

**SELECTIONS FROM
HOME FIRES INVOLVING COOKING EQUIPMENT
RANGES**

**Marty Ahrens
November 2009**



**National Fire Protection Association
Fire Analysis and Research Division**

Abstract

During 2003-2006, U.S. fire departments responded to an estimated average of 150,200 home structure fires involving cooking equipment per year. These fires caused an annual average of 500 civilian deaths, 4,660 civilian injuries, and \$756 million in direct property damage.

Ranges, with or without ovens, account for the majority (59%) of total reported home structure fires involving cooking equipment and even larger shares of associated civilian deaths (88%) and civilian injuries (77%). Unattended equipment is the leading cause of cooking fires.

Keywords: Range, stove, oven, microwave, toaster, grill, frying, fryer, fire statistics, home fires, residential 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 Consumer Product Safety Commission for their work that helps us understand home fires that are not reported to the fire department.

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

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National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7450

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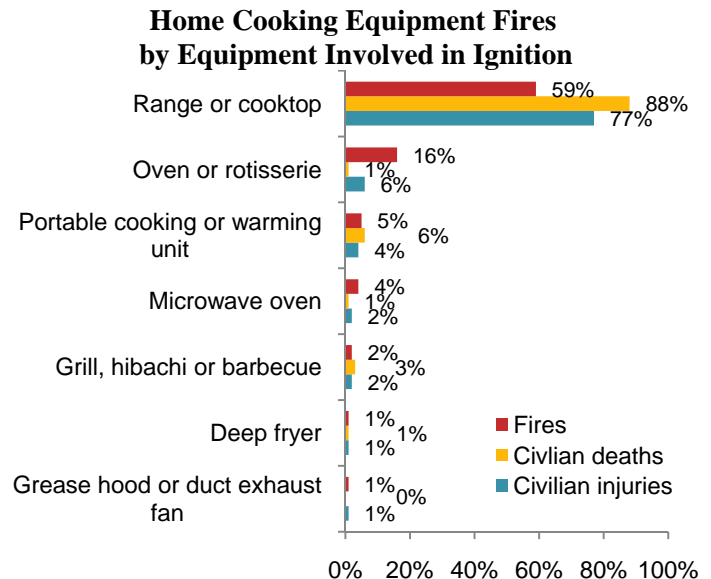


Home Fires Involving Cooking Equipment

Cooking equipment is the leading cause of home structure fires and associated civilian injuries and the third leading cause of home fire deaths.

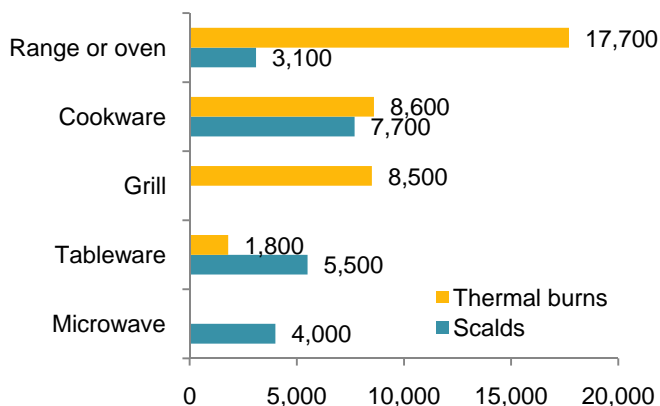
During the four-year period of 2003-2006:

- U.S. fire departments responded to an average of **150,200** home¹ structure fires that involved cooking equipment per year. These fires caused an average of 500 civilian fire deaths, 4,660 civilian fire injuries, and \$756 million in direct property damage.
- Cooking equipment was involved in 40% of all reported home fires, 17% of home fire deaths, 36% of home civilian injuries, and 12% of the direct property damage resulting from home fires.
- Unattended cooking was by far the leading contributing factor in these fires. Something that could catch fire was too close to the equipment ranked second and unintentionally turned on or not turned off ranked third.
- Ranges accounted for the largest share (59%) of home cooking fire incidents. Ovens accounted for 16%.
- Three-fifths (57%) of reported home cooking fire injuries occurred when victims tried to fight the fire themselves.



- Households that use electric ranges have a higher risk of fires and associated losses than those using gas ranges.
- In a 1999 study of range fires by the U.S. Consumer Product Safety Commission, 83% of frying fires began in the first 15 minutes of cooking.

2008 Emergency Room Visits for Burns Associated with Cooking and Related Equipment



Most burns associated with cooking equipment, cookware, and tableware were not caused by fire or flame.

In 2008, ranges or ovens were involved in an estimated 17,700 thermal burn injuries seen in U.S. hospital emergency rooms.¹

- 92% resulted from contact with the hot equipment or some other non-fire source.

Children under five accounted for 52% of the tableware scalds.

¹ Data from the Consumer Product Safety Commission's National Electronic Injury Surveillance System, queried in August 2009.

Ranges

Ranges or cooktops were involved in the majority of home cooking equipment fires.

During 2003-2006, U.S. fire departments responded to an average of 88,000 home structure fires per year in which a range or cooktop was involved in ignition. These fires caused an annual average of 440 civilian deaths, 3,540 civilian injuries, and \$523 million in direct property damage. These incidents accounted for 59% of the reported home fires involving cooking equipment, 88% of the associated civilian deaths, 77% of the associated civilian injuries, and 69% of the direct property damage from cooking equipment fires.

Data Sources, Definitions and Conventions Used in this Report

The fire statistics in this analysis 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. 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 NFPA's annual fire department experience survey. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest ten and property damage is rounded to the nearest million dollars.

NFIRS 5.0 equipment involved in ignition code 646 captures ranges or cooking surfaces and counter-mounted stoves, with or without ovens. NFIRS incident type codes in the range of 110-129 were used to identify structure fires. Unknown data were allocated proportionally in most fields analyzed except for incident type.

NFIRS incident type 113, a confined cooking fire, is used to capture structure fires involving the contents of cooking vessel with no fire extension beyond vessel. Causal information, including equipment involved in ignition, is not required for confined cooking fires or other structure fires with confined fire incident types (incident types 113-118). Consequently, estimates of equipment involved in confined fires are based on the 4% of confined fire incident reports coded with known or no equipment involved in ignition.

The estimates reflect a proportional share of home fires with equipment involved in ignition unknown or recorded as kitchen or cooking equipment of undetermined type. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated.

Unless otherwise specified, property damage has not been adjusted for inflation. Additional details on the methodology used may be found in Appendix A. Our analysis methods are continually being refined and previous estimates updated.

NFIRS 5.0, first introduced in 1999, brought major changes to fire incident data, including changes in some definitions and coding rules. Because of these changes, caution should be used when comparing data before 1998 with data from 1999 on.

These fires are a major part of the overall home fire problem. Ranges or cooktops were also involved in 23% of reported home fires from all causes combined, 15% of home fire deaths, 27% of home fire injuries, and 9% of the direct property damage resulting from home fires.

