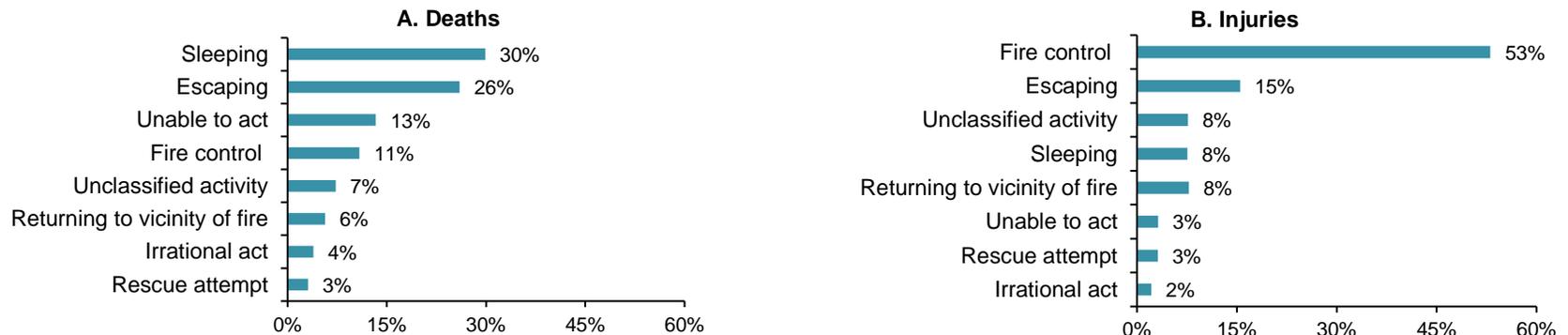
Victims of cooking fires

NFPA’s analysis of home fire victims by age and gender found that in 2011–2015, people who were 55 and older had the highest risk of cooking fire death. More than half (56 percent) of the people who died in cooking fires were at least 55 years of age.⁵ Young adults aged 20–34 were at the highest risk of non-fatal cooking injuries. There was much less variation in risk in the injury age distribution. Only one-quarter of the injured were 55 or older.

The *American Time Use Survey* reported that in 2018, 46 percent of men and 69 percent of women engaged in food and drink preparation per day, with men spending an average of 18 minutes and women 36 minutes per day on the activity.⁶ Although women spent twice as much time cooking, males were more likely to die in cooking fires.

Compared to those who were injured and survived home cooking fires, those who died were more likely to have been asleep, trying to escape, or unable to act to save themselves, possibly due to disability or impairment. In contrast, more than half of those who were non-fatally injured were trying to control the fire themselves. See Figure 6. Two-thirds (67 percent) of reported non-fatal home cooking fire injuries were minor.

Figure 6. Activity when injured in home cooking fires: 2013–2017



Smoke alarms in home cooking fires

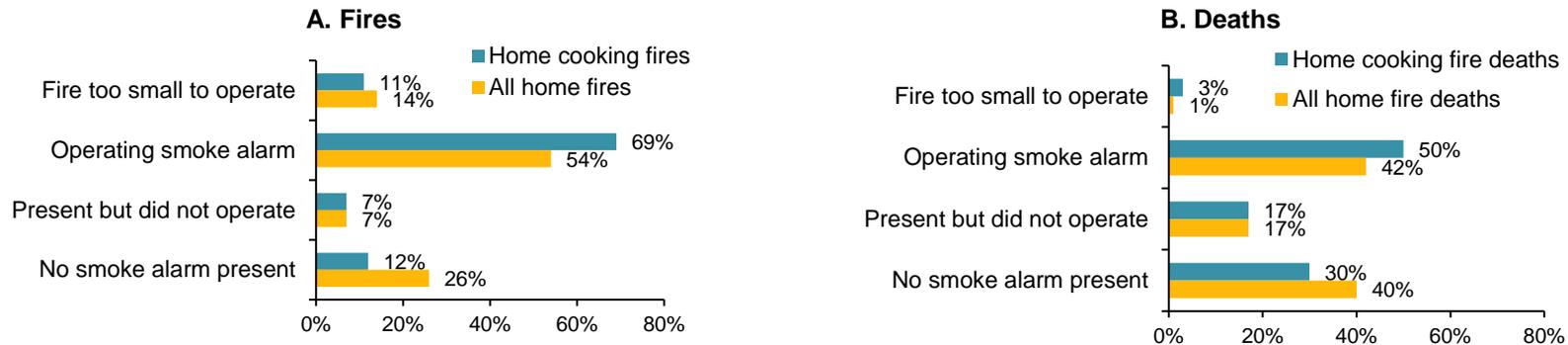
Smoke alarms were more likely to be present and operating in fires involving cooking equipment than in overall home fires. Figure 7 shows that smoke alarms were present in 87 percent of reported home cooking fires and 70 percent of cooking fire deaths. As noted earlier, 14 percent of cooking fire deaths resulted from fires started by clothing ignitions. Victims in these fires may have been fatally injured before the smoke alarm sounded.

