



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 the five-year period of 2012-2016, cooking was the leading cause of reported home¹ fires (48%) and home fire injuries (45%) and the second leading cause of home fire deaths (21%). According to the Consumer Product Safety Commission (CPSC), cooking is also the leading cause of unreported home fires.

United States fire departments responded to an estimated average of 172,100 home structure fires per year started by cooking activities in 2012-2016, or an average of 471 home cooking fires per day. These fires caused an average of 530 civilian deaths, 5,270 reported civilian fire injuries, and \$1.1 billion in direct property damage per year.

Home fires caused by cooking peaked at Thanksgiving and Christmas.

The vast majority of reported cooking fires were small. A disproportionate share of home cooking fires were reported in apartments or other multi-family homes compared to one- or two-family homes.

Ranges or cooktops were involved in the 63% of reported home cooking fires, 86% of cooking fire deaths and 79% of cooking fire injuries. Households that use electric ranges have 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 1% of these fires, but clothing ignitions led to 15% of the home cooking fire deaths.

One-third of the people killed by cooking fires were sleeping at the time. More than half of the non-fatal injuries occurred when people tried to control the fire themselves.

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

Trends in Cooking Fires and Fire Deaths

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 container where the fire started.² During the transition years of 1999-2001 when NFIRS 5.0 was introduced, less than half of the fire data were originally 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.

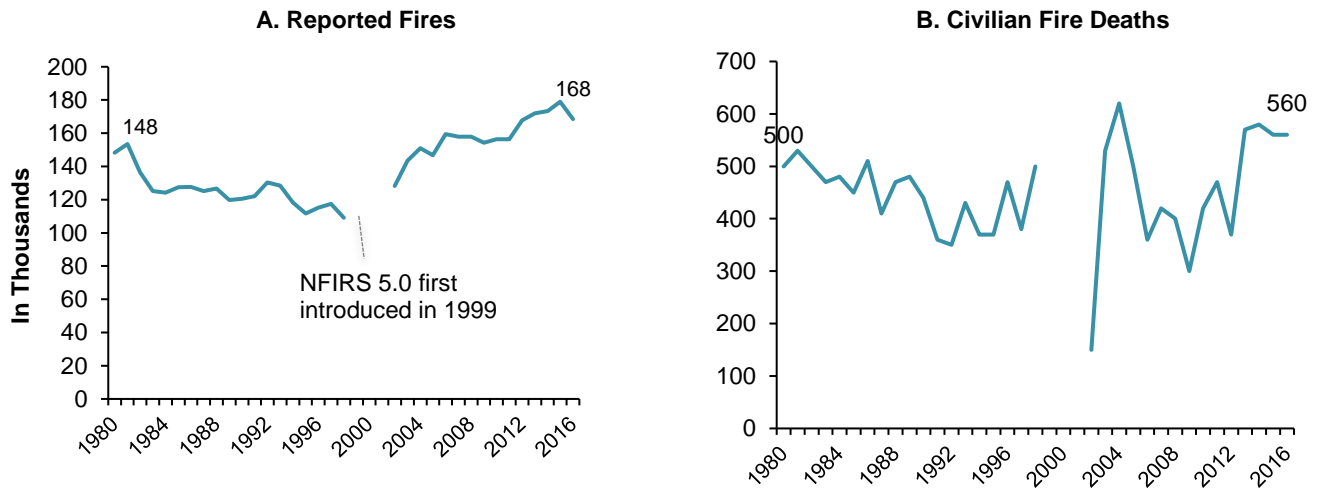
¹ The term "home" encompasses one- or two-family homes, including manufactured homes, and apartments or other multi-family housing.

² 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 object of origin. In this analysis, confined cooking fires were analyzed separately from non-confined fires and the results summed.

