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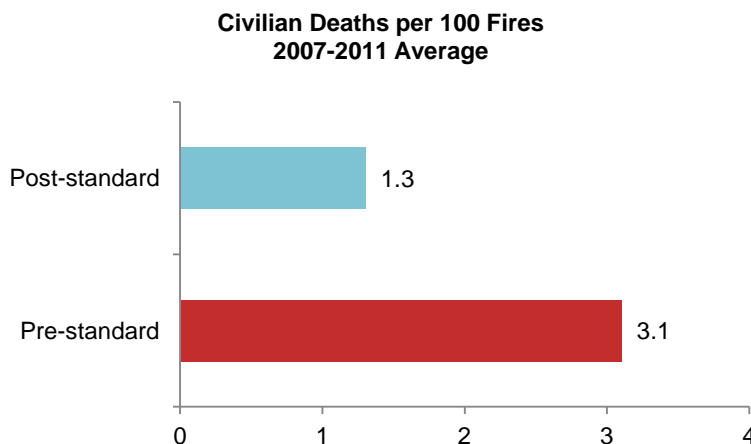
## Manufactured Home Fires

In 2007-2011, 11,400 structure fires per year were reported in manufactured homes, with associated losses of:

- 206 civilian deaths,
- 434 civilian injuries, and
- \$179 million in direct damage per year.

Because of changes in the way fires are reported since 1999, the manufactured home share of certain minor fires cannot be identified, which means estimated fires and associated injuries are probably under-estimated. Estimates of associated deaths and direct property damage are essentially unaffected.

Compared to pre-HUD-standard manufactured homes (built before 1976), post-standard homes had a 57% lower rates of civilian deaths per 100 fires in 2007-2011.



Manufactured homes (all ages combined) had roughly the same fire death rate per 100,000 occupied housing units as other one- or two-family homes in 2007-2011.

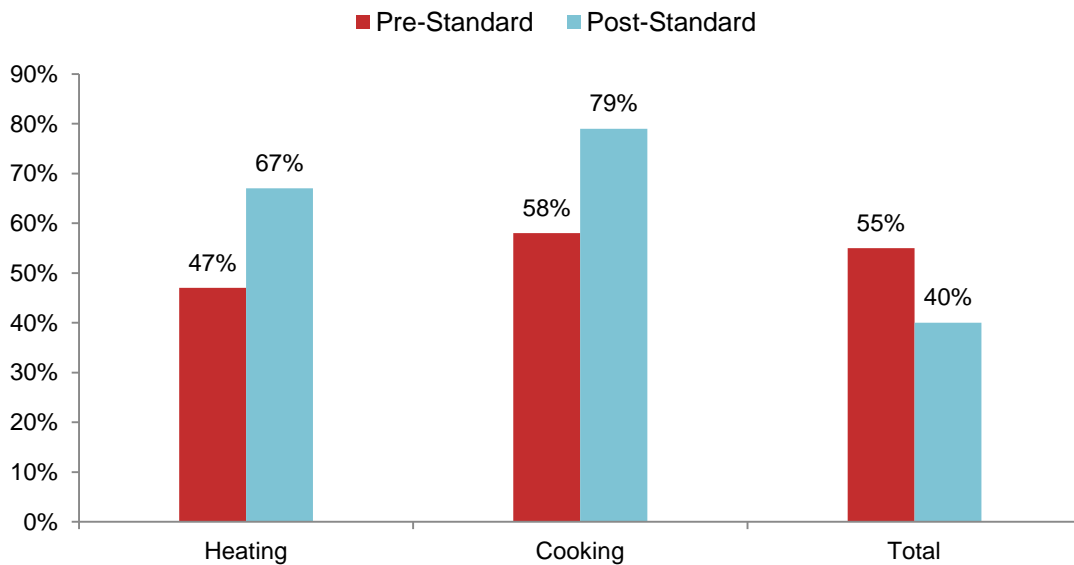
If all pre-standard manufactured homes were removed from the inventory of occupied units, it is estimated that the manufactured home fire death rate would be considerably lower than the rate in other one- or two-family homes.