A 2010 Harris Interactive poll done for the NFPA found that half (52 percent) of households reported having smoke alarms in the kitchen.⁷ Such placement is an invitation to frequent nuisance alarms. [NFPA 72®](#), [National Fire Alarm and Signaling Code®](#), provides requirements to help prevent nuisance alarms.

When possible, smoke alarms should be installed at least 20 feet away from the kitchen range. If that is not possible, any smoke alarm between 10 and 20 feet away from the stove should have a hush feature, which temporarily reduces the sensitivity of the alarm, or it should include a photoelectric sensor. Smoke alarms should not be installed within 10 feet of a cooking appliance. Additional details can be found in *NFPA 72*.

Beginning in May 2020, manufacturers of smoke alarms and smoke detectors who wish to obtain or maintain UL certification of their products must be able to distinguish normal cooking aerosols from those associated with fire to pass a cooking nuisance test. This UL requirement has been designed to minimize the number of nuisance alarms triggered by cooking activities. The new smoke alarms and detectors must also demonstrate greater sensitivity to burning polyurethane foam.⁸

Figure 7. Smoke alarm status in home structure fires: 2013–2017



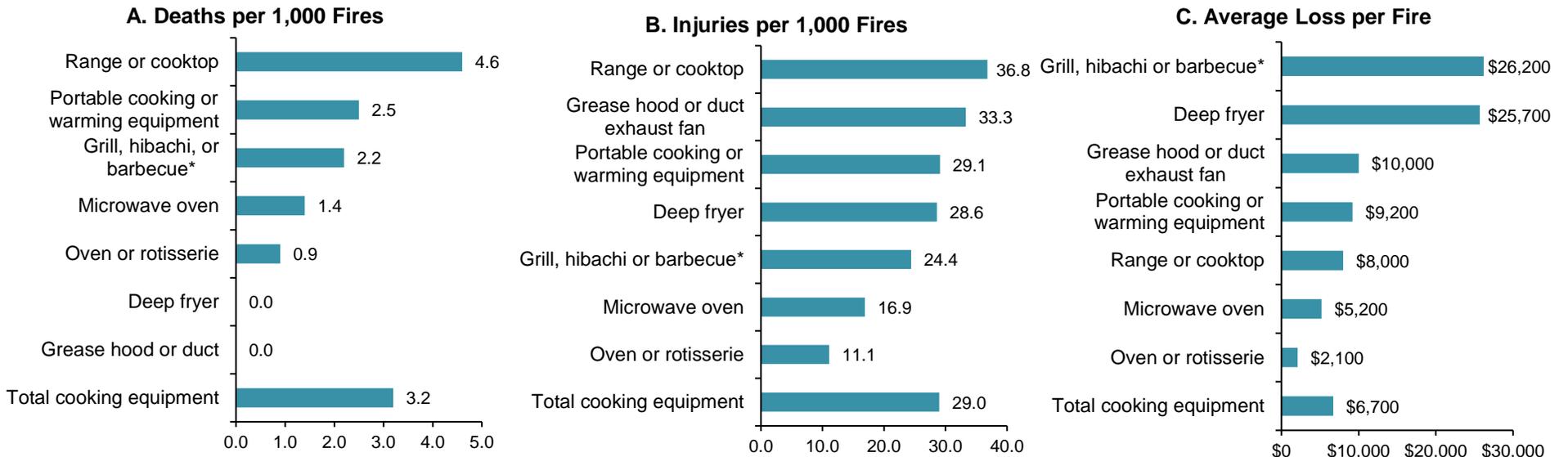
Equipment involved in reported home cooking fires

