



RESEARCH

Smoke Alarms in US Home Fires Supporting Tables

February 2021

Marty Ahrens

Smoke Alarms in US Home Fires: Supporting Tables

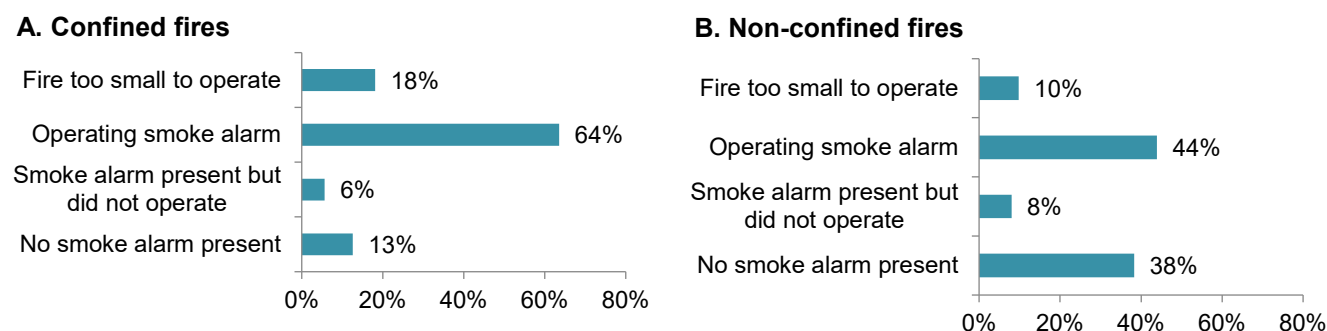
The tables in this document are a companion to the report of the same name. Firefighter deaths and injuries are excluded from this analysis. While most of the tables show national estimates of reported fires, some show data from other sources.

National estimates of fires and losses are presented as 2014–2018 annual averages. Estimates were derived from the US Fire Administration’s National Fire Incident Reporting System (NFIRS) and NFPA’s annual fire department experience survey and include proportional shares of unknown or missing data. Fires are rounded to the nearest 100, deaths and injuries are rounded to the nearest ten, and property loss is rounded to the nearest million dollars. Property loss was not adjusted for inflation. Percentages were calculated on unrounded estimates.

Confined fires — that is, fires with NFIRS incident type codes 113–118 indicating confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires — were analyzed separately from fires with non-confined structure fire incident types (NFIRS incident type codes 110–123, excluding 113–118) and summed. Estimates include proportional shares of fires with unknown data. For more information on how these estimates were calculated, please see the [full report](#) and [How NFPA's National Estimates Are Calculated for Home Structure Fires](#).

Smoke alarms were more likely to be present and more likely to have operated in confined fires than in non-confined fires. Also, a larger percentage of confined fires were too small to operate the smoke alarms. Note that NFIRS, the source of detailed data about fire department responses, does not capture information about whether the detection is monitored. Monitored detection may result in more fire department responses to very small fires.

Figure 1.
Confined and Non-Confined Home Structure Fires by Smoke Alarm Performance:
2014–2018



List of Tables

Table	Smoke Alarms in US Home Fires	Page
Home Structure Fires		
Table 1.	By Smoke Alarm Performance	3
Table 2.	By Type of Detection	4
Table 3.	By Smoke Alarm Power Source	5
Table 4.	Considered Large Enough to Activate Alarm by Operating Alarms and Power Source	6
Table 5.	By Smoke Alarm Power Source When Smoke Alarms Did Not Operate	7
Table 6.	By Power Source and Reason When Smoke Alarm Did Not Operate	8
Table 7.	With Hardwired Smoke Alarms by Extent of Flame Damage	12
Table 8.	With Battery-Powered Smoke Alarms by Extent of Flame Damage	12
Table 9.	By Effectiveness of Operating Smoke Alarms	13
Various Survey Results on Smoke Alarms		
Table 10.	Findings from 2010 Harris Poll® National Quorum	14
Table 11.	Occupied Housing Units with Smoke Alarms: 2011 American Housing Survey	15
Table 12.	Smoke Alarm Key Findings from CPSC's 2004–2005 Residential Fire Survey	16
Fires in One- or Two-Family Homes		
Table 13.	By Smoke Alarm Performance	17
Table 14.	By Type of Detection	18
Table 15.	By Smoke Alarm Power Source	19
Apartment Fires		
Table 16.	By Smoke Alarm Performance	20
Table 17.	By Type of Detection	21
Table 18.	By Smoke Alarm Power Source	22
Smoke Alarm Presence and Operation in Home Structure Fires Resulting in Death		
Table 19.	By Victim's Location and Involvement at Time of Fire Incident	23
Table 20.	By Extent of Flame Damage	24
Table 21.	By Activity at Time of Fatal Injury	24
Table 22.	By Human Factor Contributing to Injury	25
Table 23.	By Victim's Age	26
Smoke Alarm Presence and Operation in Home Structure Fires Resulting in Injury		
Table 24.	By Victim's Activity at Time of Injury	27