Ranges are found in almost every home. The American Housing Survey found that in 2007, cooking stoves or ranges were found in 98% of all occupied housing units.¹

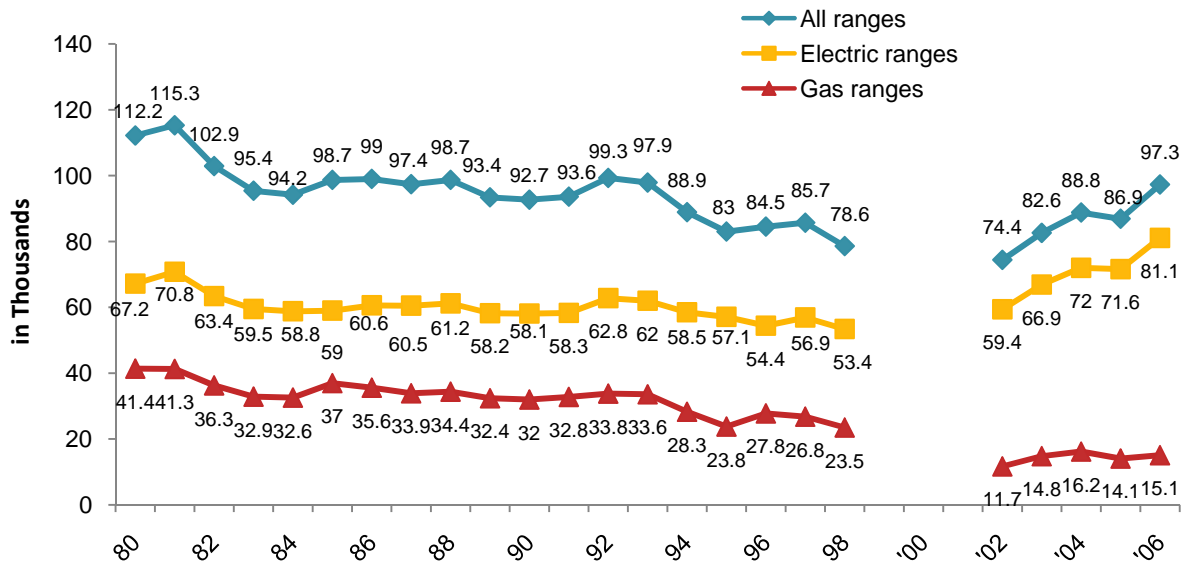
Figure 2.1 and Table 2.1 show that the total number of reported fires involving ranges or cooktops was only 13% lower in 2006 than in 1980. Table 2.2 shows that fires involving gas ranges were 63% lower while Table 2.3 shows that electric range fires were actually up 21%.

Stoves or Ranges Were Involved in Millions of Unreported Fires

Stoves or ranges were also involved in an estimated annual average of 3.8 million home U.S. fires that the fire department did not attend, according to Michael Greene's and Craig Andres' CPSC 2009 report, *2004-2005 National Sample Survey of Unreported Residential Fires*.

Because of the changes in data collection rules and definitions that accompanied the introduction of NFIRS 5.0 in 1999, caution must be used in interpreting these findings. NFIRS 5.0 made it much easier to document minor cooking fires.

Figure 2.1. Reported Home Structure Fires Involving Ranges or Cooktops, by Year: 1980-2006



Source: Data from NFIRS and NFPA survey.

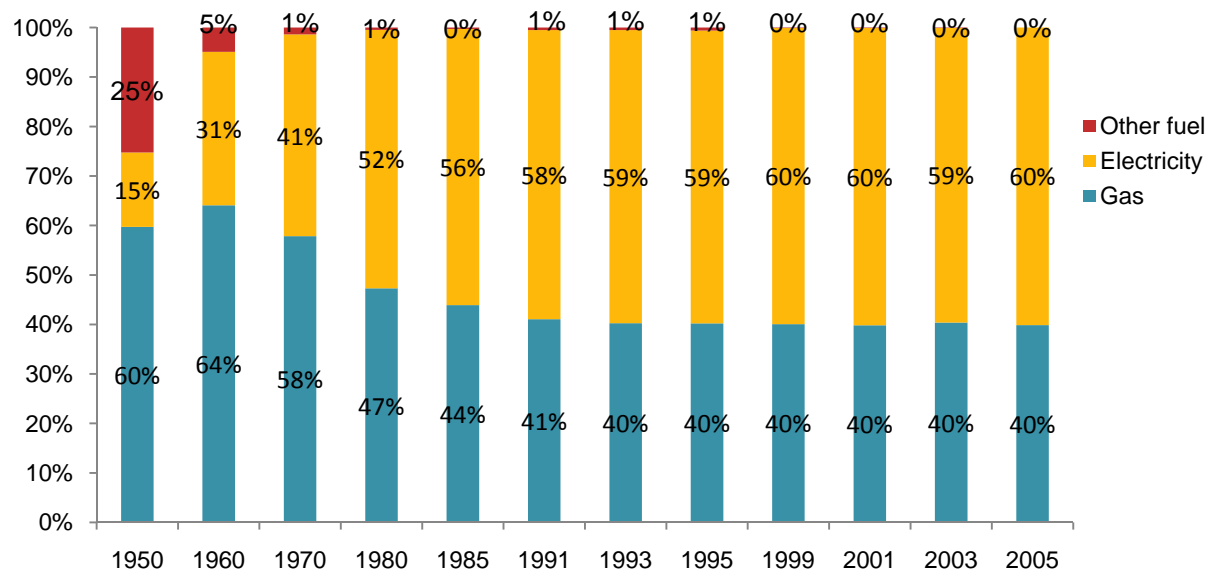
¹ U.S. Census Bureau, Current Housing Reports, Series H150/07, *American Housing Survey for the United States: 2007*, Washington, DC, 2008. Table 1A-4.

Range Power Sources

Electricity is favored over gas by 3-to-2 as the primary cooking equipment power source.

Table 2.4 and Figure 2.2 show how the use of electricity as the primary power source for cooking equipment increased from 15% of the households in 1950 to 60% in 2005. By 1970, the use of solid and liquid fuels as primary power source for cooking had fallen to 1%. By 1980, electricity had become the dominant power source. Since the early 1990s, 1.5 times as many households have used electricity as gas.

Figure 2.2. Percentage of Households Using Gas, Electricity and Other Fuel as Primary Cooking Power Source over Time



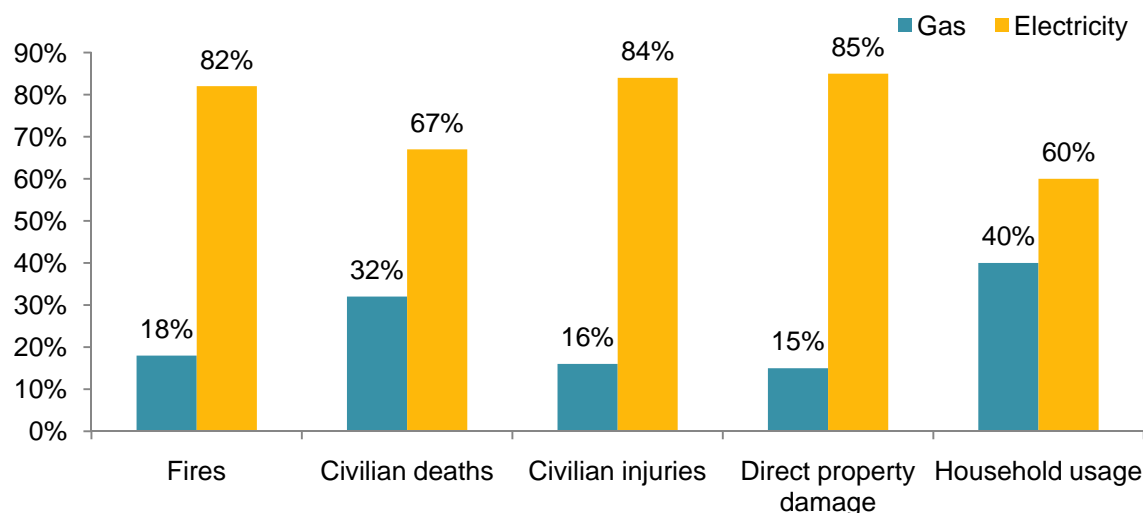
Note: Gas includes utility, bottled, tank and LP-gas.

