



United States

Consumer Product Safety Commission

2019 – 2021 Residential Fire Loss Estimates

U.S. National Estimates of Fires, Deaths, Injuries, and Property Loss from Unintentional Fires

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David Miller
Division of Hazard Analysis
U.S. Consumer Product Safety Commission
Bethesda, MD 20814

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Executive Summary

This report presents estimates of consumer product-related losses that occurred in U.S. residential structure fires attended by the fire service. The estimates were derived from data provided by the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA) Survey of Fire Departments for U.S. Fire Experience for 2018 through 2020.

The fire and fire loss estimates presented in this report pertain to unintentional residential structure fires and civilian casualties. The estimates are:

- 346,800 fires, 2,490 deaths, 11,760 injuries, and \$7.32 billion in property losses in 2019;
- 364,100 fires, 2,360 deaths, 11,010 injuries, and \$7.55 billion in property losses in 2020;
- 346,400 fires, 2,540 deaths, 10,610 injuries, and \$8.21 billion in property losses in 2021; for
- an estimated annual average of 352,400 fires, 2,460 deaths, 11,130 injuries, and \$7.70 billion in property losses over the 3-year period from 2019 through 2021.

This report will provide total estimates of residential structure fires as well as corresponding deaths, injuries, and property loss. It will also provide estimates (including deaths, injuries, and property loss) for residential structure fires associated with specific consumer products. Consumer products involved in fires can be categorized by "sources of ignition" or "the materials first ignited." Sources of ignition can be small, such as candles, or large, like ranges. The larger sources of ignition, e.g., operating equipment, are identified in NFIRS as "equipment." Smaller sources of ignition that are not equipment, such as candles, matches, and lighters, are identified in NFIRS as "heat sources." Consumer products can also be involved as items or materials contributing to flame spread. For this report, CPSC staff produced estimates based on the sources of ignition and the materials first ignited, but not for the items or materials contributing to flame spread.

Because the fire losses are derived separately for sources of ignition and materials first ignited, estimates presented in this report can overlap in some cases. For example, a fire involving a candle igniting a mattress will count as a candle fire (Heat Source) and a mattress fire (Item First Ignited). Additionally, these estimates do not account for all of the materials involved in a fire because items that are neither the Heat Source nor the Item First Ignited can still be involved in (and in some cases be a significant factor in) residential fire losses. Consider a cigarette igniting newspapers and then the flaming newspapers igniting upholstered furniture. In this case, the upholstered furniture was neither the heat source nor the first item ignited. However, the furniture represents a significant fuel load, and it increases the potential for life-threatening conditions to occupants.

The same products continue to contribute to the greatest estimated numbers of fire losses (as measured by Equipment Involved in Ignition, Heat Sources, and Items First Ignited). Tables 1a–5d, 6, and 7 show:

Cooking equipment accounted for the largest percentage of fires. An estimated annual average of 157,100 cooking equipment-related fires from 2019 through 2021 accounted for 44.6 percent of the average annual estimate of total residential fires for the same period. The corresponding death estimates constitute an annual average of 220 deaths, which is 8.8 percent of the average annual estimate of total residential fire deaths. The annual average number of cooking fire injuries for 2019 through 2021 was estimated to be 3,000, which represents 27.4 percent of the total estimated annual average number of injuries for the same period. Much of these losses were associated with range and oven fires.

Heating and cooling equipment fires constituted the second largest share of total residential fires. The estimated annual average of 37,600 fires for 2019 to 2021 was 10.7 percent of the annual average estimate of total residential fires during the same period. The corresponding death estimate is an annual average of 220 deaths, which is 8.7 percent of the average annual estimated number of total residential fire deaths. The corresponding injuries for the 3 years averaged to an annual estimate of 950. This accounts for 8.5 percent of the annual average estimate of total injuries during 2019 to 2021.

An estimated annual average of 17,100 fires was attributable to electrical distribution equipment (e.g., installed wiring, lighting, etc.). This is 4.9 percent of the estimated annual average number of residential fires for this period. The annual average death estimate is 150 (6.0 percent of average annual estimated residential fire deaths); and the injury estimates averaged 680 (6.1 percent of the estimated annual average of residential fire injuries).

For Item First Ignited, upholstered furniture was involved in the greatest number of fire deaths. From 2019 through 2021, an estimated annual average of 370 deaths was associated with these fires. This constitutes 15.0 percent of the estimated annual average of total deaths (from an estimated 1.1 percent of the fires) associated with residential structure fires for the same period. During 2019 to 2021, mattress or bedding ignitions accounted for an annual average of 320 deaths, which is 13.1 percent of the average annual estimated number of total residential fire deaths (from an estimated 1.8 percent of the fires).

Note that the estimate of Upholstered Furniture deaths has declined greatly from 2019 – 2021. The 2019 estimate is 480 deaths. That declined to 380 in 2020 and then again to 250 in 2021. The 2021 estimate (250 deaths) is lower than the 2021 mattress and bedding death estimate (310 deaths).

For Heat Source, smoking materials (cigarettes, pipes, cigars, and heat from undetermined smoking material) were the largest contributor to deaths, associated with an annual average of 620 deaths from 2019 to 2021. This is 25.3 percent of the estimated annual average of total residential fire deaths. Smoking materials as the heat source in fires, however, composed only 2.9 percent of the total estimated residential fires.

Among products that are identified as Heat Sources, candles had the second highest estimated number of deaths. The estimated annual average of deaths from candle fires is 110, which is 4.5 percent of the average estimated total number of residential fire deaths from 2019 to 2021, versus an estimated 1.6 percent of the fires.

There were also an estimated 70 deaths from cigarette lighter fires (3.0 percent of the estimated annual average of total residential fire deaths), although lighters are only involved in an estimated 0.4 percent of the fires.

There was a 5-percent increase in the estimates of total residential fires from 2019 to 2020, from an estimate of residential fires of 346,800 in 2019 to 364,100 in 2020. This was followed by a decrease of the total residential fire estimate in 2021—back down to 346,400 (a decrease of 6.7 percent).

Conversely, the total residential fire death estimate decreased and then increased over the period of 2019 to 2021, dropping from 2,490 in 2019 to 2,360 in 2020 before rising to 2,540 total residential fire deaths in 2021. This is an overall increase of 2.3 percent from 2019 to 2021.

The total residential fire injury estimates decreased throughout the period, from 11,760 in 2019 to 11,010 in 2020 and down again to 10,610 in 2021. This was an overall decrease of 9.8 percent.

By age of fire death victim, older people are the most likely age group to die from fires. The fire death rate from 2019 to 2021, for people between the ages of 65 and 74, is 1.7 per hundred thousand population, which is more than twice the overall fire death rate (0.7 per hundred thousand). The fire death rate for people aged 75 and over (2.2 per hundred thousand) is more than three times the overall rate.

By race of fire death victim, Black Americans have the highest rate of fire deaths (1.3 per hundred thousand population), nearly twice the overall rate of 0.7 per hundred thousand. For fire injuries, Black Americans also have the highest rate—5.7 per hundred thousand, which is nearly twice the overall rate (2.9 per hundred thousand).

Introduction

The fire loss estimates presented in this report are based on the National Fire Protection Association's (NFPA) national fire loss estimates¹ and the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) data. The NFPA makes national estimates of fires, deaths, injuries, and property losses, based on a probability sample survey of U.S. fire departments. NFIRS compiles fire incident reports submitted voluntarily to the USFA by U.S. fire departments. Not all the states reporting include data from all fire departments in the state. Product-specific information, such as the equipment involved in the ignition of the fire or the item that was first ignited in the fire, are among the wealth of information collected and available.

The estimated number of fires and associated fire losses in this report pertain to fires in residential properties only. These include single-family and multifamily dwellings. Mobile and motor homes, when used as a structure, and not in transit, are also included. Injury and death estimates pertain to civilian² casualties only. The property losses include property and content losses, as estimated by fire departments. In this report, for convenience, property and content losses combined are referred to as "property losses."

NFIRS has codes to identify confined fires (those that do not spread beyond the originating item). To encourage the reporting of these fires, NFIRS requires only limited information for these fires. For this reason, it is usually not possible to determine the type of equipment involved in the incidents coded as "confined fires" because the specific equipment is rarely coded. For example, when a fire is identified in NFIRS as a "confined cooking fire" it is rarely possible to distinguish a fire started by a range versus other cooking equipment, such as a microwave oven or toaster. Consequently, confined cooking fire losses are only included as part of the "Total Cooking Equipment" fires, but they are not included in subcategories that define the equipment involved or the power source. Because ranges certainly are involved in some confined fires, this should be considered in evaluating the cooking fire hazard. The same is true for microwave ovens and other cooking equipment.

Consumer products, for which there are estimates of fires and fire losses in this report, are either ignition sources for fires or materials ignited by fires. The larger ignition sources, such as ranges, clothes dryers, and space heaters, are considered equipment and are covered by the NFIRS variable called "Equipment Involved in Ignition." Smaller ignition sources, such as candles, matches, or lighters, are heat sources and fall under the NFIRS variable called "Heat Source." Some of the consumer products that are materials ignited in fires are upholstered furniture, mattresses and bedding, clothing, curtains and drapes, cooking materials³, and more. There are codes for these products under the NFIRS variable called "Item First Ignited."