Table 1. Home Structure Fires by Smoke Alarm Performance: 2014–2018 Annual Averages

Detection Performance	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Total	353,100	(100%)	2,620	(100%)	11,030	(100%)	\$7,187	(100%)
Non-confined fire	180,600	(51%)	2,620	(100%)	9,700	(88%)	\$7,145	(99%)
Confined fire	172,500	(49%)	0	(0%)	1,330	(12%)	\$42	(1%)
Smoke Alarm Present	262,200	(74%)	1,540	(59%)	7,720	(70%)	\$5,348	(74%)
Non-confined fire	111,500	(32%)	1,540	(59%)	6,550	(59%)	\$5,311	(74%)
Confined fire	150,700	(43%)	0	(0%)	1,180	(11%)	\$37	(1%)
Fire too small to operate alarm	48,900	(14%)	30	(1%)	470	(4%)	\$159	(2%)
Non-confined fire	17,700	(5%)	30	(1%)	320	(3%)	\$155	(2%)
Confined fire	31,300	(9%)	0	(0%)	150	(1%)	\$4	(0%)
<i>Smoke alarm present and fire large enough to operate alarm</i>	<i>213,300</i>	<i>(60%)</i>	<i>1,510</i>	<i>(58%)</i>	<i>7,250</i>	<i>(66%)</i>	<i>\$5,189</i>	<i>(72%)</i>
Non-confined fire	93,800	(27%)	1,510	(58%)	6,230	(57%)	\$5,156	(72%)
Confined fire	119,500	(34%)	0	(0%)	1,020	(9%)	\$33	(0%)
Smoke alarm operated	189,100	(54%)	1,100	(42%)	5,950	(54%)	\$4,547	(63%)
Non-confined fire	79,400	(22%)	1,100	(42%)	5,040	(46%)	\$4,517	(63%)
Confined fire	109,700	(31%)	0	(0%)	910	(8%)	\$29	(0%)
Smoke alarm present but did not operate	24,300	(7%)	410	(16%)	1,310	(12%)	\$642	(9%)
Non-confined fire	14,500	(4%)	410	(16%)	1,190	(11%)	\$638	(9%)
Confined fire	9,800	(3%)	0	(0%)	110	(1%)	\$4	(0%)
No Smoke Alarm	90,900	(26%)	1,080	(41%)	3,300	(30%)	\$1,839	(26%)
Non-confined fire	69,100	(20%)	1,080	(41%)	3,150	(29%)	\$1,834	(26%)
Confined fire	21,800	(6%)	0	(0%)	150	(1%)	\$5	(0%)
Operating alarms as share of those present in fires large enough to activate	189,100	(89%)	1,100	(73%)	5,950	(82%)	\$4,547	(88%)
Fires with no smoke alarms or none that operated	115,200	(33%)	1,490	(57%)	4,610	(42%)	\$2,481	(35%)

Note: Sums may not equal totals due to rounding errors. Confined and non-confined fires were analyzed separately. Smoke alarm presence or absence was reported in 68 percent of non-confined fires and 7 percent of confined fires. Fires with unknown or missing data were allocated proportionally among fires with missing data.

Source: NFIRS and NFPA's fire experience survey.