Source: U.S. Bureau of the Census, *Census of Housing, 1960*, Vol. 1; *1970 and 1980*, Vo. 1; Current Housing Reports, Series H-150-87, American Housing Survey; *1990 Census of Housing, Detailed Housing Characteristics*, Series CH-2; and *Statistical Abstract of the United States*, 1994-2008 editions.

Households that use electric ranges have a higher risk of fires and associated losses than those using gas ranges.

Although 60% of U.S. households used electricity as their primary cooking power source in 2003-2005, Figure 2.3 shows that 82% of the range or cooktop fires reported in 2003-2006 were powered by electricity. During 2003-2006, electric ranges or cooktops were involved in an average of 72,200 reported home structure fires per year. These fires caused an annual average of 290 civilian deaths, 2,980 reported civilian injuries, and \$444 million in direct property damage. Gas ranges or cooktops were involved in an average of 15,600 reported home structure fires annually during this period, resulting in an average of 140 civilian deaths, 550 civilian injuries, and \$78 million in direct property damage per year.

Figure 2.3. Percentages of 2003-2006 Reported Home Structure Fires and Associated Losses Involving Cooking Equipment by Cooking Equipment Power Source



Source: Data from NFIRS Version 5.0 and NFPA survey.

Rates per million user households of reported fires and civilian injuries and average direct property damage per reported stove or range fire were three to four times higher for households using electric ranges than in households using gas ranges. (See Table 2.5.) The death rate from fires involving stoves, ranges, or cooktops in households using electricity for cooking was 1.4 times as high as it was in households using gas. The rate of 41.2 injuries per 1,000 reported electric range or cooktop fires and average loss per fire of \$6,100 were also higher for than the 35.5 injuries per 1,000 reported gas range fires and \$5,000 in average direct property damage. However, the death rate of 9.1 deaths per reported 1,000 gas range fires was more than twice as high as the electric range rate of 4.1.

Including fires that were not attended by fire departments, based on its 2004-2005 survey, the CPSC estimates that electric ranges were involved in 2.6 million home fires, resulting in a risk of 3.8 such fires per 100 user households. Gas ranges were involved in an estimated 1.1 million fires, resulting in a rate of 2.6 fires per 100 user households.² The risk of fire was 47% higher in households using electric ranges.

Causal Factors

Unattended cooking was the leading factor contributing to home fires involving ranges.

During 2003-2006, unattended equipment was a factor contributing to ignition in 43% of reported non-confined home structure fires involving ranges or cooktops. Table 2.6 shows that other leading factors were unintentionally turned on or not turned off (11% of fires), heat source

² Source: Michael A. Greene and Craig Andres. *2004-2005 National Sample Survey of Unreported Residential Fires*, U.S. Consumer Product Safety Commission, July 2009, pp. 127-128.

too close to combustibles (11% of fires), abandoned or discarded material (9% of fires), and playing with fire (less than 1% of fires but 10% of the deaths).

Gas range fires were much less likely than electric range fires to cite equipment unattended (26% vs. 45% of fires) and much more likely to cite leak or break (12% vs. 0%). See Table 2.7 and 2.8 for more details.

Cooking materials were the leading items first ignited.

During the same four-year period, 61% of the reported non-confined home fires involving ranges started with the ignition of cooking materials, including food. Other leading items first ignited for one or more losses were flammable or combustible gases or liquids or associated piping (5% of fires), household utensils (also 5% of fires), cabinetry (another 5% of fires), appliance housing or casing (4% of fires), and clothing (only 1% of fires but 15% of deaths).

Gas range fires were much less likely than electric range fires to cite cooking materials (43% vs. 65% of fires) and more likely to cite flammable or combustible gases or liquids and related items (16% vs. 3% of fires). Additional details may be found in Tables 2.9, 2.10, and 2.11.

Flame damage was limited to the room of fire origin in 95% of range fires.

Table 2.12 shows that two-thirds (68%) of all range or cooktop fires reported in 2003-2006 were coded with an incident type that indicated the fire was confined to the vessel or object or origin. In an additional 8%, fire spread was coded as confined to the object of origin. Combined, the 76% of reported range fires with confined fire incident types or that were confined to object of origin caused 6% of the range fire deaths and 35% of the associated injuries. Flame damage spread beyond the room of origin in only 5% of reported range or cooktop fires. However, these incidents caused 76% of the associated deaths. Only 16% of the reported non-fatal range fire injuries resulted from the 5% of fires that spread beyond the room of origin. Table 2.13 shows comparable data for gas ranges while extent of flame damage for reported fires involving electric ranges is shown in Table 2.14.

Frying is the leading activity associated with cooking fires.

NFIRS provides considerable information but it cannot provide the level of detail available from specials studies. A 1999 CPSC study analyzed the results of 289 range fire investigations. Three-quarters (218) began with the ignition of food. Sixty-three percent of the food ignitions involved frying, 18% baking and 10% boiling. Eighty-three percent of the frying ignitions and 88% of the baking ignitions occurred during the first fifteen minutes of cooking. Only 6% of the ignitions while boiling occurred this early in the cooking process.³

A 1998 study of kitchen fires in the Bay-Waikato region of New Zealand found that 35% of the cooks were shallow frying and 29% deep frying. The authors elaborated on the circumstances of different types of fires.⁴ When oil or fat ignited:

³ Smith, Linda, Monticone, Ron, and Gillum, Brenda. *Range Fires, Characteristics Reported in National Fire Data and a CPSC Special Study*, Washington, DC: U.S. Consumer Product Safety Commission, Division of Hazard Analysis, Directorate of Epidemiology. 1999, online at <http://www.cpsc.gov/LIBRARY/FOIA/Foia99/os/range.pdf>

⁴ Key Research and Marketing, Ltd. *New Zealand Fire Service Bay-Waikato Fire Region Kitchen Fire Research, Summary of Findings*, October 1998.

- the cooks had forgotten to turn off the heat in 30% of the fires,
- distractions or other chores caused the cooking to be unattended in 23%;
- the stove or element's temperature was too high in 20% of the fires;
- 10% of the cooks were adding or removing food from the pan; and
- a build-up of grease under the element caught fire when the stove was turned on in 7% of the fires.

The same study noted several similar factors in the 16% of cooking fires involving boiling. When boiling was a factor, the fire started after the liquid evaporated.

Frying inherently involves a combustible medium in addition to the food, namely the cooking oil or grease. A frying pan provides no containment for fire if one begins. For all these reasons, there can be no exceptions to attendance at frying by the cook. Because frying is relatively quick, there should be no great hardship in attendance.

Technology could prevent many range fires.

The CPSC commissioned an Arthur D. Little, Inc. report on possible technologies that could address range or cooktop fires.⁵ The findings suggest that roughly two-thirds of these fires could be mitigated with technologies such as timers and motion sensors that would ensure someone was paying regular attention to the cooking. Roughly three-quarters could be mitigated with temperature sensors or related technologies to prevent cooking materials from igniting. Today's ranges and cooktops come in a variety of configurations, including open or sealed gas burners and smooth and coil burners on electric stoves. Some technologies may not be feasible for some configurations. Some of these technologies are currently available. Systematic studies of field reliability, costs vs. benefits, and consumer acceptance of these technologies would be helpful.