¹ Hylton Haynes, "Fire Loss in the U.S. During 2019," National Fire Protection Association (NFPA), September 2020; Hylton Haynes, "Fire Loss in the U.S. During 2020," National Fire Protection Association (NFPA), September 2021; Ben Evarts, "Fire Loss in the U.S. During 2021," National Fire Protection Association (NFPA), September 2022.

² Injuries and deaths involving fire service, police, or emergency medical service personnel are not included in the estimates for this report.

³ Cookware or food in cookware.

Fires can be associated with more than one product. For example, a fire can be a lighter fire and a curtain fire. Such a fire would contribute to the estimates for “Lighters,” as well as the estimates for “Curtains, Drapes.”

In some instances, consumer products ignited by the fire may contribute to the spread or severity of the fire but not be included in the category, “Item First Ignited.” An example would be where carpeting is the Item First Ignited in the fire, but upholstered furniture ignites next, and increases the severity of the fire. In that case, upholstered furniture plays a role in the fire, but the fire is not counted toward the estimates for upholstered furniture fires and losses. Some consumer products, such as mattresses and upholstered furniture, due to their larger fuel loads, tend to lead to bigger, more dangerous fires when they ignite.

NFIRS data were weighted up to the 2019, 2020, and 2021 NFPA estimates for total U.S. fires and fire losses to derive the product-specific estimates presented in this report. This was done separately for fires, deaths, injuries, and property loss. For the estimates related to victim demographics, staff looked at total residential structure fire deaths and injuries, broken down by age of victim and race of victim categories. Staff used the NFIRS variables, “Age” and “Race” for identification of victim age and victim race.

Results

Fire-loss data are presented using five main tables consistent with CPSC staff's previous reports. Each numbered table (1–5) has four associated sub-tables: Table “a” presents the fire estimates; “b” presents the death estimates; “c” presents the injury estimates; and “d” presents the property loss estimates. Only selected product-specific estimates are included in these tables, so the details may not add up to the totals that appear in the headings. All of the product categories in the tables, with the exception of smoking materials, contain products within CPSC's jurisdiction. Intentionally set fires and their associated losses, which include the deliberate misuse of heat sources or fires of an incendiary nature, are excluded from the estimates.

In Tables 1, 3, 4, and 5, Equipment Involved in Ignition codes were used to identify the types of products involved; meanwhile, in Table 2, either the Heat Source or the Item First Ignited was the primary means of identifying the product. Thus, some estimates provided in the different sections of the tables overlap. For example, in Table 2 estimates of fires involving cigarette ignition of upholstered furniture are included in the estimates for cigarettes (by Heat Source), as well as in the estimates for “Upholstered Furniture-Smoking Material Ignition” (by Item First Ignited).

This is the third year that CPSC staff analyzed the fire loss data for victim's demographic characteristics such as age and race. Staff estimated total residential structure fire deaths and injuries for 2019 through 2021, broken down by victim age and victim race categories and paired with U.S. Census Bureau population estimates to compute estimated death and injury rates. The results are shown in Table 6 and Table 7.

Additional details about the estimates and the data system are included in the Methodology section of this report.

TABLE 1a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED EQUIPMENT, 2019 – 2021

Equipment	2019	2020	2021	2019 – 2021 Avg.
Total Residential⁴	346,800	364,100	346,400	352,400
Total Heating and Cooling Equipment⁴	38,400	37,800	36,700	37,600
Local Fixed Heater	4,900	4,800	4,900	4,900
Portable Heater	1,600	1,400	1,700	1,600
Central Heating	800	700	700	700
Fireplace, Chimney, Chimney Connector ⁴	15,500	15,800	14,900	15,400
Water Heater	1,300	1,200	1,200	1,300
Air Conditioning	1,300	1,300	1,500	1,400
Other ⁴	12,900	12,400	11,900	12,400
Total Cooking Equipment⁴	156,300	167,200	148,000	157,100
Range/Oven	14,000	13,000	12,300	13,100
<i>Gas</i>	2,000	1,700	1,800	1,900
<i>Electric</i>	11,900	11,300	10,400	11,200
<i>Other</i>	*	*	*	*
Microwave Oven	800	700	700	700
All Other Cooking	4,500	4,200	4,500	4,400
<i>Gas</i>	1,100	1,200	1,200	1,200
<i>Electric</i>	2,900	2,500	2,800	2,700
<i>Other</i>	500	500	500	500
Total Electrical Distribution	16,800	16,600	18,000	17,100
Installed Wiring	7,500	7,400	8,100	7,600
Cord, Plug	1,500	1,500	1,700	1,600
Receptacle, Switch	2,100	2,300	2,600	2,300
Lighting	2,000	1,800	1,900	1,900
Other	3,600	3,600	3,700	3,600
Other Selected Equipment	9,200	8,300	8,600	8,700
Audio/Visual Equipment	300	200	300	300
Clothes Dryer	5,800	5,100	5,100	5,300
Dishwasher	400	400	400	400
Washing Machine	400	300	300	400
Torch	500	500	500	500
Refrigerator/Freezer	700	800	900	800
Shop/Garden Tool	1,000	1,000	1,100	1,000

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA. Note: Fire estimates are rounded to the nearest 100. Rounded estimates of fewer than 100 fires are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

⁴ There are confined fire estimates included in *Total Residential*, *Total Heating and Cooling Equipment*, *Fireplace, Chimney, Chimney Connector*, *Other*, and *Total Cooking Equipment* categories. These confined fire estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment and power source. See Table 10a on p. 36 for details.

TABLE 1b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED EQUIPMENT, 2019 - 2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential	2,490	2,360	2,540	2,460
Total Heating and Cooling Equipment	190	180	270	220
Local Fixed Heater	110	70	60	80
Portable Heater	70	60	100	70
Central Heating	*	*	20	10
Fireplace, Chimney, Chimney Connector	*	40	30	20
Water Heater	*	*	10	*
Air Conditioning	*	*	*	*
Other	10	10	50	20
Total Cooking Equipment	210	220	220	220
Range/Oven	180	140	140	160
<i>Gas</i>	30	20	50	30
<i>Electric</i>	150	130	90	120
<i>Other</i>	*	*	*	*
Microwave Oven	*	*	10	*
All Other Cooking	10	40	10	20
<i>Gas</i>	*	*	*	*
<i>Electric</i>	10	40	10	20
<i>Other</i>	*	*	*	*
Total Electrical Distribution	130	110	200	150
Installed Wiring	20	40	100	50
Cord, Plug	60	30	20	40
Receptacle, Switch	10	10	20	10
Lighting	*	10	*	10
Other	30	20	60	40
Other Selected Equipment	10	30	50	30
Audio/Visual Equipment	*	*	*	*
Clothes Dryer	*	10	*	*
Dishwasher	*	*	*	*
Washing Machine	*	*	*	*
Torch	*	*	10	*
Refrigerator/Freezer	*	20	30	20
Shop/Garden Tool	10	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA. Note: Death estimates are rounded to the nearest 10. Rounded estimates of fewer than 10 deaths are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

TABLE 1c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED EQUIPMENT, 2019 – 2021

Equipment	2019	2020	2021	2019 – 2021 Avg.
Total Residential⁵	11,760	11,010	10,610	11,130
Total Heating and Cooling Equipment⁵	1,010	850	980	950
Local Fixed Heater	420	350	350	370
Portable Heater	160	160	150	160
Central Heating	30	20	60	40
Fireplace, Chimney, Chimney Connector ⁵	50	80	120	80
Water Heater	40	60	70	50
Air Conditioning	80	50	80	70
Other ⁵	240	120	160	170
Total Cooking Equipment⁵	3,340	2,990	2,800	3,040
Range/Oven	1,450	1,290	1,300	1,350
<i>Gas</i>	130	200	130	160
<i>Electric</i>	1,310	1,090	1,160	1,190
<i>Other</i>	*	*	10	*
Microwave Oven	40	30	40	40
All Other Cooking	310	300	290	300
<i>Gas</i>	70	80	80	80
<i>Electric</i>	220	200	160	200
<i>Other</i>	10	20	50	30
Total Electrical Distribution	700	640	700	680
Installed Wiring	250	160	260	230
Cord, Plug	150	140	120	140
Receptacle, Switch	80	120	100	100
Lighting	70	60	40	60
Other	140	150	170	160
Other Selected Equipment	340	190	310	280
Audio/Visual Equipment	40	10	20	20
Clothes Dryer	160	60	120	120
Dishwasher	10	10	*	10
Washing Machine	10	*	20	10
Torch	30	20	20	20
Refrigerator/Freezer	60	40	40	50
Shop/Garden Tool	20	40	80	50

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA. Note: Fire injury estimates are rounded to the nearest 10. Rounded estimates of fewer than 10 injuries are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

⁵ There are confined fire injury estimates included in *Total Residential*, *Total Heating and Cooling Equipment*, *Fireplace, Chimney, Chimney Connector*, *Other*, and *Total Cooking Equipment* categories. These confined fire injury estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment and power source. See Table 10b on p. 37 for details.