In 1989-1998, post-standard manufactured homes with smoke alarms had a 31% lower death rate per 100 fires than post-standard manufactured homes with no smoke alarms.

According to the *American Housing Survey*, in 2011, occupied manufactured homes were less likely to have working smoke alarms (91.8% vs. 94.6%) than all occupied housing units including multi-family. In the U.S. Consumer Product Safety Commission's 2004-2005 study of unreported fires, manufactured homes were less likely (91% vs. 97-98%) to have smoke alarms than either detached single-family homes, townhouses or row homes, or multi-family housing.

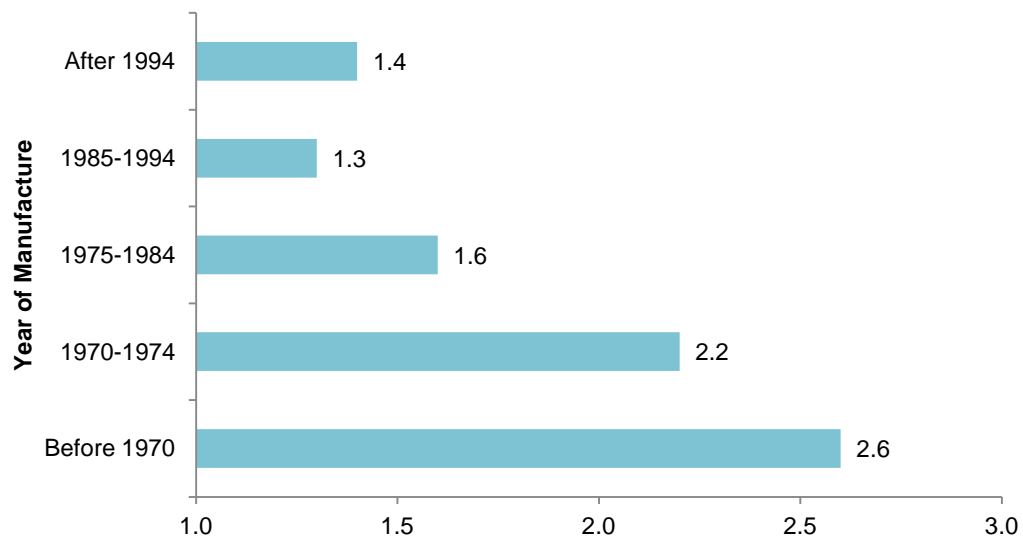
Post-standard manufactured home fires are more likely to have flame damage confined to room of origin, especially if the fires are started by heating or cooking equipment.

**Percent of 1989-1998 Fires with Flame Damage Confined to Room of Origin**



Fires per 1,000 occupied manufactured homes dropped sharply when the HUD standards were introduced but have not declined since then.

**Rate of 2007-2011 Fires per 1,000 Manufactured Homes**















































**Manufactured home fires peak in the afternoon and evening, while associated civilian deaths peak after midnight.**

See [Table 3-1](#). This pattern is also seen in overall one- or two-family home structure fires.

**The leading items first ignited in manufactured home fires are very similar to the leading items first ignited in non-confined fires in other one- or two-family homes.**

See [Table 3-2](#). The items not shown on [Table 3-2](#) that have larger shares of fires in one- or two-family homes than some items on the [Table 3-2](#) list include flammable or combustible liquids or gases, unclassified structural component or finish, and clothing.

There also are no dramatic differences in leading areas of origin between manufactured home fires and fires involving other one- or two-family homes, as [Table 3-3](#) shows. The areas not shown on [Table 3-3](#) that have larger shares of fires in one- or two-family homes than some items on the [Table 3-3](#) list include attic or ceiling/roof assembly or concealed space, garage, and exterior balcony or outside porch.