Visits to Hospital Emergency Rooms for Injuries Involving Ranges or Ovens

Fire injuries are only a fraction of the injuries involving ranges seen at hospital emergency rooms.

Almost half of the range- or oven-related injuries seen in hospital emergency rooms were contact burns.

Data collected by the CPSC's National Electronic Injury Surveillance System (NEISS) show that in 2008, an estimated 36,000 people with injuries involving ranges or ovens went to hospital emergency rooms.⁶ Figure 2.4 and Table 2.15 show that 49% of these injuries were thermal burns, including 45% caused by contact with a hot object or other non-fire source (92% of the range or oven thermal burns). *Forty-one percent (6,700) of these contact/non-fire burns were incurred by children under five years of age.*

⁵ Arthur D. Little, Inc. *Technical, Practical and Manufacturing Feasibility of Technologies to Address Surface Cooking Fires, Final Report to United States Consumer Product Safety Commission*, May 2001, online at <http://www.cpsc.gov/library/foia/foia01/brief/ranges.pt1.pdf>.

⁶ All statistics are based on National Electronic Injury Surveillance System (NEISS) data obtained from the U.S. Consumer Product Safety Commission (CPSC) website, www.cpsc.gov, accessed in August 2009.

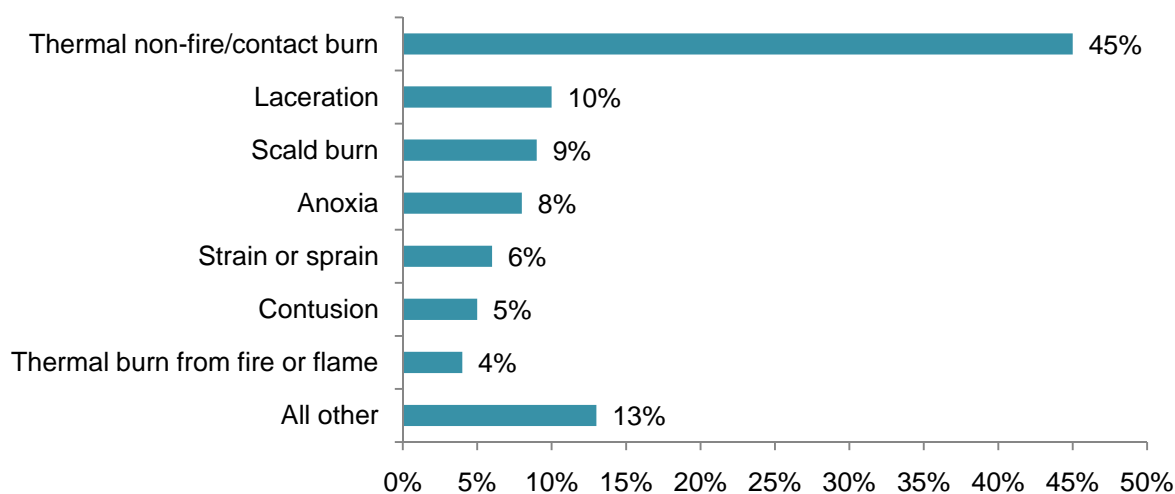
Four percent of the ER visits associated with a range or oven (8% of thermal burns) resulted from a fire or flame. Ten percent of the injuries were lacerations; 9% scald burns; 8% were due to anoxia, including both smoke inhalation from fires, non-fire carbon monoxide poisoning, and exposure to leaking gas; 6% were strains or sprains; and 5% were contusions.

After proportional allocation of injuries involving ranges or ovens of unknown type, these injuries included 11,600 injuries involving gas-fueled ranges and ovens, 19,800 injuries involving electric-powered ranges and ovens, and 4,600 injuries involving other types of ranges and ovens. See Table 16.

CPSC's National Electronic Injury Surveillance System

The CPSC's National Electronic Injury Surveillance System (NEISS) collects information about all injuries seen in a weighted statistical sample of hospital emergency rooms. The database may be queried and results downloaded for further analysis. Information about the injury cause is obtained from the patient. Fire involvement code zero is used when there is no fire, no unexpected flames or smoke, or no unexpected spread of flames or smoke. Thermal burns with code zero for fire involvement were considered contact or non-fire burns. Fire involvement codes one to three indicate fire involvement or smoke inhalation with or without fire department attendance. No filters on location and occupancy were included in the queries.

Figure 2.4. Injuries Involving Ranges or Ovens Seen at Hospital Emergency Rooms in 2008, by Diagnosis



Source: CPSC's NEISS, queried in August 2009.

Safety Tips

Choose the right cooking equipment. Install and use it properly.

- Always use cooking equipment tested and approved by a recognized testing facility.
- Follow manufacturer's instructions and code requirements when installing and operating cooking equipment.
- Plug microwave ovens or other cooking appliances directly into an outlet. Never use an extension cord for a cooking appliance as it can overload the circuit and cause a fire.
- For gas-fueled ranges, be sure the range is installed in accordance with NFPA 54, *National Fuel Gas Code*, which addresses clearances, installation, and maintenance. Read and follow manufacturer's instructions, particularly with regard to installation, maintenance, and operation. Liquefied-petroleum (LP)-gas-fueled devices with self-contained fuel supplies are prohibited for home use by NFPA codes.
- For electric-powered ranges, be sure the range is installed in accordance with NFPA's *National Electrical Code*®. Read and follow manufacturer's instructions, particularly with regard to, installation, maintenance, and operation.

Watch what you heat!

- The leading cause of fires in the kitchen is unattended cooking.
- Stay in the kitchen when you are frying, grilling, or broiling food. If you leave the kitchen for even a short period of time, turn off the stove.
- If you are simmering, baking, roasting, or boiling food, check it regularly, remain in the home while food is cooking, and use a timer to remind you that you're cooking.

Stay alert.

- To prevent cooking fires, you have to be alert. You won't be if you are sleepy, have taken medicine or drugs, or consumed alcohol.

Use equipment for intended purposes only.

- Cook only with equipment designed and intended for cooking, and heat your home only with equipment designed and intended for heating. There is additional danger of fire, injury, or death if equipment is used for a purpose for which it was not intended.

Keep things that can catch fire and heat sources apart.

- Keep anything that can catch fire – potholders, oven mitts, wooden utensils, paper or plastic bags, boxes, food packaging, towels or curtains – away from your stovetop.
- Keep the stovetop, burners and oven clean.
- Keep pets off cooking surfaces and nearby countertops to prevent them from knocking things onto the burner.
- Wear short, close fitting or tightly rolled sleeves when cooking. Loose clothing can dangle onto stove burners and can catch fire if it comes in contact with a gas flame or electric burner.

Know what to do if your clothes catch fire.

- If your clothes catch fire, stop, drop, and roll. Stop immediately, drop to the ground, and cover face with hands. Roll over and over or back and forth to put out the fire. Immediately cool the burn with *cool* water for 3 to 5 minutes and seek emergency medical treatment.

Know what to do if you have a cooking fire.