TABLE 1d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In \$Millions⁶) **SELECTED EQUIPMENT, 2019 – 2021**

Equipment	2019	2020	2021	2019 – 2021 Avg.
Total Residential⁷	\$7,319.7	\$7,554.0	\$8,214.7	\$7,696.1
Total Heating and Cooling Equipment⁷	\$555.6	\$612.6	\$630.5	\$599.6
Local Fixed Heater	\$133.2	\$122.4	\$146.2	\$133.9
Portable Heater	\$53.2	\$58.1	\$63.3	\$58.2
Central Heating	\$19.9	\$23.0	\$18.8	\$20.6
Fireplace, Chimney, Chimney Connector ⁷	\$117.3	\$131.0	\$115.1	\$121.1
Water Heater	\$22.5	\$25.8	\$20.2	\$22.8
Air Conditioning	\$62.7	\$91.3	\$91.6	\$81.8
Other ³	\$146.8	\$161.0	\$175.3	\$161.1
Total Cooking Equipment⁷	\$595.9	\$585.7	\$592.9	\$591.5
Range/Oven	\$306.5	\$305.8	\$290.6	\$301.0
<i>Gas</i>	\$47.8	\$35.3	\$31.6	\$38.2
<i>Electric</i>	\$255.4	\$269.5	\$256.0	\$260.3
<i>Other</i>	\$3.3	\$1.0	\$3.0	\$2.4
Microwave Oven	\$19.2	\$17.9	\$19.0	\$18.7
All Other Cooking	\$154.9	\$171.2	\$179.0	\$168.4
<i>Gas</i>	\$55.0	\$80.3	\$74.3	\$69.9
<i>Electric</i>	\$79.0	\$71.5	\$64.5	\$71.7
<i>Other</i>	\$20.9	\$19.4	\$40.2	\$26.8
Total Electrical Distribution	\$635.5	\$594.3	\$691.6	\$640.5
Installed Wiring	\$234.8	\$248.9	\$283.6	\$255.8
Cord, Plug	\$54.6	\$50.7	\$63.0	\$56.1
Receptacle, Switch	\$56.5	\$51.7	\$133.8	\$80.7
Lighting	\$55.0	\$55.9	\$54.1	\$55.0
Other	\$234.7	\$187.1	\$157.1	\$193.0
Other Selected Equipment	\$220.3	\$287.2	\$253.6	\$253.7
Audio/Visual Equipment	\$8.2	\$10.6	\$6.9	\$8.6
Clothes Dryer	\$85.9	\$80.8	\$73.0	\$79.9
Dishwasher	\$8.8	\$7.4	\$8.5	\$8.2
Washing Machine	\$7.0	\$1.8	\$5.2	\$4.7
Torch	\$20.9	\$18.9	\$17.7	\$19.2
Refrigerator/Freezer	\$41.0	\$32.8	\$45.5	\$39.8
Shop/Garden Tool	\$48.6	\$134.8	\$96.8	\$93.4

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA. Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

⁶ Dollar values are not adjusted for inflation in this table or for any of the property loss estimates in the report.

⁷ There are confined fire estimates included in *Total Residential*, *Total Heating and Cooling Equipment*, *Fireplace, Chimney, Chimney Connector*, *Other*, and *Total Cooking Equipment* categories. These confined fire property loss estimates could not be included in the detail lines as NFIRS does not provide information to determine the type of equipment and power source. See Table 10c on p. 37 for details.

TABLE 2a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED PRODUCTS, 2019 – 2021

Product	2019	2020	2021	2019–2021 Avg.
Total Residential⁸	346,800	364,100	346,400	352,400
By Heat Source				
Cigarette, Other Tobacco Products	9,600	10,700	10,600	10,300
Candle	5,700	5,300	6,200	5,700
Lighter	1,300	1,300	1,400	1,300
Match	300	300	200	300
By Item First Ignited				
Upholstered Furniture	3,800	3,600	3,700	3,700
Smoking Material Ignition	900	900	900	900
Open-Flame Ignition	500	400	500	500
Other ⁸	2,500	2,300	2,400	2,400
Mattress, Bedding	6,500	6,300	6,300	6,400
Smoking Material Ignition	1,300	1,200	1,300	1,300
Open-Flame Ignition	1,100	1,000	1,100	1,100
Other ⁸	4,100	4,000	4,000	4,000
Other Materials				
Cooking Materials ⁸	153,900	165,600	145,100	154,900
Electric Cable Insulation	17,800	17,200	18,700	17,900
Interior Wall Covering	5,400	4,800	4,600	4,900
Wearing Apparel-Worn	200	300	300	300
Wearing Apparel-Not Worn	4,100	3,700	3,600	3,800
Floor Covering	3,100	2,900	3,100	3,100
Curtains, Drapes	1,100	1,000	1,200	1,100
Magazines, Newspaper	1,300	1,300	1,200	1,300
Thermal Insulation	4,900	4,300	4,400	4,500
Cabinet, Desk	4,300	3,900	3,800	4,000
Trash, Rubbish ⁸	25,200	32,700	32,800	30,200
Toy, Game	300	400	400	400
Box, Carton, Bag, Basket, Barrel	3,200	3,600	3,600	3,400

Source: U. S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire estimates are rounded to the nearest 100. Subtotals do not necessarily add up to heading totals. Estimates exclude intentionally set fires.

⁸ There are confined fire estimates included in *Total Residential*, *Cooking Materials*, and *Trash, Rubbish* categories. Estimates for confined cooking fires are included in the *Cooking Materials* fire losses because cooking materials are most likely the item first ignited. See Table 10a on p. 36 for details.

TABLE 2b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED PRODUCTS, 2019 – 2021

Product	2019	2020	2021	2019–2021 Avg.
Total Residential	2,490	2,360	2,540	2,460
By Heat Source				
Cigarette, Other Tobacco Products	660	640	580	620
Candle	170	90	70	110
Lighter	60	70	90	70
Match	*	*	*	*
By Item First Ignited				
Upholstered Furniture	480	380	250	370
Smoking Material Ignition	230	190	100	170
Open-Flame Ignition	50	*	10	20
Other	200	190	140	180
Mattress, Bedding	300	360	310	320
Smoking Material Ignition	180	190	220	190
Open-Flame Ignition	10	20	10	10
Other	110	160	80	120
Other Materials				
Cooking Materials	170	150	190	170
Electric Cable Insulation	60	90	110	90
Interior Wall Covering	80	80	70	80
Wearing Apparel-Worn	100	80	50	80
Wearing Apparel-Not Worn	30	40	20	30
Floor Covering	40	60	40	40
Curtains, Drapes	10	10	10	10
Magazines, Newspaper	50	20	30	30
Thermal Insulation	10	*	40	20
Cabinet, Desk	30	70	30	40
Trash, Rubbish	80	80	50	70
Toy, Game	*	*	*	*
Box, Carton, Bag, Basket, Barrel	50	50	30	40

Source: U. S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Death estimates are rounded to the nearest 10. Subtotals do not necessarily add up to heading totals. Estimates exclude intentionally set fires.

TABLE 2c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED PRODUCTS, 2019 – 2021

Product	2019	2020	2021	2019–2021 Avg.
Total Residential⁹	11,760	11,010	10,610	11,130
By Heat Source				
Cigarette, Other Tobacco Products	920	960	930	940
Candle	650	500	680	610
Lighter	260	300	200	250
Match	30	30	10	30
By Item First Ignited				
Upholstered Furniture	580	580	610	590
Smoking Material Ignition	160	190	210	190
Open-Flame Ignition	110	100	100	100
Other	310	290	300	300
Mattress, Bedding	910	960	830	900
Smoking Material Ignition	250	350	290	300
Open-Flame Ignition	190	180	160	170
Other	470	430	380	430
Other Materials				
Cooking Materials ⁹	3,670	3,200	2,890	3,250
Electric Cable Insulation	550	440	690	560
Interior Wall Covering	200	180	130	170
Wearing Apparel-Worn	80	130	60	90
Wearing Apparel-Not Worn	240	200	160	200
Floor Covering	170	150	220	180
Curtains, Drapes	130	80	110	110
Magazines, Newspaper	130	80	110	110
Thermal Insulation	60	40	70	60
Cabinet, Desk	420	270	280	320
Trash, Rubbish ⁹	280	440	220	310
Toy, Game	10	40	10	20
Box, Carton, Bag, Basket, Barrel	120	190	150	150

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

⁹ There are confined fire injury estimates included in *Total Residential*, *Cooking Materials*, and *Trash, Rubbish* categories. Estimates for confined cooking fire injuries are included in the *Cooking Materials* fire losses because cooking materials are most likely the item first ignited. See Table 10b on p. 37 for details.