Ranges or cooktops were involved in almost two-thirds (62 percent) of the reported cooking fires, 89 percent of the deaths, and 79 percent of the injuries. Ranges or cooktops had the highest death and injury rates per 1,000 reported fires. Ovens and microwave ovens showed lower casualty and loss rates than other cooking equipment. Cooking that is done in an oven or microwave oven is less likely to extend outside of the equipment. Grills and deep fryers had the highest average loss per fire., followed by deep fryers. Such equipment tends to be portable and may be used too close to things that can catch fire. Deep fryer and

grease hood fires were less common than other types of cooking fires. See Figure 8.

The Worcester Fire Department in Massachusetts retrofitted electric coil ranges with temperature limiting controls in four apartment buildings for low-income older adults that together had experienced an average of 12 reported cooking fires per month in 2015. Roughly 800 ranges were retrofitted. No stovetop fires were reported in any of those units during the 10 months after installation.⁹

Figure 8. Casualty rates per 1,000 reported fires and average loss per fire by type of cooking equipment: 2013–2017



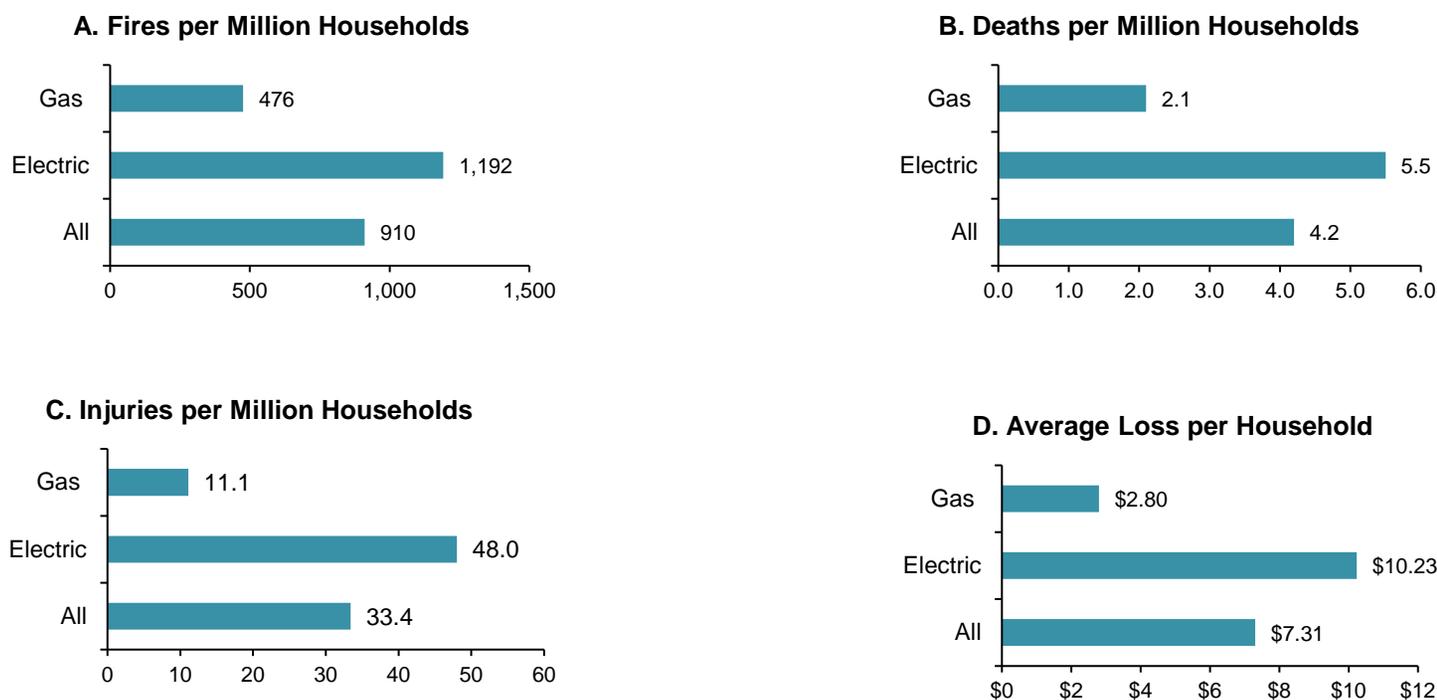
* Grill, hibachi, or barbecue fires that were coded as outside fires are not included.