- When in doubt, just get out! When you leave, close the door behind you to help contain the fire. Call 911 or the local emergency number after you leave.
- If you do try to fight the fire, be sure others are already getting out and you have a clear path to the exit.
- Always keep an oven mitt and a lid nearby when you're cooking. If a small grease fire starts in a pan, smother the flames by carefully sliding the lid over the pan (make sure you are wearing the oven mitt). Turn off the burner. Do not move the pan. To keep the fire from restarting, leave the lid on until the pan is completely cool.
- In case of an oven fire, turn off the heat and keep the door closed to prevent flames from burning you or your clothing. After a fire, the oven should be checked and/or serviced before being used again.

**Table 2.1. Home Fires Involving Ranges, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)		
							As Reported	In 2006 Dollars	
1980	112,200		380		4,210		\$181		\$443
1981	115,300		420		4,230		\$701		\$1,552
1982	102,900		370		4,600		\$219		\$457
1983	95,400		400		4,820		\$267		\$540
1984	94,200		420		4,150		\$282		\$546
1985	98,700		360		4,050		\$267		\$500
1986	99,000		390		4,210		\$303		\$558
1987	97,400		380		4,750		\$304		\$539
1988	98,700		390		4,940		\$332		\$566
1989	93,400		360		4,710		\$335		\$545
1990	92,700		380		5,050		\$355		\$548
1991	93,600		310		5,130		\$465*		\$688*
1992	99,300		290		4,960		\$321		\$461
1993	97,900		340		5,490		\$417		\$582
1994	88,900		270		4,480		\$321		\$437
1995	83,000		280		4,300		\$309		\$409
1996	84,500		360		4,350		\$366		\$471
1997	85,700		330		4,610		\$382		\$480
1998	78,600		410		4,280		\$863		\$1,068
1999	31,900	(17,100)	310	(310)	1,420	(900)	\$242	(\$231)	\$293
2000	55,700	(23,800)	120	(120)	2,830	(1,800)	\$266	(\$244)	\$312
2001	68,200	(28,800)	390	(390)	3,580	(2,420)	\$364	(\$353)	\$414
2002	74,400	(28,200)	120	(120)	3,570	(2,450)	\$476	(\$460)	\$534
2003	82,600	(26,700)	420	(420)	3,350	(2,490)	\$523	(\$505)	\$574
2004	88,800	(28,400)	600	(590)	3,860	(2,810)	\$549	(\$531)	\$587
2005	86,900	(29,200)	410	(410)	3,690	(2,890)	\$548	(\$535)	\$566
2006	97,300	(31,400)	350	(350)	3,460	(2,610)	\$498	(\$484)	\$498

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. *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 adjustment to 2006 dollars is done using the consumer price index. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 2.2. Home Fires Involving Gas-Fueled Ranges, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)	
				As Reported	In 2006
1980	41,400	270	1,410	\$53	\$130
1981	41,300	210	1,390	\$590	\$1,306
1982	36,300	230	1,580	\$79	\$165
1983	32,900	250	1,570	\$83	\$168
1984	32,600	220	1,390	\$79	\$153
1985	37,000	140	1,380	\$81	\$152
1986	35,600	190	1,240	\$90	\$166
1987	33,900	170	1,410	\$97	\$172
1988	34,400	220	1,500	\$118	\$201
1989	32,400	230	1,410	\$89	\$145
1990	32,000	180	1,450	\$100	\$154
1991	32,800	160	1,540	\$137*	\$203*
1992	33,800	140	1,410	\$96	\$138
1993	33,600	120	1,400	\$99	\$138
1994	28,300	170	1,140	\$86	\$117
1995	23,800	170	1,020	\$75	\$99
1996	27,800	210	1,110	\$103	\$132
1997	26,800	180	1,060	\$92	\$116
1998	23,500	220	900	\$84	\$104
1999	11,400 (6,200)	80 (80)	650 (380)	\$86 (\$84)	\$104
2000	11,500 (5,800)	120 (120)	570 (570)	\$90 (\$86)	\$105
2001	12,900 (5,600)	190 (190)	560 (350)	\$71 (\$70)	\$81
2002	11,700 (4,600)	20 (20)	430 (370)	\$76 (\$74)	\$85
2003	14,800 (4,900)	210 (210)	570 (410)	\$86 (\$84)	\$94
2004	16,200 (5,200)	220 (220)	670 (480)	\$87 (\$84)	\$93
2005	14,100 (5,200)	60 (60)	400 (260)	\$67 (\$64)	\$69
2006	15,100 (5,600)	100 (100)	540 (440)	\$74 (\$72)	\$74

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. *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 adjustment to 2006 dollars is done using the consumer price index. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 2.3. Home Fires Involving Electric-Powered Ranges, by Year
Structure Fires Reported to U.S. Fire Departments**

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)		
							As Reported	In 2006 Dollars	
1980	67,200		100		2,690		\$119		\$292
1981	70,800		190		2,750		\$106		\$235
1982	63,400		110		2,910		\$130		\$271
1983	59,500		140		3,130		\$174		\$352
1984	58,800		170		2,660		\$197		\$382
1985	59,000		200		2,590		\$175		\$327
1986	60,600		200		2,870		\$205		\$377
1987	60,500		170		3,210		\$191		\$339
1988	61,200		140		3,290		\$204		\$348
1989	58,200		110		3,220		\$235		\$382
1990	58,100		190		3,480		\$245		\$378
1991	58,300		150		3,450		\$316*		\$468*
1992	62,800		150		3,420		\$217		\$312
1993	62,000		220		3,950		\$307		\$428
1994	58,500		100		3,270		\$224		\$305
1995	57,100		110		3,210		\$222		\$294
1996	54,400		140		3,110		\$248		\$319
1997	56,900		140		3,470		\$281		\$353
1998	53,400		170		3,320		\$269		\$333
1999	20,400	(10,800)	230	(230)	650	(380)	\$155	(\$146)	\$187
2000	34,300	(16,600)	0	(0)	1,900	(1,130)	\$157	(\$146)	\$184
2001	54,000	(22,400)	190	(190)	2,890	(1,960)	\$288	(\$278)	\$328
2002	59,400	(23,000)	100	(100)	3,080	(2,050)	\$388	(\$375)	\$435
2003	66,900	(21,800)	210	(210)	2,780	(2,080)	\$437	(\$421)	\$479
2004	72,000	(23,100)	360	(350)	3,170	(2,330)	\$459	(\$444)	\$491
2005	71,600	(24,000)	350	(350)	3,210	(2,600)	\$480	(\$470)	\$496
2006	81,100	(25,700)	240	(240)	2,900	(2,160)	\$421	(\$408)	\$421

* All 1991 home fire property damage figures are inflated by estimation problems related to the handling of the Oakland fire storm.

Note: Numbers in parentheses exclude confined fires. Confined fires are fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment; they are analyzed separately. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. *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 adjustment to 2006 dollars is done using the consumer price index. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2006) and from NFPA survey.

**Table 2.4. Trends in U.S. Use of Primary Cooking Power Sources
(Percentage of Households)**

Year	Gas	Electricity	Other Fuel	None
1950	59.6%	15.0%	25.2%	0.3%
1960	63.7%	30.8%	4.9%	0.5%
1970	57.6%	40.6%	1.4%	0.3%
1980	47.2%	52.1%	0.5%	0.2%
1985	43.7%	55.5%	0.3%	0.5%
1991	40.9%	58.2%	0.5%	0.4%
1993	40.1%	59.0%	0.5%	0.4%
1995	40.1%	59.0%	0.6%	0.3%
1999	39.9%	59.6%	0.1%	0.4%
2001	39.7%	59.9%	0.1%	0.3%
2003	40.3%	59.4%	0.1%	0.3%
2005	39.8%	60.0%	0.0%	0.2%

Note: Gas includes utility, bottled, tank and LP-gas.