TABLE 2d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In \$Millions) SELECTED PRODUCTS, 2019 – 2021

Product	2019	2020	2021	2019-2021 Avg.
Total Residential¹⁰	\$7,319.7	\$7,554.0	\$8,214.7	
Cigarette, Other Tobacco Products	\$423.7	\$495.7	\$502.1	\$473.8
Candle	\$278.2	\$240.5	\$297.6	\$272.1
Lighter	\$54.0	\$51.1	\$60.8	\$55.3
Match	\$13.7	\$13.7	\$7.6	\$11.2
By Item First Ignited				
Upholstered Furniture	\$223.3	\$259.2	\$265.2	\$249.2
Smoking Material Ignition	\$35.8	\$77.0	\$82.4	\$65.1
Open-Flame Ignition	\$34.6	\$27.1	\$30.3	\$30.7
Other	\$152.8	\$155.1	\$152.4	\$153.5
Mattress, Bedding	\$265.8	\$248.4	\$276.7	\$263.6
Smoking Material Ignition	\$53.1	\$40.3	\$70.3	\$54.5
Open-Flame Ignition	\$53.8	\$37.8	\$49.8	\$47.1
Other	\$158.8	\$170.3	\$156.7	\$162.0
Other Materials				
Cooking Materials ¹⁰	\$515.5	\$597.7	\$506.7	\$539.9
Electric Cable Insulation	\$641.9	\$518.2	\$605.2	\$588.4
Interior Wall Covering	\$278.9	\$202.7	\$250.5	\$244.0
Wearing Apparel-Worn	\$6.0	\$4.7	\$4.7	\$5.2
Wearing Apparel-Not Worn	\$114.3	\$132.5	\$104.1	\$117.0
Floor Covering	\$114.6	\$105.6	\$122.0	\$114.1
Curtains, Drapes	\$53.3	\$31.5	\$74.8	\$53.2
Magazines, Newspaper	\$37.7	\$48.7	\$47.9	\$44.7
Thermal Insulation	\$204.3	\$140.9	\$181.4	\$175.5
Cabinet, Desk	\$166.1	\$190.5	\$170.8	\$175.8
Trash, Rubbish ¹⁰	\$172.6	\$239.3	\$236.4	\$216.1
Toy, Game	\$6.2	\$9.4	\$14.3	\$9.9
Box, Carton, Bag, Basket, Barrel	\$128.7	\$180.6	\$132.4	\$147.2

Source: U. S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

¹⁰ There are confined fire property loss estimates included in *Total Residential*, *Cooking Materials*, and *Trash, Rubbish* categories. Estimates for confined cooking fire property loss are included in the *Cooking Materials* fire losses because cooking materials are most likely the item first ignited. See Table 10c on p. 37 for details.

TABLE 3a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
HEATING AND COOLING EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹¹	346,800	364,100	346,400	352,400
Total Heating and Cooling Equipment¹¹	38,400	37,800	36,700	37,600
Solid Fuel	2,000	1,900	1,600	1,900
Fixed Heater	400	400	400	400
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	1,500	1,400	1,100	1,300
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	100	100	100	100
Gas-Fired	2,500	2,200	2,200	2,300
Fixed Heater	800	800	800	800
Portable Heater	200	100	200	200
Fireplace, Chimney, Chimney Connector	200	200	200	200
Central Heating	300	300	200	300
Water Heater	600	500	400	500
Fixed, Central Air Conditioning	*	*	*	*
Other	300	200	200	300
Electric	12,900	12,500	13,300	12,900
Fixed Heater	3,600	3,500	3,600	3,600
Portable Heater	1,300	1,100	1,200	1,200
Central Heating	400	400	400	400
Water Heater	800	700	800	800
Fixed, Central Air Conditioning	1,000	900	900	900
Portable Air Conditioner	400	400	500	400
Other	5,500	5,500	5,800	5,600
Liquid Fuel	300	300	300	300
Fixed Heater	*	*	*	*
Portable Heater	100	200	200	200
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
All Other Fuel	100	100	100	100

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire estimates are rounded to the nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

¹¹ There are confined fire estimates included in *Total Residential*, and *Total Heating and Cooling Equipment* categories. These confined fire estimates were not included in the detail lines because NFIRS does not provide information to determine the equipment or the power source. See Table 10a on p. 36 for details.

**TABLE 3b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
HEATING AND COOLING EQUIPMENT, 2019–2021**

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential	2,490	2,360	2,540	2,460
Total Heating and Cooling Equipment	190	180	270	220
Solid Fuel	50	80	80	70
Fixed Heater	40	40	40	40
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	*	40	30	20
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
Gas-Fired	50	30	40	40
Fixed Heater	40	20	10	20
Portable Heater	10	*	20	10
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Fixed, Central Air Conditioning	*	*	*	*
Other	*	10	10	10
Electric	80	60	150	90
Fixed Heater	20	10	10	10
Portable Heater	50	50	70	60
Central Heating	*	*	20	10
Water Heater	*	*	10	*
Fixed, Central Air Conditioning	*	*	*	*
Portable Air Conditioner	*	*	*	*
Other	10	*	40	20
Liquid Fuel	20	10	10	10
Fixed Heater	10	*	*	*
Portable Heater	10	10	10	10
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
All Other Fuel	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

TABLE 3c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
HEATING AND COOLING EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹²	11,760	11,010	10,610	11,130
Total Heating and Cooling Equipment¹²	1,010	850	980	950
Solid Fuel	60	70	110	80
Fixed Heater	30	20	30	20
Portable Heater	*	*	*	*
Fireplace, Chimney, Chimney Connector	30	50	80	60
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	*	*
Gas-Fired	190	180	210	190
Fixed Heater	100	80	80	90
Portable Heater	10	20	40	20
Fireplace, Chimney, Chimney Connector	10	*	10	10
Central Heating	20	20	20	20
Water Heater	20	60	50	40
Fixed, Central Air Conditioning	*	*	*	*
Other	30	*	10	10
Electric	710	520	580	600
Fixed Heater	290	240	240	260
Portable Heater	140	140	100	120
Central Heating	10	10	30	20
Water Heater	10	*	20	10
Fixed, Central Air Conditioning	30	20	30	30
Portable Air Conditioner	50	30	50	40
Other	180	70	110	120
Liquid Fuel	20	*	30	20
Fixed Heater	*	*	*	*
Portable Heater	10	*	20	10
Fireplace, Chimney, Chimney Connector	*	*	*	*
Central Heating	*	*	*	*
Water Heater	*	*	*	*
Other	*	*	10	*
All Other Fuel	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

¹² There are confined fire injury estimates included in *Total Residential*, and *Total Heating and Cooling Equipment* categories. These confined fire injury estimates were not included in the detail lines because NFIRS does not provide information to determine the equipment or the power source of the equipment. See Table 10b on p. 37 for details.

TABLE 3d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS (In \$Millions)
HEATING AND COOLING EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹³	\$7,319.7	\$7,554.0	\$8,214.7	\$7,696.1
Total Heating and Cooling Equipment¹³	\$555.6	\$612.6	\$630.5	\$599.6
Solid Fuel	\$111.6	\$137.1	\$124.9	\$124.5
Fixed Heater	\$20.3	\$21.5	\$22.7	\$21.5
Portable Heater	*	*	\$0.1	\$0.1
Fireplace, Chimney, Chimney Connector	\$88.2	\$111.8	\$99.2	\$99.7
Central Heating	\$1.1	\$0.5	\$0.1	\$0.5
Water Heater	\$0.1	*	*	*
Other	\$1.9	\$3.4	\$2.8	\$2.7
Gas-Fired	\$76.1	\$93.9	\$76.0	\$82.0
Fixed Heater	\$19.6	\$17.5	\$26.9	\$21.3
Portable Heater	\$6.6	\$5.1	\$12.7	\$8.2
Fireplace, Chimney, Chimney Connector	\$19.0	\$12.3	\$8.9	\$13.4
Central Heating	\$11.7	\$12.6	\$9.4	\$11.2
Water Heater	\$11.2	\$20.3	\$12.4	\$14.6
Fixed, Central Air Conditioning	*	\$10.7	*	\$3.6
Other	\$7.9	\$4.5	\$5.8	\$6.1
Electric	\$344.8	\$365.0	\$408.9	\$372.9
Fixed Heater	\$90.3	\$82.2	\$94.4	\$88.9
Portable Heater	\$42.6	\$48.6	\$44.3	\$45.1
Central Heating	\$7.0	\$8.5	\$7.8	\$7.8
Water Heater	\$11.1	\$5.5	\$7.9	\$8.2
Fixed, Central Air Conditioning	\$26.5	\$30.5	\$38.4	\$31.8
Portable Air Conditioner	\$36.2	\$39.2	\$52.9	\$42.8
Other	\$131.2	\$151.6	\$163.2	\$148.3
Liquid Fuel	\$8.6	\$5.9	\$10.0	\$8.2
Fixed Heater	\$1.9	\$0.6	\$1.2	\$1.2
Portable Heater	\$3.9	\$3.6	\$6.2	\$4.6
Fireplace, Chimney, Chimney Connector	\$1.1	*	*	\$0.4
Central Heating	\$0.1	\$1.4	\$1.6	\$1.0
Water Heater	*	*	*	*
Other	\$1.7	\$0.3	\$1.0	\$1.0
All Other Fuel	\$5.9	\$2.1	\$3.2	\$3.7

¹³ There are confined fire property loss estimates included in *Total Residential*, and *Total Heating and Cooling Equipment* categories. These estimates were not included in the detail lines because NFIRS does not provide information to determine the equipment or its power source. See Table 10c on p. 37 for details.