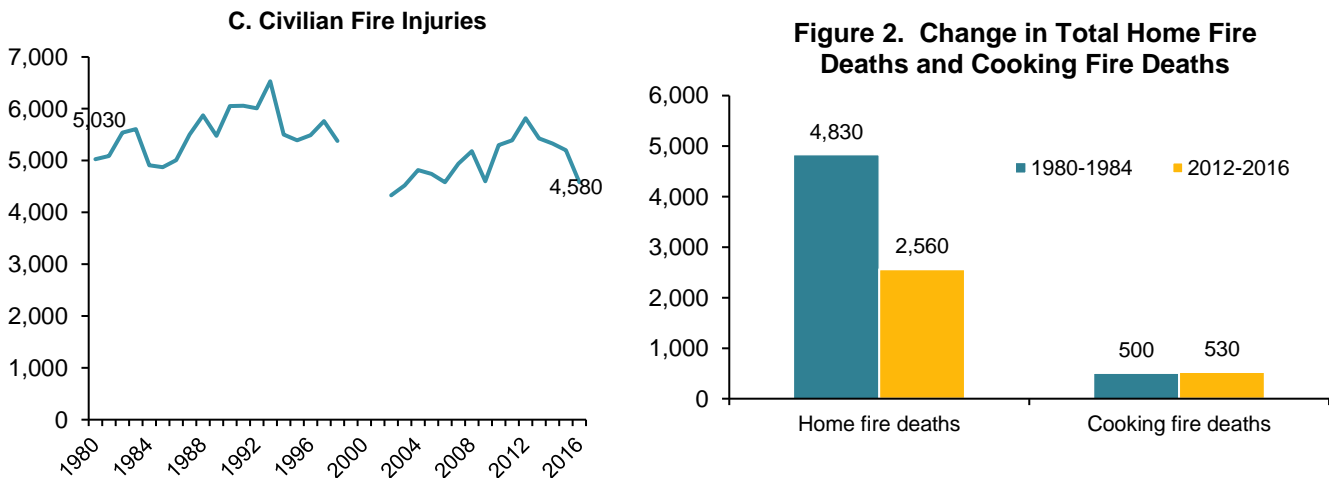
After leveling off for a few years, reported cooking fires hit consecutive new highs in 2012-2015 before dropping slightly in 2016.

To obtain more complete data, in 2012, the USFA began requiring a valid entry for equipment involved in ignition when other data elements indicated that equipment was involved. Because of the changes in NFIRS, it is impossible to tell how much of the increase is due to changes in the data collection system and how much reflects true changes in fire experience.

Figure 1. Reported Home Cooking Fires, by Year, 1980-2016



There were more cooking fire deaths in 2012-2016 than in 1980-1984, even though total home fire deaths fell 47% 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.