Source: U.S. Bureau of the Census, *Census of Housing, 1960*, Vol. 1; *1970 and 1980*, Vo. 1; Current Housing Reports, Series H-150-87, American Housing Survey; *1990 Census of Housing, Detailed Housing Characteristics*, Series CH-2; and *Statistical Abstract of the United States*, 1994-2008 editions.

Table 2.5. Comparative Risks of Reported Fires and Associated Losses of Gas Versus Electric Stoves

A. Input Data

	Average U.S. Households U.S. Households Using a Range With This Power Power (in Millions)	Annual Average of 2003-2006 U.S. Home Structure Fires (Non-Confined or Confined) Involving Range or Stove With This Power			
		Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions)
Gas	43.0	15,600	140	550	\$78
Electricity	64.1	72,200	290	2,980	\$444
All ranges	107.1	88,000	440	3,540	\$528

Note: Usage statistics are published only for odd-numbered years. Therefore, in this analysis, usage is estimated as the average of 2003 and 2005 usage and assumes that households using these power sources for cooking have a range or stove.

Source: Data from NFIRS Version 5.0 and NFPA survey; *Statistical Abstract of the United States 2008* Table 963, Washington: U.S. Department of Commerce, 2007.

B. Comparative U.S. Risk Relative to Usage

	Fires per Million Households	Civilian Deaths per Million Households	Civilian Injuries per Million Households	Direct Property Damage per Households
Gas	363	3.3	12.9	\$1.81
Electricity	1,126	4.6	46.4	\$6.92
All ranges	822	4.1	33.1	\$4.88

**Table 2.6. Home Fires Involving Ranges, by Factor Contributing to Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Equipment unattended	12,200	(43%)	200	(46%)	1,380	(51%)	\$233	(46%)
Unintentionally turned on or not turned off	3,200	(11%)	40	(9%)	230	(9%)	\$95	(19%)
Heat source too close to combustible	3,100	(11%)	60	(13%)	270	(10%)	\$49	(10%)
Abandoned or discarded material	2,500	(9%)	30	(7%)	290	(11%)	\$56	(11%)
Unclassified misuse of material or product	1,900	(7%)	10	(2%)	220	(8%)	\$33	(7%)
Electrical failure or malfunction	1,400	(5%)	10	(3%)	20	(1%)	\$18	(4%)
Unclassified factor contributed to ignition	1,400	(5%)	10	(2%)	110	(4%)	\$26	(5%)
Failure to clean	800	(3%)	10	(1%)	30	(1%)	\$3	(1%)
Leak or break	600	(2%)	0	(0%)	20	(1%)	\$4	(1%)
Unclassified mechanical failure or malfunction	600	(2%)	0	(0%)	10	(1%)	\$4	(1%)
Unclassified operational deficiency	500	(2%)	20	(3%)	80	(3%)	\$7	(1%)
Equipment not being operated properly	400	(2%)	10	(3%)	60	(2%)	\$7	(1%)
Flammable liquid or gas spilled	300	(1%)	0	(0%)	60	(2%)	\$5	(1%)
Improper container or storage	200	(1%)	0	(0%)	10	(0%)	\$2	(0%)
Worn out	200	(1%)	0	(0%)	10	(0%)	\$0	(0%)
Equipment used for unintended purpose	100	(1%)	30	(6%)	20	(1%)	\$1	(0%)
Other known factor*	1,000	(3%)	50	(12%)	70	(2%)	\$17	(3%)
Total	28,500	(100%)	440	(100%)	2,690	(100%)	\$506	(100%)
Total entries	30,600	(107%)	470	(109%)	2,880	(107%)	\$560	(111%)

* Other known factor includes playing with heat source with 10% of the deaths. and an unclassified design deficiency, manufacturing or installation deficiency, a factor in 1% of the deaths..

Note: Multiple entries are allowed, resulting in more factor entries than fires. Home cooking fires involving cooking equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 2.7. Home Fires Involving Gas-Fueled Ranges, by Factor Contributing to Ignition
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Equipment unattended	1,400	(26%)	20	(16%)	170	(42%)	\$33	(44%)
Heat source too close to combustible	800	(16%)	20	(15%)	70	(16%)	\$7	(10%)
Leak or break	600	(12%)	0	(0%)	20	(6%)	\$5	(6%)
Unintentionally turned on or not turned off	400	(8%)	10	(4%)	20	(4%)	\$11	(15%)
Unclassified misuse of material	400	(7%)	10	(4%)	50	(13%)	\$9	(12%)
Abandoned or discarded material	300	(6%)	20	(16%)	20	(5%)	\$5	(7%)
Unclassified factor contributed to ignition	300	(5%)	10	(4%)	20	(5%)	\$3	(4%)
Unclassified mechanical failure or malfunction	200	(5%)	0	(0%)	0	(0%)	\$3	(4%)
Failure to clean	200	(4%)	0	(0%)	10	(1%)	\$0	(0%)
Electrical failure or malfunction	100	(2%)	0	(0%)	0	(0%)	\$1	(1%)
Unclassified operational deficiency	100	(2%)	0	(0%)	10	(2%)	\$0	(1%)
Worn out	100	(2%)	0	(0%)	0	(1%)	\$0	(0%)
Equipment not being operated properly	100	(2%)	0	(3%)	10	(2%)	\$1	(1%)
Improper container or storage	100	(2%)	0	(0%)	10	(1%)	\$0	(0%)
Playing with heat source	100	(1%)	50	(34%)	10	(1%)	\$1	(1%)
Flammable liquid or gas spilled	100	(1%)	0	(0%)	10	(2%)	\$1	(2%)
Equipment used for unintended purpose	100	(1%)	0	(3%)	10	(3%)	\$1	(1%)
Other known factor	300	(5%)	0	(0%)	20	(5%)	\$3	(4%)
Total	5,200	(100%)	140	(100%)	400	(100%)	\$75	(100%)
Total entries	5,500	(107%)	140	(100%)	440	(110%)	\$84	(112%)

Note: Multiple entries are allowed, resulting in more factor entries than fires. Home cooking fires involving cooking equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 2.8. Home Fires Involving Electric-Powered Ranges, by Factor Contributing to Ignition
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Equipment unattended Unintentionally turned on or not turned off	10,600	(45%)	170	(60%)	1,200	(53%)	\$196	(46%)
Heat source too close to combustible	2,900	(12%)	30	(11%)	230	(10%)	\$84	(20%)
Abandoned or discarded material	2,300	(10%)	30	(12%)	200	(9%)	\$42	(10%)
Unclassified misuse of material	2,200	(9%)	10	(3%)	270	(12%)	\$52	(12%)
Electrical failure or malfunction	1,500	(6%)	0	(0%)	160	(7%)	\$24	(6%)
Unclassified factor contributed to ignition	1,400	(6%)	10	(4%)	20	(1%)	\$18	(4%)
Failure to clean	1,200	(5%)	10	(2%)	100	(4%)	\$24	(6%)
Unclassified operational deficiency	600	(3%)	10	(2%)	20	(1%)	\$3	(1%)
Unclassified mechanical failure or malfunction	400	(2%)	20	(6%)	70	(3%)	\$7	(2%)
Equipment not being operated properly	400	(2%)	0	(0%)	20	(1%)	\$2	(0%)
Flammable liquid or gas spilled	400	(2%)	10	(4%)	40	(2%)	\$5	(1%)
Improper container or storage	300	(1%)	0	(0%)	50	(2%)	\$4	(1%)
Other known factor*	100	(1%)	0	(0%)	0	(0%)	\$2	(0%)
	900	(4%)	20	(6%)	50	(2%)	\$14	(3%)
Total	23,300	(100%)	290	(100%)	2,290	(100%)	\$429	(100%)
Total entries	25,000	(107%)	320	(110%)	2,440	(106%)	\$476	(111%)

* Other known factor includes equipment used for unintended purpose, a factor in 4% of the deaths and an unclassified design deficiency, manufacturing or installation deficiency, a factor in 2% of the deaths.