TABLE 4a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED ELECTRICAL EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹⁴	346,800	364,100	346,400	352,400
Total Electrical	57,400	54,200	56,200	55,900
Electric Heating and Cooling	12,900	12,500	13,300	12,900
Central Heating	400	400	400	400
Local Fixed Heater	3,600	3,500	3,600	3,600
Portable Heater	1,300	1,100	1,200	1,200
Water Heater	800	700	800	800
Fixed, Central Air Conditioning	1,000	900	900	900
Portable Air Conditioner	400	400	500	400
Other	5,500	5,500	5,800	5,600
Electric Cooking Equipment	15,500	14,500	13,700	14,600
Range/Oven	11,900	11,300	10,400	11,200
Range/Oven Hood	200	200	200	200
Deep Fat Fryer	100	100	100	100
Grill	100	100	*	100
Microwave Oven	800	700	700	700
Small Heat-Producing Appliance	800	700	700	700
Other	1,700	1,400	1,600	1,600
Electrical Distribution	17,100	16,700	18,100	17,300
Installed Wiring	7,500	7,400	8,100	7,600
Light Fixture	1,400	1,300	1,400	1,400
Receptacle, Switch	2,100	2,300	2,600	2,300
Cord, Plug	1,500	1,500	1,700	1,600
Lamp, Light Bulb	600	500	600	600
Panel Board	700	700	600	700
Meter	500	400	500	500
Transformer	100	100	100	100
Other	2,700	2,500	2,600	2,600
Other Selected Electrical Appliances	6,700	5,900	6,300	6,300
Clothes Dryer	4,400	3,800	3,900	4,000
Dishwasher	400	400	400	400
Audio/Visual Equipment	300	200	300	300
Washing Machine	400	300	300	400
Refrigerator/Freezer	700	800	800	800
Shop/Garden Tools	400	300	400	300
Torch	100	100	100	100

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire estimates are rounded to the nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

¹⁴ There are confined fire estimates included in *Total Residential*. These were not included in the detail lines because NFIRS does not provide information to determine the equipment or power source. See Table 10a on p. 36 for details.

TABLE 4b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED ELECTRICAL EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential	2,490	2,360	2,540	2,460
Total Electrical	450	480	610	510
Electric Heating and Cooling	80	60	150	90
Central Heating	*	*	20	10
Local Fixed Heater	20	10	10	10
Portable Heater	50	50	70	60
Water Heater	*	*	10	*
Fixed, Central Air Conditioning	*	*	*	*
Portable Air Conditioner	*	*	*	*
Other	10	*	40	20
Electric Cooking Equipment	160	170	110	140
Range/Oven	150	130	90	120
Range/Oven Hood	*	*	*	*
Deep Fat Fryer	*	*	*	*
Grill	*	*	*	*
Microwave Oven	*	*	*	*
Small Heat-Producing Appliance	*	10	*	*
Other	*	20	10	10
Electrical Distribution	140	100	190	140
Installed Wiring	20	40	100	50
Light Fixture	*	10	*	*
Receptacle, Switch	10	10	20	10
Cord, Plug	60	30	20	40
Lamp, Light Bulb	*	*	*	*
Panel Board	*	*	10	10
Meter	*	*	*	*
Transformer	*	*	*	*
Other	30	20	30	30
Other Selected Electrical Appliances	*	30	30	20
Clothes Dryer	*	10	*	*
Dishwasher	*	*	*	*
Audio/Visual Equipment	*	*	*	*
Washing Machine	*	*	*	*
Refrigerator/Freezer	*	20	30	10
Shop/Garden Tools	*	*	*	*
Torch	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*).
Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

TABLE 4c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED ELECTRICAL EQUIPMENT, 2018–2020

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹⁵	11,760	11,010	10,610	11,130
Total Electrical	3,470	2,960	3,140	3,190
Electric Heating and Cooling	700	520	580	600
Central Heating	10	10	30	20
Local Fixed Heater	280	240	240	260
Portable Heater	140	140	100	120
Water Heater	10	*	20	10
Fixed, Central Air Conditioning	30	20	30	30
Portable Air Conditioner	50	30	50	40
Other	180	70	110	120
Electric Cooking Equipment	1,580	1,320	1,350	1,420
Range/Oven	1,310	1,090	1,160	1,190
Range/Oven Hood	20	10	10	10
Deep Fat Fryer	10	10	10	10
Grill	*	*	*	*
Microwave Oven	40	30	40	40
Small Heat-Producing Appliance	50	50	70	60
Other	150	130	60	110
Electrical Distribution	660	610	660	640
Installed Wiring	250	160	260	230
Light Fixture	40	40	30	40
Receptacle, Switch	80	120	100	100
Cord, Plug	150	140	120	140
Lamp, Light Bulb	30	20	10	20
Panel Board	20	10	20	20
Meter	*	10	*	*
Transformer	*	*	*	*
Other	90	100	110	100
Other Selected Electrical Appliances	250	130	210	200
Clothes Dryer	130	60	90	90
Dishwasher	10	10	*	10
Audio/Visual Equipment	40	10	20	20
Washing Machine	10	*	20	10
Refrigerator/Freezer	60	40	40	50
Shop/Garden Tools	*	10	40	20
Torch	*	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

¹⁵ There are confined fire estimates included in *Total Residential*. These were not included in the detail lines because NFIRS does not provide information to determine the equipment or power source. See Table 10b on p. 37 for details.

TABLE 4d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In \$Millions) SELECTED ELECTRICAL EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹⁶	\$7,319.7	\$7,554.0	\$8,214.7	\$7,696.1
Total Electrical	\$1,733.4	\$1,726.8	\$1,798.8	\$1,753.0
Electric Heating and Cooling	\$344.8	\$365.0	\$408.9	\$372.9
Central Heating	\$7.0	\$8.5	\$7.8	\$7.8
Local Fixed Heater	\$90.3	\$82.2	\$94.4	\$88.9
Portable Heater	\$42.6	\$48.6	\$44.3	\$45.1
Water Heater	\$11.1	\$5.5	\$7.9	\$8.2
Fixed, Central Air Conditioning	\$26.5	\$30.5	\$38.4	\$31.8
Portable Air Conditioner	\$36.2	\$39.2	\$52.9	\$42.8
Other	\$131.2	\$150.6	\$163.2	\$148.3
Electric Cooking Equipment	\$308.4	\$375.1	\$338.1	\$340.5
Range/Oven	\$255.4	\$269.5	\$256.0	\$260.3
Range/Oven Hood	\$3.2	\$3.3	\$4.1	\$3.5
Deep Fat Fryer	\$1.9	\$12.2	\$4.7	\$6.3
Grill	\$1.9	\$1.6	\$8.0	\$3.8
Microwave Oven	\$19.2	\$17.9	\$19.0	\$18.7
Small Heat-Producing Appliance	\$26.8	\$21.2	\$13.6	\$20.5
Other	\$40.3	\$49.5	\$32.7	\$40.8
Electrical Distribution	\$636.4	\$585.9	\$677.4	\$633.2
Installed Wiring	\$234.8	\$248.9	\$283.6	\$255.8
Light Fixture	\$37.5	\$38.1	\$39.1	\$38.2
Receptacle, Switch	\$56.5	\$51.7	\$133.8	\$80.7
Cord, Plug	\$54.6	\$50.7	\$63.0	\$56.1
Lamp, Light Bulb	\$17.4	\$17.8	\$15.0	\$16.8
Panel Board	\$31.7	\$22.8	\$19.8	\$24.7
Meter	\$9.9	\$11.8	\$7.4	\$9.7
Transformer	\$4.8	\$1.2	\$3.4	\$3.1
Other	\$189.3	\$143.0	\$112.2	\$148.2
Other Selected Electrical Appliances	\$149.5	\$201.7	\$165.5	\$172.2
Clothes Dryer	\$64.9	\$64.7	\$52.7	\$60.8
Dishwasher	\$8.8	\$7.4	\$8.5	\$8.2
Audio/Visual Equipment	\$8.2	\$10.6	\$6.9	\$8.6
Washing Machine	\$7.1	\$1.8	\$5.2	\$4.7
Refrigerator/Freezer	\$40.7	\$31.8	\$42.7	\$38.4
Shop/Garden Tools	\$13.1	\$81.3	\$47.6	\$47.3
Torch	\$6.7	\$4.1	\$1.8	\$4.2

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude intentionally set fires.

¹⁶ There are confined fire estimates included in *Total Residential*. These were not included in the detail lines because NFIRS does not provide information to determine the equipment or power source. See Table 10c on p. 37 for details.

TABLE 5a
ESTIMATED RESIDENTIAL STRUCTURE FIRES
SELECTED GAS-FIRED EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹⁷	346,800	364,100	346,400	352,400
Total Gas-Fired Equipment	8,800	8,000	8,200	8,400
Gas Heating Equipment	2,500	2,200	2,200	2,300
Fixed Heater	800	800	800	800
Portable Heater	200	100	200	200
Central Heating	300	300	200	300
Fireplace, Chimney, Connector	200	200	200	200
Water Heater	600	500	400	500
Fixed, Central Air Conditioning	*	*	*	*
Other	300	200	200	300
Gas Cooking Equipment	3,100	2,800	3,000	3,000
Range/Oven	2,000	1,700	1,800	1,900
Open Gas Grill	600	700	700	700
Other	400	400	500	400
Other Selected Gas Equipment	1,800	1,700	1,700	1,700
Clothes Dryer	1,100	1,000	900	1,000
Torch	400	400	300	400
Shop/Garden Tool	400	300	400	400

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire estimates are rounded to the nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude losses from intentionally set fires.