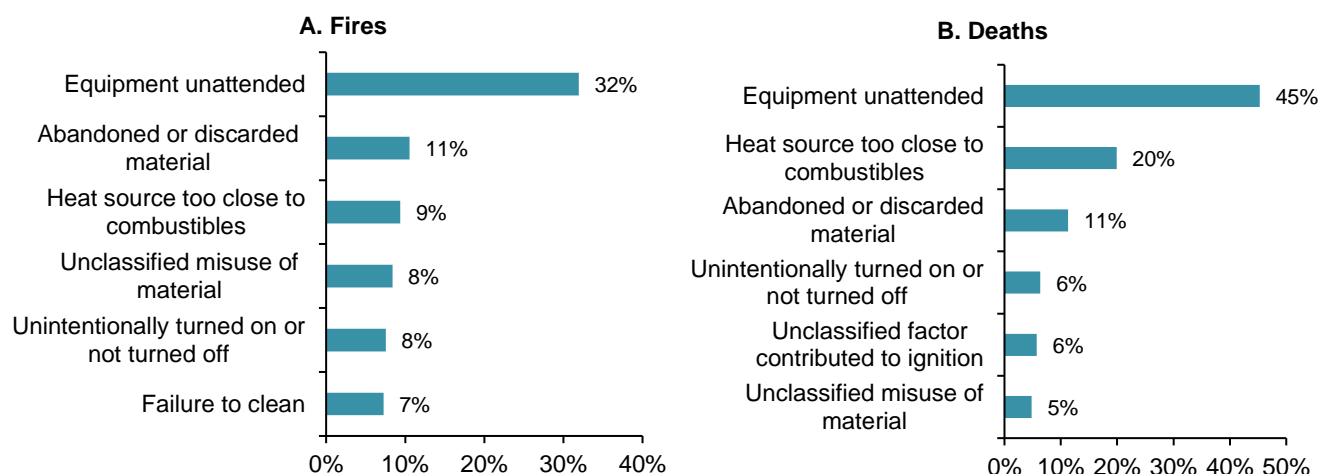


Causes and Circumstances of Home Cooking Fires in 2012-2016

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

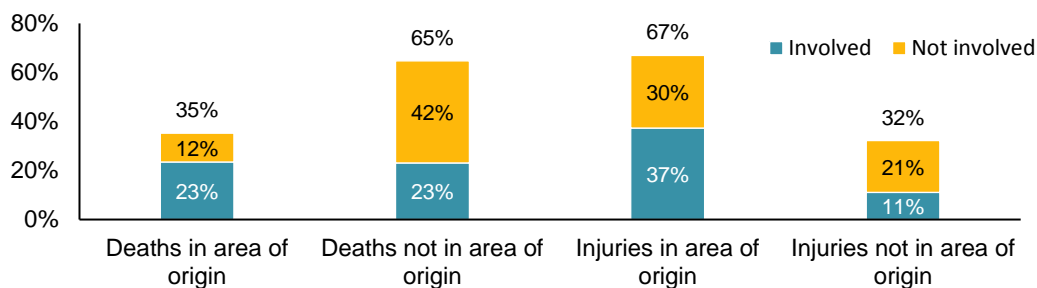
In another common scenario, combustible materials such as wrappers, potholders or clothing caught fire when they were left or came too close to hot cooking equipment.

Figure3. Leading Factors in Home Cooking Fires and Cooking Fire Deaths: 2012-2016



One-third of the fatalities and two-thirds of the injuries occurred in the area of origin when the fire started. With unattended cooking the leading cause of cooking fires, it is not surprising that 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 Involvement in Ignition: 2012-2016



Not surprisingly, two-thirds of home cooking fires began with the ignition of cooking materials, including food. Fat, grease, cooking oil and related substances that could be associated with grease were first ignited in half (53%) of the home cooking fires that began with cooking

materials. Almost two-thirds (64%) of the civilian deaths and three-quarters of the civilian injuries (78%), and direct property damage (78%) associated with cooking material or food ignitions resulted from these fat, grease or cooking oil fires.

Table A shows that death and injury rates per 1,000 fires are higher for food or cooking material fires that began with the ignition cooking oil and fats 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 of 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.

Table A.
Death and Injury Rates per 1,000 Fires and Average Loss per Fire in Reported Home Cooking Fires That Began with Food or Cooking Materials, by Leading Type of Material
2012-2016 Annual Averages

Equipment Involved	Fires	Civilian Deaths Per 1,000 Fires	Civilian Injuries Per 1,000 Fires	Average Loss Per Fire
Food or starch, excluding fat or grease	42,600	1.7	13.7	\$1,800
Cooking oil or other Class IIIB combustible liquid	35,400	2.7	54.0	\$8,900
Fat, grease, butter, margarine or lard	24,700	2.5	35.7	\$5,200
Other known types of material	10,900	1.3	14.8	\$4,200
Total	113,500	2.2	31.5	\$5,000

Clothing was the item first ignited in less than 1% of these fires, but clothing ignitions led to 15% of the home cooking fire deaths. Five of every six (83%) of these victims were 65 or older. While it is important for all who cook to wear snug or short sleeves, this is especially critical for older adults.

The vast majority of reported cooking fires were small. Four out of five (79%) were confined to the object or pan of origin; 6% of the cooking fire deaths and one-third (32%) of reported cooking fire injuries resulted from these small fires. One-third (33%) of the home cooking fire deaths and 83% of home cooking fire injuries resulted from the 95% of fires that were confined to the room where the fire began.

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

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

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

Not surprisingly, cooking fires peaked between 5:00 and 8:00 p.m. when people were preparing dinner. The 12% of the fires reported between 11:00 p.m. and 7:00 a.m. accounted for 44% of the deaths. Sleep and possible alcohol impairment or drug impairment were more common factors in these late night fires. Cooking while overtired or under the influence is dangerous. It is likely that “unattended or unsupervised person” was often used for unattended cooking as “age was a factor” was indicated much less frequently.

Figure 5. Human Factors Contributing to Ignition in Home Cooking Fires by Alarm Time: 2012-2016