Note: Multiple entries are allowed, resulting in more factor entries than fires. Home cooking fires involving cooking equipment and factor contributing to ignition listed as unknown, unreported, none, or blank have also been allocated proportionally. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 2.9. Home Fires Involving Ranges, by Item First Ignited
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Cooking materials, including food Flammable or combustible liquid or gas, pipe, hose or duct	17,500	(61%)	190	(44%)	1,940	(72%)	\$287	(57%)
Household utensil	1,500	(5%)	10	(1%)	130	(5%)	\$19	(4%)
Cabinetry	1,400	(5%)	10	(1%)	110	(4%)	\$23	(5%)
Appliance housing or casing	1,300	(5%)	40	(9%)	110	(4%)	\$53	(10%)
Unclassified item first ignited	1,200	(4%)	40	(8%)	40	(2%)	\$16	(3%)
Interior wall covering, excluding drapes	1,000	(3%)	20	(5%)	80	(3%)	\$12	(2%)
Electrical wire or cable insulation	800	(3%)	30	(7%)	50	(2%)	\$29	(6%)
Box, carton, bag, basket or barrel	600	(2%)	0	(0%)	10	(0%)	\$5	(1%)
Unclassified furniture or utensil	500	(2%)	10	(2%)	30	(1%)	\$13	(3%)
Magazine, newspaper or writing paper	300	(1%)	0	(0%)	10	(0%)	\$4	(1%)
Linen other than bedding	300	(1%)	0	(0%)	10	(0%)	\$4	(1%)
Clothing	200	(1%)	60	(15%)	40	(2%)	\$3	(1%)
Multiple items first ignited	200	(1%)	10	(3%)	10	(0%)	\$5	(1%)
Unclassified structural component or finish	200	(1%)	0	(0%)	10	(0%)	\$7	(1%)
Rubbish, trash or waste	200	(1%)	0	(0%)	10	(0%)	\$2	(0%)
Unclassified soft goods or wearing apparel	200	(1%)	0	(0%)	10	(1%)	\$1	(0%)
Other known item*	1,000	(3%)	10	(2%)	60	(2%)	\$19	(4%)
Total	28,500	(100%)	440	(100%)	2,690	(100%)	\$506	(100%)

* "Other known" includes ignition of a person (1% of deaths) and floor covering, rug or mat (1% of the deaths).

Note: Sums may not equal totals due to rounding errors. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 2.10. Home Fires Involving Gas-Fueled Ranges, by Item First Ignited
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Cooking materials, including food flammable or combustible liquid or gas, piping or filter	2,200	(43%)	50	(36%)	200	(50%)	\$31	(41%)
Household utensil	300	(6%)	0	(0%)	10	(3%)	\$4	(6%)
Appliance housing or casing	300	(5%)	0	(0%)	10	(4%)	\$2	(3%)
Cabinetry	200	(5%)	10	(10%)	10	(3%)	\$8	(11%)
Unclassified item first ignited	200	(4%)	0	(3%)	20	(5%)	\$3	(4%)
Interior wall covering, excluding drapes	200	(4%)	20	(13%)	0	(1%)	\$8	(11%)
Linen other than bedding	100	(2%)	0	(0%)	10	(1%)	\$0	(0%)
Box, carton, bag, basket or barrel	100	(2%)	0	(0%)	0	(0%)	\$0	(0%)
Clothing	100	(2%)	40	(25%)	30	(6%)	\$1	(1%)
Unclassified furniture or utensil	100	(1%)	0	(0%)	0	(1%)	\$1	(2%)
Electrical wire or cable insulation	100	(1%)	0	(0%)	0	(1%)	\$0	(0%)
Magazine, newspaper or writing paper	100	(1%)	0	(0%)	0	(1%)	\$2	(2%)
Other known item*	400	(8%)	10	(8%)	40	(10%)	\$7	(9%)
Total	5,200	(100%)	140	(100%)	400	(100%)	\$75	(100%)

* "Other known" includes ignition of a person (4% of deaths) and multiple items first ignited (3% of the deaths).

Note: Sums may not equal totals due to rounding errors. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 2.11. Home Fires Involving Electric-Powered Ranges, by Item First Ignited
Annual Average of 2002-2005 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)**

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Cooking materials, including food	15,100	(65%)	140	(47%)	1,730	(76%)	\$253	(59%)
Household utensil	1,100	(5%)	0	(2%)	90	(4%)	\$20	(5%)
Cabinetry	1,100	(5%)	30	(9%)	90	(4%)	\$45	(10%)
Appliance housing or casing	1,000	(4%)	30	(12%)	30	(1%)	\$13	(3%)
Flammable or combustible liquid or gas, piping, filter or duct	800	(3%)	0	(0%)	80	(3%)	\$12	(3%)
Unclassified item first ignited	800	(3%)	20	(7%)	60	(3%)	\$8	(2%)
Interior wall covering, excluding drapes	600	(2%)	20	(5%)	40	(2%)	\$21	(5%)
Electrical wire or cable insulation	500	(2%)	0	(0%)	10	(0%)	\$5	(1%)
Box, carton, bag, basket or barrel	400	(2%)	0	(2%)	30	(1%)	\$13	(3%)
Unclassified furniture or utensil	200	(1%)	0	(0%)	10	(0%)	\$3	(1%)
Magazine, newspaper or writing paper	200	(1%)	0	(2%)	10	(0%)	\$3	(1%)
Multiple items first ignited	200	(1%)	10	(3%)	10	(0%)	\$5	(1%)
Linen other than bedding	200	(1%)	0	(0%)	30	(1%)	\$1	(0%)
Clothing	100	(1%)	30	(10%)	20	(1%)	\$3	(1%)
Unclassified structural component or finish	100	(1%)	0	(0%)	10	(0%)	\$5	(1%)
Rubbish, trash or waste	100	(1%)	0	(0%)	10	(0%)	\$2	(0%)
Other known item*	900	(4%)	0	(2%)	40	(2%)	\$17	(4%)
Total	23,300	(100%)	290	(100%)	2,290	(100%)	\$429	(100%)

* "Other known" includes floor covering, rug or mat (2% of the deaths).