¹⁷ There are confined fire estimates included in *Total Residential*. These were not included in the detail lines because NFIRS does not provide information to determine the equipment or power source. See Table 10a on p. 36 for details.

TABLE 5b
ESTIMATED RESIDENTIAL STRUCTURE FIRE DEATHS
SELECTED GAS-FIRED EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential	2,490	2,360	2,540	2,460
Total Gas-Fired Equipment	130	60	130	110
Gas Heating Equipment	50	30	40	40
Fixed Heater	40	20	10	20
Portable Heater	10	*	20	10
Central Heating	*	*	*	*
Fireplace, Chimney, Connector	*	*	*	*
Water Heater	*	*	*	*
Fixed, Central Air Conditioning	*	*	*	*
Other	*	10	10	10
Gas Cooking Equipment	30	20	50	30
Range/Oven	30	20	50	30
Open Gas Grill	*	*	*	*
Other	*	*	*	*
Other Selected Gas Equipment	10	*	10	10
Clothes Dryer	*	*	*	*
Torch	*	*	10	*
Shop/Garden Tool	10	*	*	*

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.
 Note: Death estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*).
 Subtotals do not necessarily add to heading totals. Estimates exclude deaths from intentionally set fires.

TABLE 5c
ESTIMATED RESIDENTIAL STRUCTURE FIRE INJURIES
SELECTED GAS-FIRED EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹⁸	11,760	11,010	10,610	11,130
Total Gas-Fired Equipment	580	610	580	590
Gas Heating Equipment	190	180	210	200
Fixed Heater	110	80	80	90
Portable Heater	10	20	40	20
Central Heating	20	20	20	20
Fireplace, Chimney, Connector	10	*	10	10
Water Heater	20	60	50	40
Fixed, Central Air Conditioning	*	*	*	*
Other	30	*	10	10
Gas Cooking Equipment	200	270	210	230
Range/Oven	130	200	130	160
Open Gas Grill	40	50	30	40
Other	20	30	40	30
Other Selected Gas Equipment	70	40	60	50
Clothes Dryer	20	*	20	20
Torch	30	20	20	20
Shop/Garden Tool	10	10	10	10

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Injury estimates are rounded to the nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude injuries from intentionally set fires.

¹⁸ There are confined fire injury estimates included in the *Total Residential* category. These confined fire injury estimates could not be included in the detail lines because NFIRS does not provide information to determine the type of equipment or the power source. See Table 10b on p. 37 for details.

TABLE 5d
ESTIMATED RESIDENTIAL STRUCTURE FIRE PROPERTY LOSS
(In \$Millions) SELECTED GAS-FIRED EQUIPMENT, 2019–2021

Equipment	2019	2020	2021	2019–2021 Avg.
Total Residential¹⁹	\$7,319.7	\$7,554.0	\$8,214.7	\$7,696.1
Total Gas-Fired Equipment	\$286.2	\$315.6	\$379.6	\$327.1
Gas Heating Equipment	\$76.1	\$93.9	\$76.0	\$82.0
Fixed Heater	\$19.6	\$17.5	\$26.9	\$21.3
Portable Heater	\$6.6	\$5.1	\$12.7	\$8.2
Central Heating	\$11.7	\$12.6	\$9.4	\$11.2
Fireplace, Chimney, Connector	\$19.0	\$12.3	\$8.9	\$13.4
Water Heater	\$11.2	\$20.3	\$12.4	\$14.6
Fixed, Central Air Conditioning	*	\$10.7	*	\$3.6
Other	\$7.9	\$4.5	\$5.8	\$6.1
Gas Cooking Equipment	\$98.8	\$107.4	\$100.2	\$102.1
Range/Oven	\$47.8	\$35.3	\$31.6	\$38.2
Open Gas Grill	\$32.4	\$49.0	\$55.6	\$45.7
Other	\$18.7	\$23.1	\$12.9	\$18.2
Other Selected Gas Equipment	\$43.5	\$54.8	\$40.4	\$46.2
Clothes Dryer	\$13.0	\$11.4	\$11.1	\$11.8
Torch	\$10.2	\$12.3	\$13.5	\$12.0
Shop/Garden Tool	\$20.3	\$30.5	\$14.8	\$21.8

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Rounded estimates less than \$0.1m are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. Estimates exclude property loss from intentionally set fires.

¹⁹ There are confined fire property loss estimates included in the *Total Residential*. These confined fire property loss estimates could not be included in the detail lines because NFIRS does not provide information to determine the equipment or the power source. See Table 10c on p. 37 for details.

Estimates of Fire Death and Injury Victims by Age and Race

Table 6 provides estimates of the rate of deaths and injuries by age categories. Note that people in the age categories of “40 – 64”, “65 – 74” and “75+” have fire death rates higher than the overall rate of 0.7 per hundred thousand people. The death rate for people aged between 65 and 74 is more than twice as high as the overall death rate, and the rate for people aged 75 and over is more than three times as high as the overall rate. The discrepancies by age are not as great in the fire injury rate, but the people in the age categories of “40 – 64”, “65 – 74”, and “75+” all have injury rates as high or higher than the overall rate of 2.9 per hundred thousand. In general, older adults suffer higher rates of fire deaths and injuries than younger people. The relative difference in rates is much larger for deaths.

Table 6. Death and Injury Estimates by Age Category: 2019–2021

Age Category	Fire Deaths per Hundred Thousand People ²⁰	Fire Injuries per Hundred Thousand People ²⁰
Overall	0.7	2.9
Under 5 years	0.6	2.4
5 – 14 years	0.3	1.2
15 – 39 years	0.3	2.9
40 – 64 years	0.8	3.4
65 – 74 years	1.7	3.5
75+ years	2.2	3.9

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Table 7 provides estimates of the rate of fire deaths and injuries by race. The estimated per capita fire death rate of Black people (1.3 per hundred thousand) is nearly twice the overall rate. The estimated rate of injuries per person for Black people (5.7 per hundred thousand) is also nearly twice the overall rate.

²⁰ Population estimates obtained from U.S. Census Bureau resident population estimates by age for 2019 – 2021. Estimates can be found at <https://www.census.gov/data/datasets/time-series/demo/popest/2010s-national-detail.html> and <https://www.census.gov/data/datasets/time-series/demo/popest/2020s-national-detail.html>

Table 7. Death and Injury Estimates by Race: 2019–2021

Race	Fire Deaths per Hundred Thousand People²⁰	Fire Injuries per Hundred Thousand People²⁰
Overall	0.7	2.9
White	0.7	2.6
Black	1.3	5.7
Asian	0.1	0.8
American Indian, Alaska Native	0.5	1.6
Other – Including multi-racial	0.5	4.8

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

There is an NFIRS variable for ethnicity that has codes for “Hispanic” and “Other”. However, the instructions to fire services for coding this variable say to leave it blank if the ethnicity is unknown or is not listed among the codes. CPSC staff is concerned that this causes confounding of the “others” and “unknowns” and would cause estimates to be unreliable. For this reason, staff decided not to include estimates of fire deaths and injuries by Hispanic/Non-Hispanic origin.

Methodology

This section describes the data from which fire loss estimates were derived, the procedures for preparing the data, and how the fire loss estimates were made by imputing missing and unknown data.

Data

Sources of Data for Fire Loss Estimates

The estimates in this report are based on the National Fire Protection Association’s (NFPA) Survey of Fire Departments and the U.S. Fire Administration’s (USFA) National Fire Incident Reporting System (NFIRS) data.

The NFPA survey is a stratified random sample of fire departments in the United States.²¹ The sample is stratified by the size of the community protected. The NFPA makes national estimates of aggregated fires, deaths, injuries, and property loss, by weighting sample results according to the proportion of the total U.S. population accounted for by communities of each size. The table below shows the NFPA estimates of residential structure fires and the associated losses for 2019 through 2021.

Table 8. NFPA Estimates of Residential Structure Fires and Associated Losses 2019–2021

	2019	2020	2021
Structure Fires	361,500	379,500	361,500
Civilian Deaths	2,870	2,630	2,880
Civilian Injuries	12,700	11,900	11,500
Property Loss	\$7.98 billion	\$8.70 billion	\$8.95 billion

Source: See footnote 21.

The table above contains the only data from the NFPA survey that CPSC staff use to make fire loss estimates.

NFIRS compiles incident reports submitted voluntarily to the U.S. Fire Administration (USFA) by U.S. fire departments. Thus, NFIRS is not a probability sample and is insufficient to support precision estimation. The reports come from all 50 states and the District of Columbia in each of 2019, 2020, and 2021. Not all the states reporting included data from every fire department in the state. The number of fire departments participating in NFIRS increased slightly from 22,685 in 2019 to 22,726 fire departments in 2020. It then decreased to 22,303 in 2021. Table 9 shows the number of residential structure fires and the corresponding losses reported to USFA from 2019 through 2021. The number of residential structure fires reported to NFIRS decreased

²¹ Hylton Haynes, “Fire Loss in the U.S. During 2019,” National Fire Protection Association (NFPA), September 2020; Hylton Haynes, “Fire Loss in the U.S. During 2020,” National Fire Protection Association (NFPA), September 2021; Ben Evarts, “Fire Loss in the U.S. During 2021,” National Fire Protection Association (NFPA), September 2022.

by a large amount from 2019 to 2020 and again to 2021. It decreased by 20 percent in total during this time period. This could be an effect of the Covid-19 pandemic, although causation has not been established. A large decrease was also seen in the residential structure fire deaths and injuries during this time period, especially from 2019 to 2020.