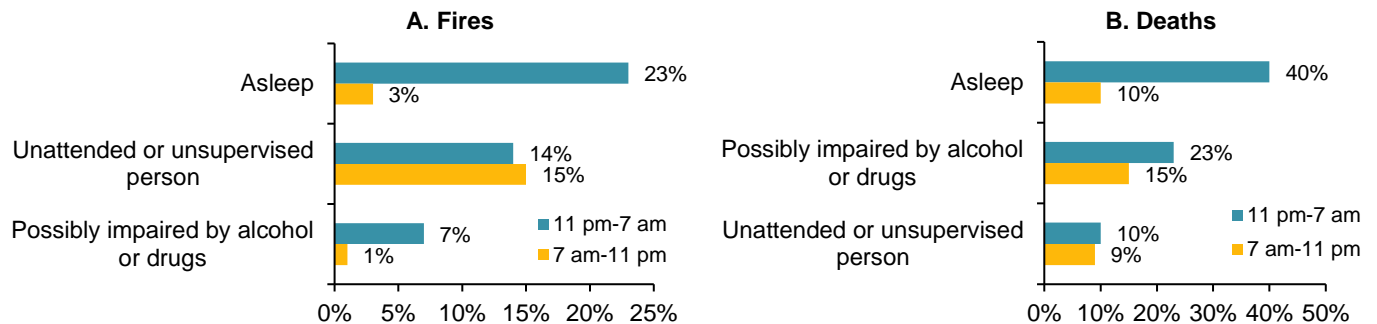


Table B shows that Thanksgiving is by far the leading day for home cooking fires. Christmas, another holiday associated with food ranked second. Super Bowl Sunday has also become a major food event, ranking fifth in these fires following the days before Christmas and Thanksgiving. Cooking increases for holiday celebrations. Televised sporting events have taken on holiday-like qualities. Guests and TV can distract attention from the kitchen.

**Table B.
Leading Dates for 2016 Home Cooking Fires
Structure Fires Reported to U.S. Fire Departments**

Date	Fires	Percent above Average Number of Fires per Day
November 24 (Thanksgiving)	1,570	(241%)
December 25 (Christmas Day)	800	(73%)
December 24 (Christmas Eve)	760	(66%)
November 23 (Day before Thanksgiving)	690	(51%)
February 7 (Super Bowl Sunday)	630	(38%)
Daily average in 2016	460	

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%) of the people who died in cooking fires were at least 55 years of age.⁵

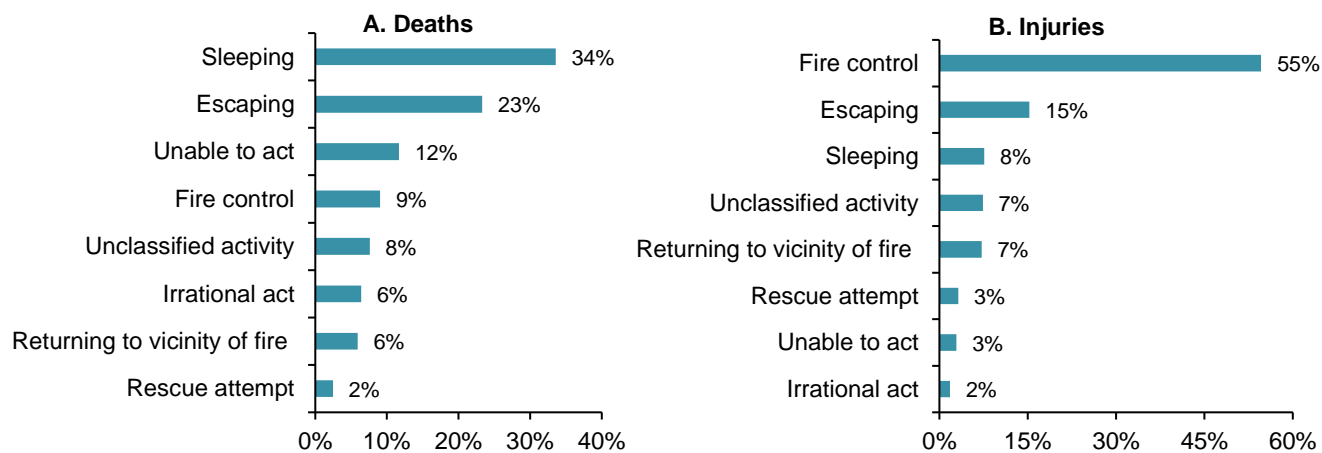
Young adults aged 20-34 were at the highest risk of non-fatal cooking injury. Much less variation in risk was seen in the injury age distribution. Only one-quarter of the injured were 55 or older.

The American Time Use Survey reported that in 2017, 43% of men and 65% of women engaged in “food and drink preparation” per day, with men spending an average of 17 minutes and women 38 minutes per day on the activity.⁶ Although women spend more time in food preparation and clean-up, males were more likely to die in cooking fires.

People who were fatally injured in home cooking fires were more likely to have been sleeping, trying to escape, or unable to take action 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.