Note: Sums may not equal totals due to rounding errors. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

**Table 2.12. Home Fires Involving Ranges, by Extent of Flame Damage
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property	
							Damage (in Millions)	
Confined fire identified by incident type	59,500	(68%)	0	(1%)	850	(24%)	\$17	(3%)
Confined to object of origin	7,000	(8%)	20	(5%)	380	(11%)	\$25	(5%)
Confined to room of origin	17,200	(20%)	80	(18%)	1,760	(50%)	\$188	(36%)
Confined to floor of origin	1,400	(2%)	60	(15%)	210	(6%)	\$70	(13%)
Confined to building of origin	2,700	(3%)	230	(53%)	310	(9%)	\$203	(39%)
Extended beyond building of origin	200	(0%)	40	(8%)	30	(1%)	\$20	(4%)
Total	88,000	(100%)	440	(100%)	3,540	(100%)	\$523	(100%)

**Table 2.13. Home Fires Involving Gas Ranges, by Extent of Flame Damage
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property	
							Damage (in Millions)	
Confined fire identified by incident type	10,400	(67%)	0	(0%)	160	(28%)	\$2	(3%)
Confined to object of origin	1,700	(11%)	10	(7%)	70	(13%)	\$3	(3%)
Confined to room of origin	2,600	(17%)	30	(18%)	210	(39%)	\$28	(36%)
Confined to floor of origin	200	(2%)	10	(9%)	30	(6%)	\$7	(9%)
Confined to building of origin	600	(4%)	80	(54%)	80	(14%)	\$35	(44%)
Extended beyond building of origin	0	(0%)	20	(11%)	10	(1%)	\$3	(4%)
Total	15,600	(100%)	140	(100%)	550	(100%)	\$78	(100%)

**Table 2.14. Home Fires Involving Electric Ranges, by Extent of Flame Damage
Annual Average of 2003-2006 Structure Fires Reported to U.S. Fire Departments**

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property	
							Damage (in Millions)	
Confined fire identified by incident type	48,800	(68%)	0	(1%)	690	(23%)	\$15	(3%)
Confined to object of origin	5,300	(7%)	10	(4%)	300	(10%)	\$22	(5%)
Confined to room of origin	14,600	(20%)	60	(20%)	1,540	(52%)	\$162	(36%)
Confined to floor of origin	1,200	(2%)	50	(16%)	180	(6%)	\$63	(14%)
Confined to building of origin	2,100	(3%)	150	(51%)	240	(8%)	\$166	(38%)
Extended beyond building of origin	100	(0%)	20	(8%)	30	(1%)	\$16	(3%)
Total	72,200	(100%)	290	(100%)	2,980	(100%)	\$444	(100%)

Note: Sums may not equal totals due to rounding errors. Unknowns have been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

2.15. Hospital Emergency Room Visits for Injuries Involving Ranges or Ovens During 2008 by Diagnosis

Diagnosis	Injuries	
Thermal burn	17,700	(49%)
Contact/non-fire burn	16,200	(45%)
Contact/non-fire burn victim under 5	6,700	(19%)
Thermal burn from fire or flame	1,500	(4%)
Laceration	3,800	(10%)
Scald burn	3,100	(9%)
Scalds under 5	900	(3%)
Anoxia	2,800	(8%)
Strain or sprain	2,000	(6%)
Contusion	1,900	(5%)
All other	4,800	(13%)
Total	36,000	(100%)

Table 2.16. Hospital Emergency Room Visits for Injuries Involving Ranges or Ovens During 2008, by Range Power Source

Power Source	Injuries	
Electric range or oven	19,800	(55%)
Gas range or oven	11,600	(32%)
Other range or oven	4,600	(13%)
Total	36,000	(100%)

Note: Unspecified types of ranges or ovens were allocated proportionally among the specified types of ranges or ovens.

Source: CPSC's National Electronic Injury Surveillance System (NEISS) queried in August 2009.

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 by 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.

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 <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from http://www.nfirs.fema.gov/_download/nfirpaperforms2007.pdf.

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 50,000 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 and 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; and (3) 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*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

Projecting NFIRS to National Estimates

As noted, NFIRS is a voluntary 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, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database - the NFPA 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 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.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission have developed the specific analytical rules used for this procedure. "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. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

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.

Figure 1.

Fires Originally Collected in NFIRS 5.0 by Year

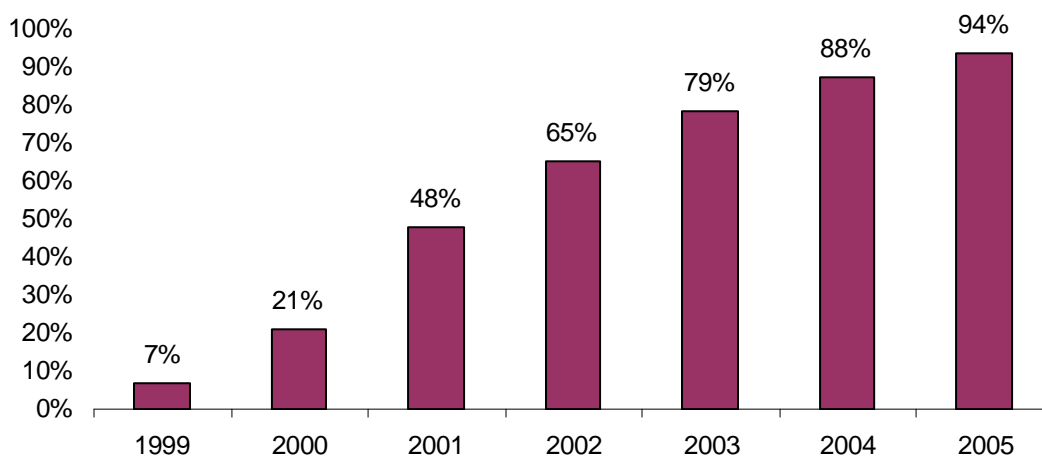


Figure 1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

For 2002 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

$$\frac{\text{NFPA survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

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.

A second option is to omit year estimates for 1999-2001 from year tables.

NFIRS 5.0 has 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. In order for that limited detail to be used to characterize the confined fires, they must be analyzed separately from non-confined fires. Otherwise, the patterns in a factor for the more numerous non-confined fires with factor known will dominate the allocation of the unknown factor fires for both non-confined and confined fires. If the pattern is different for confined fires, which is often the case, that fact will be lost unless analysis is done separately.

For most fields other than Property Use, 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.

For Factor Contributing to Ignition, 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%. Groupings for this field show all category headings and specific factors if they account for a rounded value of at least 1%.

Type of Material First Ignited (TMI). This field is required only if the Item First Ignited falls within the code range of 00-69. NFPA has created a new code “not required” for this field that is applied when Item First Ignited is in code 70-99 (organic materials, including cooking materials and vegetation, and general materials, such as electrical wire, cable insulation, transformers, tires, books, newspaper, dust, rubbish, etc..) and TMI is blank. The ratio for allocation of unknown data is:

$$\frac{\text{(All fires – TMI Not required)}}{\text{(All fires – TMI Not Required – Undetermined – Blank)}}$$

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, fusee,
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11)
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, the 2006 data is not yet available and a large portion of the fires coded as no equipment involved (NNN) have heat sources in the operating equipment category. 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

All fires

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

Additional allocations may be used in specific analyses. For example, NFPA’s report about home heating fires treats Equipment Involved in Ignition Code 120, fireplace, chimney, other” as a partial unknown (like Heat Source 60) and allocates it over its related decade of 121-127, which includes codes for fireplaces (121-122) and chimneys (126-127) but also includes codes for fireplace insert or stove, heating stove, and chimney or vent connector. More general analyses of specific occupancies may not perform as many allocations of partial allocations. Notes at the end of each table describe what was allocated.

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. Values that appear identical may be associated with different percentages, and identical percentages may be associated with slightly different values.