Table 9. Residential Structure Fires and Associated Losses Reported to NFIRS 2019–2021

	2019	2020	2021
Structure Fires	261,404	226,686	209,407
Civilian Deaths	1,596	1,351	1,344
Civilian Injuries	6,704	4,914	4,389
Property Loss	\$4.69 billion	\$4.20 billion	\$4.5 billion

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA.

According to NFPA, there was an estimated annual average of 367,500 residential structure fires in the United States during 2019 to 2021, and an annual average of 2,800 deaths, 12,000 injuries, and \$8.5 billion in property losses. NFIRS captured about 63 percent of these fires, 51 percent of the deaths, 44 percent of the injuries, and 52 percent of the property losses (Table 9).

NFIRS Variables

The NFIRS version 5.0 coding system includes many variables, but CPSC staff used only the following for this report:

<u>Variable</u>	<u>Description</u>
<i>Civilian Deaths</i>	Number of people who died in connection with the fire incident other than fire service personnel.
<i>Civilian Injuries</i>	Number of people who were injured (but did not die) in connection with the fire incident, other than fire service personnel.
<i>Property Loss</i>	Estimate of loss, in whole dollars, if structure sustained damage from flame, smoke, or suppression efforts. Content losses are not adjusted for inflation.
<i>Contents Loss</i>	Estimate of loss, in whole dollars for contents (which had value) that sustained damage from flame, smoke, suppression efforts, or otherwise. Content losses are not adjusted for inflation.
<i>Property Use</i>	Refers to the specific use of the property where the incident occurred. For residential structure fires, the properties that were deemed appropriate were single/multifamily dwellings,

any type of boarding houses, dormitories, sorority/fraternity houses, hotels/motels, and mobile property not in transit.

Incident Type

Identifies the various types of incidents to which fire departments respond. It may include fires, rescue and emergency medical services, or false alarms. For this report, the incident codes of interest included structure fires (which include confined fires) and fires in mobile and portable structures used as fixed residences.

Equipment Involved

Device that provided the heat that started the fire (e.g., heater, clothes dryer, etc.).

Power Source

The type of power for the equipment involved in the fire's ignition. These are grouped into electrical; gas-, liquid-, or solid-fueled; and other.

Equipment Portability

Identifies the equipment involved as stationary or portable.

Heat Source

Source of heat that ignited the fire (e.g., candle, lighter, cigarette, heat from operating equipment, hot object, etc.).

Item First Ignited

The functional description or use of the item that was first ignited by the heat source (e.g., upholstered furniture, mattress, bedding, electric cable insulation, curtains or drapes, etc.).

Cause of Ignition

The general causal factor that resulted in a heat source igniting a combustible material. The cause code values are:

- 1: intentional
- 2: unintentional
- 3: failure of equipment or heat source
- 4: act of nature
- 5: cause under investigation
- 0: cause, other
- U: cause undetermined after investigation

CPSC staff regrouped the codes as:

- 1: intentional
- 0, 2, 3, 4, or fire involving child play: unintentional
- 5, U, missing information: unknown

Age

The age of the civilian fire casualty.

Race

The race of the civilian fire casualty. The race code values are:

- 1: White
- 2: Black
- 3: American Indian, Eskimo, or Aleut
- 4: Asian
- 0: Other, includes multi-racial
- U: Race undetermined

The NFIRS coding manual²² defines some variables as “required fields.” A “required field” means that, if known, a value must be supplied for that variable. Other variables may or may not be supplied at the discretion of the reporting department. In the list above, the categories Equipment Involved, Power Source, and Equipment Portability are not required fields. Variables that are not required are more likely to be missing from a given fire incident report in NFIRS than those that are required.

Data Preparation—Addressing Different Types of Missing Data

There are four general types of missing data in NFIRS: (1) data where the value of the missing variable can be inferred logically; (2) missing data from exposure fires; (3) missing data from confined fires; and (4) other missing data. Standard practice, in analysis of fire data over the last 20 years or so, has been to fill in the missing values whenever possible, as explained below.

Missing data that can be logically inferred

Only a few of the available fire incident characteristics were used to generate estimates in this report. Of these, only the variables Incident Type, Property Use, Cause of Ignition, Item First Ignited, Heat Source, and the Loss²³ variables are required to be filled out by the fire departments. Even fewer are required for confined fires, which will be discussed below. Tables 1, 3, 4, and 5 in this report rely heavily on the variables Equipment Involved and Equipment Power Source. To reduce the extent of missing data, CPSC staff has implemented some conventions, as necessary, after consulting with USFA technical staff. For example, if the heat source is known to be matches, lighters, or candles, and no equipment is reported, CPSC staff concludes that equipment was not involved, rather than equipment being unknown. Similarly, if the factor contributing to the ignition of a fire is reported to be an act of nature—such as an earthquake or a storm—and no equipment is reported, CPSC staff concludes that no equipment was involved.

In another scenario, the reported equipment code is electrical but the Equipment Power Source is missing. The power source in this scenario should have been reported as electrical. Similarly,

²² NFIRS Complete Reference Guide, January 2015.

²³ These are property loss and content loss which CPSC staff add together for what they call *property loss*.

when known that no electrical equipment is involved, the power source should be reported as “none” instead of “unknown.”

These edits are made before any other steps in data preparation.

Exposure fires

Some fires involved more than one residential structure. The initial structure is identified as “exposure zero” in the data file. Structure fires that spread from the initial fire are identified as “exposure fires” and are numbered from “zero,” up to as many structures as necessary. Typically, in exposure fires, most of the information on the variables listed above is not filled out for exposures beyond the initial home. Any residential structure exposure fire that originated from a different residential fire or a non-residential structure fire is in-scope for this report.

If the initial fire was a residential structure fire, CPSC staff transferred the fire cause values, such as Cause of Ignition, Equipment Involved, or Heat Source, from the initial fire to the exposure fire. For example, if a portable heater caused the initial fire, all exposures would be considered portable heater fires. All associated deaths, injuries, and property losses in these exposures also would be attributed to portable heaters.

If the initial fire is not a residential structure fire but the exposure fire is a residential structure fire, then the cause information is not passed down from the initial fire. For example, if a wildfire is started by a cigarette and then the fire spreads to homes, the wildfire would not count as a residential structure fire, but the exposure home fires would. The cigarette as the heat source would not be passed on to the home fires in this case. The cause information for the exposure home fires would be left as is.

Confined fires

NFIRS’s defines a fire that is confined to a noncombustible container causing no flame damage beyond the container to be a confined fire. By far, the largest proportion of missing data was encountered among the confined fires.

In NFIRS version 5.0, the following Incident Type codes are used to identify the different types of confined fires.

Incident Type Code

	<i>Definition</i>
113	Fire involving the contents of a cooking vessel without fire extension beyond the vessel.
114	Fire originating in and confined to a chimney or flue.

- 115 Fire caused by overload or malfunction of an incinerator, with no flame damage outside the incinerator.
- 116 Fire caused by delayed ignition or malfunction of a fuel or oil burner/boiler, with no flame damage outside the box.
- 117 Fire originating in and confined to contents of a trash compactor. Home trash compactors are excluded.
- 118 Fire involving a trash or rubbish fire in a structure with no flame damage to structure or its contents.

With the proportion of reported confined fires increasing, the proportion of missing data also increases. However, imputation of unknowns based on the information from confined fires is not a viable option. CPSC staff’s imputation of unknown data assumes that the unknown data will be like the known. Confined fires are inherently different than non-confined fires so data are not imputed across those categories. From the definition of the Incident Type of confined fires, it is unclear whether they are at all similar to the rest of the fires by Equipment Involved in Ignition, the Equipment Power Source, Heat Source, or Item First Ignited. As such, CPSC staff separates all confined fires from the data before the product-specific estimates are derived.

The confined fire and fire loss counts were weighted up to the NFPA estimates, using the same weights as the rest of the data and presented at the aggregate levels (and sometimes at more specific levels as allowed by the Incident Type definitions). See the section on Estimation Procedure below for a discussion of the weights used. Tables 10a through 10c present all estimates related to confined fires. These estimates are also included in Tables 1a through 5d, as appropriate. Note that they do not appear in Tables 4a through 5d at any of the specific levels because there is no information available on Equipment Power Source.