More than two-thirds (69%) of reported non-fatal home cooking fire injuries were minor.

Figure 6. Activity when Injured in Home Cooking Fires: 2012-2016



The estimates of home cooking fires reported to local fire departments are a tiny fraction of all home fires involving home cooking equipment. In their analysis of the Consumer Product Safety Commission’s (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

⁵ Marty Ahrens, 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,” *Fire Deaths and Injuries in Reported Home Structure Fires by Age and Gender*, Quincy, MA: NFPA, 2018, publication pending.

⁶ Bureau of Labor Statistics, Table A-1. “Time spent in detailed primary activities and percent of the civilian population engaging in each activity, average per day by sex, 2017. Accessed at <https://www.bls.gov/tus/tables/a3-1317.htm> on August 9, 2018

cooking fires were handled safely by individuals without fire department assistance. In some cases, the fire went out by itself.⁷

The study also found that 102,000 injuries resulted from cooking equipment fires with no fire department presence. This is 19 times the average of 5,270 civilian injuries per year in reported home cooking structure fires during 2012-2016. However, almost all of the injuries from unreported fires were minor.

CPSC noted that unreported cooking equipment fires fell 63% from 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.

Equipment Involved in Reported Home Cooking Fires

Ranges or cooktops were involved in almost two-thirds (63%) of reported cooking fires, 86% of the deaths, and 79% of the injuries. Table B shows that ovens and microwave ovens have lower death and injury rates per 1,000 reported fires, and lower average property losses per fire than do ranges, portable cooking equipment, grills or deep fryers.

Table C.
Reported Home Cooking Fires, by Equipment Involved in Ignition,
Death and Injury Rates per 1,000 Fires and Average Loss per Fire
2012-2016 Annual Averages

Equipment Involved	Fires	Civilian Deaths Per 1,000 Fires	Civilian Injuries Per 1,000 Fires	Average Loss Per Fire
Specific types of cooking equipment	150,000	3.5	33.1	\$7,500
Range or cooktop	107,700	4.2	38.8	\$7,800
Oven or rotisserie	21,800	0.9	11.6	\$2,000
Portable cooking or warming equipment	8,000	4.1	29.6	\$8,900
Microwave oven	6,800	1.1	17.4	\$5,200
Grill, hibachi or barbecue	4,300	2.2	26.3	\$27,400
Deep fryer	700	2.6	43.3	\$23,500
Grease hood or duct exhaust fan	600	0.0	47.1	\$11,200
Total	172,100	3.1	30.6	\$6,600
Non-confined fire	43,500	12.1	89.4	\$25,400
Confined fire	128,600	0.0	10.8	\$200

⁷ Michael A. Greene and Craig Andres. *2004-2005 National Sample Survey of Unreported Residential Fires*. U.S. Consumer Product Safety Commission, July 2009.

Households that use electric ranges have a higher risk of cooking fires and associated losses than those using gas ranges. Although 60% of households cook with electricity,⁸ four out of five (79%) ranges or cooktops involved in reported cooking fires were powered by electricity.

Compared to rates and averages for households using gas ranges:

- The rate of reported fires was 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 for households using gas ranges; and
- The average fire dollar loss per user household was 3.9 times as high among households with electric ranges.

Safety Information

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 fire-safe cooking. As a result, some messaging may be repeated throughout topic areas. Fire and life safety educators can download the [Educational Messages Desk Reference- 2018](#) 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, 2018, for more detailed information about the material presented in this report.

Methodology

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. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

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

NFPA's fire department 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

⁸ U.S. Bureau of the Census, [American Housing Survey- Table Creator](#), "2015 National - Heating, Air Conditioning, and Appliances - All Occupied Units," accessed October 2018.

captured in NFIRS, scaling ratio are 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 (codes 630-649 and 654). Fire 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 said to be 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 incident type 113- “Cooking fire in or on a structure and confined to the vessel of origin” were considered cooking fires regardless of the equipment involved in ignition. 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 to cause ignition if the equipment malfunctioned or was used improperly. NFPA noticed that many fires in which EII was coded as None (NNN) have had other causal factors that indicated equipment was a factor or were completely unknown. 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

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

In addition, fires and losses associated with code EII 600, kitchen and cooking equipment, other, were allocated proportionally across specific kitchen and equipment codes EII codes 611-699. Equipment that is totally unclassified is not allocated further. Unfortunately, equipment that is truly different is erroneously 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.*](#)

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.

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