Households that use electric ranges have a higher risk of cooking fires and associated losses than those using gas ranges. Although 60 percent of households cook with electricity,¹⁰ four out of five (79 percent) ranges or cooktops involved in reported cooking fires were powered by electricity. Figure 9 shows that, compared to rates and averages for households using gas ranges:

- The rate of reported fires per million households was 2.5 times higher with electric ranges.

- The civilian fire death rate per million households was 2.6 times higher with electric ranges.
- The civilian fire injury rate per million households was 4.3 times higher with electric ranges than in households using gas ranges.
- The average fire dollar loss per household was 3.6 times as high among households with electric ranges.

Figure 9. Risk related to usage of electric vs. gas ranges or cooktops: 2013–2017



It is sometimes less obvious that an electric burner is turned on or is still hot than it is with gas burners. In addition, once turned off, it takes time for an electric burner to cool.

UL 858, *Standard for Household Electric Ranges*, includes requirements for electric coil ranges to prevent the ignition of cooking oil, and it took effect in June 2018. Compliance may be demonstrated by either not igniting cooking oil in a cast iron pan or keeping the average temperature of the inside bottom surface of the pan below or equal to 725° F (385° C). All electrical coil ranges now being manufactured must meet these requirements.¹¹ Because ranges last a long time, it will take years before these ranges become common in US homes.

Unreported home cooking fires

The estimates of home cooking fires reported to local fire departments are a tiny fraction of all the home fires involving home cooking equipment. In their analysis of the CPSC’s 2004–2005 survey of residential fires, Michael Greene and Craig Andres found that United States households handled an average of 4.7 million home fires involving cooking equipment per year without having the fire department on scene. Roughly one of every 23 occupied households had a cooking fire. The overwhelming majority of home cooking fires were handled safely by individuals without fire department assistance. Twelve percent of the unreported stove or range fires self-extinguished, as did 24 percent of the fires caused by other cooking equipment.¹²

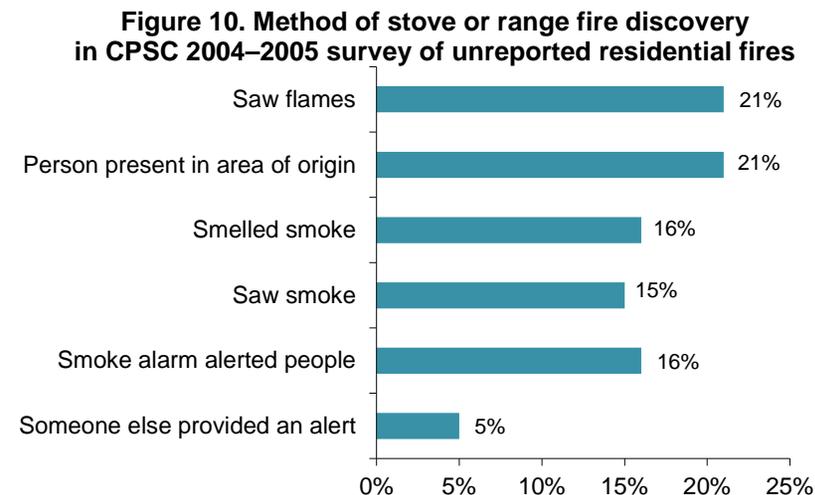
The study also found that 102,000 injuries resulted from cooking equipment fires with no fire department presence. This is 20 times the average of 5,020 injuries per year in reported home cooking structure fires during 2013–2017. However, almost all of the injuries from unreported fires were minor. As with reported fires, cooking was the leading cause of unreported home fires and home fire injuries.