Table 2. Home Structure Fires with Detection Equipment by Type of Detection: 2014–2018 Annual Averages

Type of Detection Equipment	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Smoke	232,400	(89%)	1,450	(94%)	7,110	(92%)	\$4,753	(89%)
Non-confined fire	101,800	(39%)	1,450	(94%)	6,050	(78%)	\$4,723	(88%)
Confined fire	130,600	(50%)	0	(0%)	1,060	(14%)	\$30	(1%)
Combination smoke and heat	17,500	(7%)	40	(2%)	270	(3%)	\$349	(7%)
Non-confined fire	5,600	(2%)	40	(2%)	210	(3%)	\$347	(6%)
Confined fire	11,900	(5%)	0	(0%)	50	(1%)	\$2	(0%)
More than one type present	7,200	(3%)	30	(2%)	230	(3%)	\$166	(3%)
Non-confined fire	2,300	(1%)	30	(2%)	200	(3%)	\$164	(3%)
Confined fire	4,900	(2%)	0	(0%)	30	(0%)	\$1	(0%)
Unclassified detection equipment	2,000	(1%)	10	(1%)	30	(0%)	\$32	(1%)
Non-confined fire	600	(0%)	10	(1%)	30	(0%)	\$31	(1%)
Confined fire	1,400	(1%)	0	(0%)	0	(0%)	\$0	(0%)
Sprinkler with waterflow detection	1,900	(1%)	0	(0%)	50	(1%)	\$27	(1%)
Non-confined fire	700	(0%)	0	(0%)	30	(0%)	\$24	(0%)
Confined fire	1,300	(0%)	0	(0%)	20	(0%)	\$3	(0%)
Heat	1,200	(0%)	10	(1%)	30	(0%)	\$22	(0%)
Non-confined fire	500	(0%)	10	(1%)	30	(0%)	\$21	(0%)
Confined fire	700	(0%)	0	(0%)	0	(0%)	\$0	(0%)
Total	262,200	(100%)	1,540	(100%)	7,720	(100%)	\$5,348	(100%)
Non-confined fire	111,500	(43%)	1,540	(100%)	6,550	(85%)	\$5,311	(99%)
Confined fire	150,700	(57%)	0	(0%)	1,180	(15%)	\$37	(1%)

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

Source: NFIRS and NFPA’s fire experience survey.

Table 23. Smoke Alarm Presence and Operation in Home Structure Fires Resulting in Death by Victim’s Age: 2014–2018 Annual Averages

Age Group	Present and Operated		None or Not Working	
Under 5	60	(6%)	100	(7%)
5–9	50	(4%)	70	(4%)
10–14	20	(2%)	40	(2%)
15–24	40	(4%)	60	(4%)
25–34	70	(6%)	120	(8%)
35–44	90	(8%)	120	(8%)
45–54	160	(15%)	220	(14%)
55–64	200	(19%)	300	(20%)
65–74	200	(18%)	240	(16%)
75–84	140	(13%)	150	(10%)
85 and over	70	(6%)	80	(6%)
Total	1,100	(100%)	1,490	(100%)
Under 15	120	(11%)	210	(14%)
65 and over	410	(37%)	480	(32%)
75 and over	210	(19%)	240	(16%)

Note: Fire deaths resulting from fires too small to activate the smoke alarm are not included in these tables. Sums may not equal totals due to rounding errors. Entries of zero may actually be zero or may have rounded to zero.

Source: NFIRS and NFPA’s fire experience survey.

Table 24. Smoke Alarm Presence and Operation in Home Structure Fires Resulting in Non-Fatal Injury by Victim’s Activity at Time of Injury: 2014–2018 Annual Averages

Activity	Present and Operated		None or Not Working	
Fire control	2,160	(36%)	1,280	(28%)
Escaping	1,690	(28%)	1,350	(29%)
Sleeping	530	(9%)	640	(14%)
Returning to vicinity of fire before control	420	(7%)	350	(8%)
Rescue attempt	390	(7%)	380	(8%)
Unclassified activity	340	(6%)	330	(7%)
Unable to act	190	(3%)	120	(3%)
Irrational act	200	(3%)	140	(3%)
Returning to vicinity of fire after control	30	(0%)	10	(0%)
Total	5,950	(100%)	4,610	(100%)

Note: Fire deaths or injuries resulting from fires too small to activate the smoke alarm are not included in these tables. Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA’s fire experience survey.

Acknowledgments

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 makes this analysis possible. Their contributions allow us to estimate the size of the fire problem.

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

To learn more about research at NFPA visit [nfpa.org/research](https://www.nfpa.org/research).

E-mail: research@nfpa.org.

NFPA No. USS04ST