Table 10a. Estimated Residential Confined Fires: 2019–2021

Included in Table Categories:	Appear in Tables:	2019	2020	2021
Total Residential	1a, 2a, 3a, 4a, 5a	177,800	197,400	176,300
Total Heating and Cooling Equipment	1a, 3a	20,600	20,800	19,300
<i>Fireplace, Chimney, Connector</i>	<i>1a, 3a</i>	<i>13,700</i>	<i>14,200</i>	<i>13,600</i>
<i>Other (Burner/Boiler)</i>	<i>1a, 3a</i>	<i>6,900</i>	<i>6,600</i>	<i>5,700</i>
Cooking	1a, 2a	135,300	147,600	128,800
Trash, Rubbish	2a	20,700	27,600	27,100
Incinerator	-	500	500	400
Trash Compactor	-	700	800	700

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Fire estimates are rounded to nearest 100. Rounded estimates less than 100 are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. No information was available on the intentionality of these fires.

There were no confined fire deaths in 2019, 2020, or 2021.

Table 10b. Estimated Residential Confined Fire Injuries: 2019–2021

Included in Table Categories:	Appear in Tables:	2019	2020	2021
Total Residential	1c, 2c, 3c, 4c, 5c	1,520	1,390	1,180
Total Heating and Cooling Equipment	1c, 3c	40	60	50
<i>Fireplace, Chimney, Connector</i>	1c, 3c	10	20	20
<i>Other (Burner/Boiler)</i>	1c, 3c	20	40	30
Cooking	1c, 2c	1,420	1,250	1,060
Trash, Rubbish	2c	60	70	70
Incinerator	-	*	*	*
Trash Compactor	-	*	*	10

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Injury estimates rounded to nearest 10. Rounded estimates less than 10 are denoted by an asterisk (*).

Subtotals do not necessarily add to heading totals. No information was available on the intentionality of these fires.

Table 10c. Estimated Residential Confined Fire Property Loss (In \$Millions): 2019–2021

Included in Table Categories:	Appear in Tables:	2019	2020	2021
Total Residential	1d, 2d, 3d, 4d, 5d	\$51.6	\$50.6	\$39.1
Total Heating and Cooling Equipment	1d, 3d	\$8.4	\$8.7	\$7.6
<i>Fireplace, Chimney, Connector</i>	1d, 3d	\$5.0	\$6.7	\$5.5
<i>Other (Burner/Boiler)</i>	1d, 3d	\$3.5	\$2.0	\$2.1
Cooking	1d, 2d	\$39.4	\$37.0	\$27.7
Trash, Rubbish	2d	\$3.2	\$4.5	\$3.5
Incinerator	-	\$0.5	\$0.3	\$0.2
Trash Compactor	-	\$0.1	\$0.1	\$0.1

Source: U.S. Consumer Product Safety Commission/EPHA, from data obtained from the USFA and NFPA.

Note: Property loss estimates are rounded to the nearest tenth of a million dollars. Rounded estimates less than

\$0.1m are denoted by an asterisk (*). Subtotals do not necessarily add to heading totals. No information was

available on the intentionality of these fires.

Other missing data

Tables 11a–11c show the proportion of data missing for important fire cause variables after inferring data when appropriate. Because a large majority of the data fields for confined fires were not reported, those data fields were excluded from the tabulations.

The proportion of data for key fire cause variables that is missing has been generally increasing for decades. The high proportion of missing data, particularly for the fire deaths, is problematic because the estimates are based on the non-missing data, with the missing data allocated based on the characteristics of the non-missing data. Against this trend, in 2021 there were some large decreases in the proportion of missing data—most notably a decrease to 60 percent (from 67 percent) in the Cause of Ignition deaths and a decrease to 66 percent (from 70 percent) in the Heat Source deaths. This is a positive development.

Table 11a. Missing Data on Residential Structure Fires: 2019–2021

	2019	2020	2021
Cause of Ignition	36%	35%	34%
Heat Source	41%	40%	41%
Item First Ignited	42%	42%	42%
Equipment Involved	47%	43%	40%
Equipment Power	46%	43%	40%

Source: U.S. Consumer Product Safety Commission/EPHA, from NFIRS data obtained from the USFA. Table excludes confined fires.

Table 11b. Missing Data on Residential Structure Fire Deaths: 2019–2021

	2019	2020	2021
Cause of Ignition	65%	67%	60%
Heat Source	68%	70%	66%
Item First Ignited	68%	70%	68%
Equipment Involved	55%	57%	54%
Equipment Power	55%	57%	54%
Race	39%	39%	39%

Source: U.S. Consumer Product Safety Commission/EPHA, from NFIRS data obtained from the USFA.

Table 11c. Missing Data on Residential Structure Fire Injuries: 2019–2021

	2019	2020	2021
Cause of Ignition	43%	42%	41%
Heat Source	41%	43%	43%
Item First Ignited	43%	42%	43%
Equipment Involved	37%	38%	37%
Equipment Power	38%	38%	37%
Race	49%	51%	50%

Source: U.S. Consumer Product Safety Commission/EPHA, from NFIRS data obtained from the USFA. Table excludes injuries from confined fires.

Quality Control Checks of NFIRS Data

In 2006 a California home fire was reported to NFIRS with a \$100 million property loss. Because this loss was unusually high, CPSC staff decided to assign the fire to CPSC field staff to investigate and confirm (or correct) the amount of this large property loss. The actual fire department estimate of property loss for the fire was \$100,000. The property loss was corrected, and the weight used for property loss estimates was changed accordingly.

Because of the finding on the 2006 California incident property loss estimate, CPSC staff initiated more quality control checking of the NFIRS data, beginning with the 2007 data. This began with looking into fires with reported property losses of \$5 million or higher. If CPSC staff deemed these property loss estimates to be suspicious, the cases were assigned to field

investigators to conduct In-depth Investigations (IDI's) in an attempt to confirm or correct these high property loss estimates. Any new or differing information gained from these IDIs leads to editing of the data.

In addition to the high property loss incidents, CPSC staff also began assigning IDIs for many multiple (three or more) death fires. Much of the fire cause information in NFIRS is missing or unknown for many of the multiple death fires. Staff have found these IDIs useful for filling in or updating the fire cause information. In many cases, the IDI informs staff that the Cause of Ignition, although coded as unknown in NFIRS, is actually unintentional. In some cases, CPSC staff learn that the deaths were the result of homicides that occurred before the fire was set. In such instances, CPSC staff edit the data with the new information.

Beginning with the 2015 data, a new class of NFIRS incident was assigned to CPSC field staff for IDIs. There has been concern that some fires where the Heat Source was coded as "43 – Hot ember or ash" or where the Heat Source was coded as "60 – Heat from other open flame or smoking materials", are incorrectly coded fires where a cigarette was the correct Heat Source. Beginning with the 2015 data, CPSC staff assigned to field investigators all incidents with at least one fire death where the coded Heat Source was either "43 – Hot ember or ash" or "60 – Heat from other open flame or smoking materials". In these cases, the investigator was instructed to contact the attending fire department and inquire about what specifically provided the source of heat for the fire.

These Quality Control check IDIs were conducted for each of the three years (2019, 2020, and 2021) covered in this report. For the years 2019, 2020, and 2021, there were a total of 44 high property loss fires assigned for Quality Control check IDIs. These IDI's led to editing the data for 27 of these fires. CPSC staff assigned a total of 56 IDIs for multiple death (three or more) fires. These IDIs led to data edits for 40 of these fires. Staff assigned IDIs for a total of 126 fires due to the Heat Source being coded as either "43 – Hot ember or ash" or "60 – Heat from other open flame or smoking materials". These IDIs led to edits for 102 of these fires. CPSC staff believe that this data editing improves the quality of the estimates both by reducing the amount of unknown data and by correcting coding that was learned to be incorrect.

Using Raking to Allocate Missing Data and Make Estimates

For missing data, an assumption was made that the unknown values for a characteristic had the same distribution as the known values for that characteristic. To allocate these unknowns for the various characteristics, "raking" was performed using a SAS[®] macro.²⁴ The raking procedure maintains the marginal distributions for the known data while allocating the unknown data for all characteristics involved.²⁵ For each year, the raking procedure was applied separately for fires, deaths, injuries, and property loss.

For the CPSC staff estimates going back to 1980 all the way up to 2014, one raking procedure was applied separately for each year for each of the tables 1–5 (a–d). For 2015 and

²⁴ M. Battaglia, D. Hoaglin and D. Izrael, "To Rake or Not To Rake Is Not the Question Anymore with the Enhanced Raking Macro," SAS[®] Users Group International (SUGI) 29th Annual Conference, May 9–12, 2004, Paper #207-29.

²⁵ M.A. Greene, L.E. Smith, M.S. Levenson, S. Hiser, and J.H. Mah, "Raking Fire Data," Presented at the Federal Conference on Statistical Methodology, Arlington, VA, 2001.

subsequent years, CPSC staff now rakes for each product. For example, for the Table 2b estimate for 2020 candle fire deaths, the raking only includes two variables: Cause of Ignition (Intentional or Unintentional) and Heat Source (“candle” or “not candle”). From this raking an estimate for 2020 candle fire deaths is produced. Such rakings are done for each row in each table.

Because some of the NFIRS information for victim age and victim race was missing/unknown (although victim age is rarely missing or unknown), the raking procedure was used to allocate the unknowns in order to produce age and race estimates. The raking procedure was performed separately for age and race, separately for deaths and injuries, and separately for each of years 2019, 2020, and 2021. For example, it was used to allocate unknown victim ages to produce an estimate for 2019 deaths by age. Subsequently, it was repeated to estimate 2019 injuries by age, and so on.