CPSC noted that the 2004–2005 estimate of the annual unreported cooking equipment fires was 62 percent lower than the 12.3 million such incidents in the 1984 survey of unreported residential fires. Smoke alarms were much less common in the early 1980s. It is possible that

smoke alarms are alerting people to situations that are close to developing into a fire — i.e., burned food — but have not actually progressed to something that most people would call a fire. In the 2010 Harris poll done for NFPA, 22 percent of the respondents who reported that a smoke alarm sounded in the past year agreed that the last time a smoke alarm sounded it warned them of something that could have become a fire.¹³

In many unreported cooking fires, someone nearby discovered the fire. Smoke alarms sounded in 41 percent of stove fires and 30 percent of other cooking equipment fires that were handled without a fire department response. The activated alarms alerted people in 16 percent of both stove and other cooking fires. The alarms provided the only alert in 13 percent of the stove or range fires and 11 percent of other cooking fires. When the smoke alarm did not sound, it was typically because not enough smoke reached the alarm to activate it.

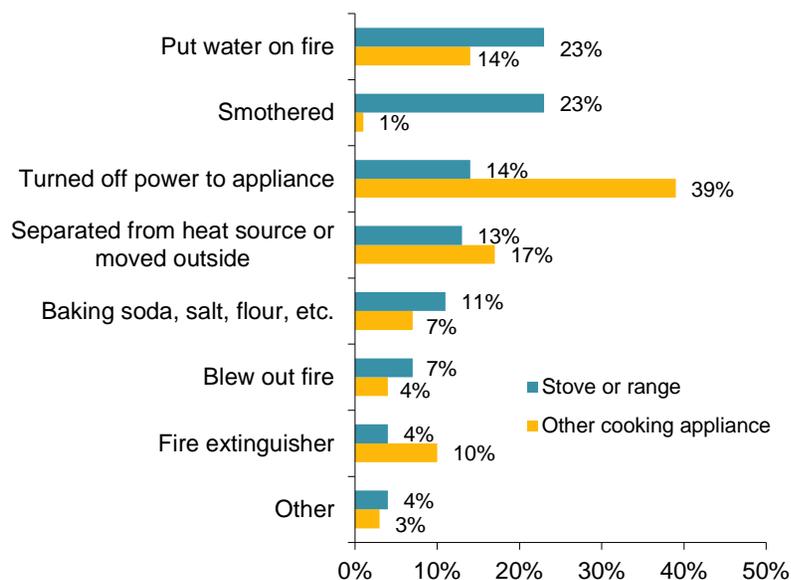
Figure 10 shows that among fires handled without fire department assistance, most were discovered when someone noticed flames or smoke. Someone was present in the area of origin when the fire started in one of every five stove or range fires.¹⁴ Multiple answers were allowed to this question.



Source: Greene and Andres, pp. 162–168

While efforts to extinguish a fire often result in injury in home cooking fires, they are more often successful in quickly controlling the situation. The ratio of 50 unreported home cooking fires for every reported home cooking fire is evidence of this success. The fire department was less likely to attend fires started by cooking equipment than most other types of fires. In the same study, the CPSC also asked who extinguished the unreported fire and how this was done. See Figure 11.

Figure 11.
Extinguishment method used in cooking equipment fires
in CPSC's 2004–2005 survey of unreported residential fires



Source: Greene and Andres, 2009, pp. 166–172.

Safety information

The Educational Messages Advisory Committee to NFPA's Public Education Division developed a collection of safety tips for a wide variety of activities, including fire-safe cooking.

Fire and life safety educators can download the [NFPA Educational Messages Desk Reference](#) to find consistent safety messaging.

NFPA also has [safety resources to help consumers](#) protect themselves from cooking fires. These include videos, safety tip sheets, public service announcements, and illustrated handouts in several different languages.

Additional information – Supporting Tables

See [Home Cooking Fires: Supporting Tables](#) by Marty Ahrens, November 2019, for more detailed information about the material presented in this report.

Methodology

The statistics in this analysis are estimates derived from the US Fire Administration's [National Fire Incident Reporting System \(NFIRS\)](#) and the NFPA's annual survey of US fire departments. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

Only civilian (non-firefighter) casualties are included in this analysis.

NFPA's Fire Experience Survey provides estimates of the big picture. NFIRS is a voluntary system through which participating fire departments report detailed factors about the fires to which they respond. To compensate for fires reported to local fire departments but not captured in NFIRS, a scaling ratio was calculated and then applied to the NFIRS database using the formula below:

$$\frac{\text{NFPA's Fire Experience Survey projections}}{\text{NFIRS totals}}$$

Cooking equipment refers to equipment used to cook, heat, or warm food [NFIRS Equipment involved in ignition (EII) codes 630-649 and 654]. Fires in which ranges, ovens or microwave ovens, food warming appliances, fixed or portable cooking appliances, deep fat fryers, open-fired charcoal or gas grills, grease hoods or ducts, or other cooking appliances were involved in the ignition are classified as being caused by cooking equipment. Food preparation devices that do not involve heating, such as can openers or food processors, are not included here.

All fires with NFIRS incident type code 113, “Cooking fire in or on a structure and confined to the vessel of origin,” were classified as cooking fires regardless of the EII code. Fires with other confined fire incident types were excluded from the analysis. NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source that caused ignition if the equipment malfunctioned or was used improperly. NFPA noticed that many fires in which EII was coded as None (NNN) had other causal factors that indicated equipment was a factor or were completely unknown. To compensate, NFPA treats fires in which EII = NNN and the 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:

All fires

(All fires – blank – undetermined – [fires in which EII =NNN and heat source <>40-99])

In addition, fires and losses associated with code EII 600, “Kitchen and cooking equipment, other,” were allocated proportionally across specific kitchen and equipment codes, such as EII codes 611-699.

¹ Campbell, Richard, “Firewatch: Maine: Unattended Cooking Fire Claims Life of Resident,” *NFPA Journal*, January/February 2018.

² Campbell, Richard, “Firewatch: Elderly Woman Dies of Injuries Sustained in Cooking Fire,” *NFPA Journal*, July/August 2017.

³ Ahrens, Marty. *Home Structure Fires*. Quincy, MA: NFPA, 2018,

⁴ Ahrens, Marty. *How National Estimates Statistics Are Calculated for Home Structure Fires*. Quincy, MA: NFPA, 2018.

⁵ Ahrens, Marty, “Table 8A: Fire Deaths and Injuries in Reported Home Structure Fires Caused by Cooking by Age of Victims of Both Genders: 2011–2015 Annual Averages,” *Home Fire Victims by Age and Gender: Supporting Tables*. Quincy, MA: NFPA, 2018.

⁶ Bureau of Labor Statistics, “Table A-1: Time spent in detailed primary activities and percent of the civilian population engaging in each activity, averages per day by sex, 2018 annual averages.” Accessed at <https://www.bls.gov/tus/a1-2018.pdf> on October 8, 2019.

⁷ Ahrens, Marty. *Smoke Alarms in U.S. Home Fires*. Quincy, MA: NFPA, September 2010, pp. 14.

⁸ Kaiser, Dan, “New Smoke Alarm Requirements and Features Coming Soon,” UL.com, 2019. Accessed at <https://www.ul.com/news/new-smoke-alarm-requirements-and-features-coming-soon> on October 15, 2019.

Equipment that is totally unclassified was not allocated further. Unfortunately, equipment that is truly different can erroneously be assigned to other categories.

For more information on the methodology used for this report, see [How NFPA’s National Estimates Are Calculated for Home Structure Fires](#).

Acknowledgments

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the NFIRS and the annual NFPA Fire Experience Survey. These firefighters are the original sources of the detailed data that makes this analysis possible. Their contributions allow us to estimate the size of the fire problem.

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

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⁹ Pickett, Annie, “Teaching and Technology: A Recipe for Safer Cooking,” 2018 Model Performance in Community Risk Reduction Symposium (Reston, VA, 2018). Accessed at <https://strategicfire.org/wp-content/uploads/2018/05/Fire-Safe-Cooking-Pickett-Summary.pdf> on October 16, 2019.

¹⁰ US Bureau of the Census, “[American Housing Survey Table Creator](#),” “2015 National – Heating, Air Conditioning, and Appliances – All Occupied Units,” accessed October 2018.

¹¹ Hopper, Howard. “What’s Cooking with Cooking: UFL, FCAC, and IAFC Considerations.” 2019 NFPA Conference and Expo, San Antonio, TX, June 18, 2019.

¹² Greene, Michael A. and Craig Andres. *2004–2005 National Sample Survey of Unreported Residential Fires*. U.S. Consumer Product Safety Commission, July 2009.

¹³ Harris Poll National Quorum, 2010.

¹⁴ Greene, Michael A. and Craig Andres. *2004–2005 National Sample Survey of Unreported Residential Fires*. U.S. Consumer Product Safety Commission, July 2009, pp. 162-172.