**Table 3-1.**  
**Manufactured Home Fires, by Hour of Day**  
**Annual Average of 2007-2011 Structure Fires Reported to U.S. Fire Departments**

Hour of Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight – 12:59 a.m.	460	(4%)	13	(7%)	24	(5%)	\$22	(12%)
1:00 – 1:59 a.m.	430	(4%)	13	(7%)	23	(5%)	\$7	(4%)
2:00 – 2:59 a.m.	410	(4%)	16	(8%)	24	(6%)	\$7	(4%)
3:00 – 3:59 a.m.	390	(3%)	10	(5%)	23	(5%)	\$7	(4%)
4:00 – 4:59 a.m.	320	(3%)	29	(14%)	21	(5%)	\$5	(3%)
5:00 – 5:59 a.m.	300	(3%)	8	(4%)	10	(2%)	\$4	(3%)
6:00 – 6:59 a.m.	280	(2%)	10	(5%)	12	(3%)	\$5	(3%)
7:00 – 7:59 a.m.	290	(3%)	9	(4%)	16	(4%)	\$4	(2%)
8:00 – 8:59 a.m.	370	(3%)	7	(3%)	20	(5%)	\$6	(3%)
9:00 – 9:59 a.m.	400	(3%)	8	(4%)	17	(4%)	\$5	(3%)
10:00 – 10:59 a.m.	460	(4%)	7	(3%)	20	(5%)	\$8	(5%)
11:00 – 11:59 a.m.	490	(4%)	4	(2%)	12	(3%)	\$9	(5%)
Noon – 12:59 p.m.	560	(5%)	3	(1%)	21	(5%)	\$8	(4%)
1:00 – 1:59 p.m.	580	(5%)	4	(2%)	13	(3%)	\$8	(5%)
2:00 – 2:59 p.m.	600	(5%)	6	(3%)	17	(4%)	\$8	(5%)
3:00 – 3:59 p.m.	610	(5%)	6	(3%)	20	(5%)	\$8	(4%)
4:00 – 4:59 p.m.	600	(5%)	4	(2%)	19	(4%)	\$7	(4%)
5:00 – 5:59 p.m.	590	(5%)	4	(2%)	16	(4%)	\$8	(4%)
6:00 – 6:59 p.m.	590	(5%)	4	(2%)	16	(4%)	\$8	(4%)
7:00 – 7:59 p.m.	560	(5%)	6	(3%)	17	(4%)	\$7	(4%)
8:00 – 8:59 p.m.	570	(5%)	6	(3%)	18	(4%)	\$6	(3%)
9:00 – 9:59 p.m.	560	(5%)	10	(5%)	19	(4%)	\$7	(4%)
10:00 – 10:59 p.m.	520	(5%)	11	(5%)	20	(5%)	\$7	(4%)
11:00 – 11:59 p.m.	470	(4%)	7	(3%)	16	(4%)	\$7	(4%)
<b>Total</b>	<b>11,400</b>	<b>(100%)</b>	<b>206</b>	<b>(100%)</b>	<b>434</b>	<b>(100%)</b>	<b>\$179</b>	<b>(100%)</b>

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fire estimated to the nearest ten for manufactured homes. Civilian deaths and injuries are estimated to the nearest one for manufactured homes. Direct property damage has been estimated to the nearest million dollars.

Manufactured home fires are identified as Incident Type 121 with any Property Use or Incident Type 120 with Property Use 400-429. Manufactured home fires coded as Incident Type 110-118 with Mobile Property Type 17 are not included because nearly all fires with Incident Type 113-118 (confined fires) have Mobile Property Type blank, making it impossible to estimate relevant fires of this type. For this reason, fires coded as confined fires are excluded from comparisons of manufactured home fires to fires in other one- or two-family dwellings.

Source: NFIRS and NFPA survey.

**Table 3-2. Leading Items First Ignited in Fires in  
Manufactured Homes and One- or Two-Family Homes  
Annual Average of 2007-2011 Structure Fires Reported to Fire Departments**

**A. Manufactured Homes, Probably Excluding Confined Fires**

<b>Item First Ignited</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Wire or cable insulation	1,290	(11%)	12	(6%)	27	(6%)	\$13	(8%)
Cooking materials	850	(7%)	12	(6%)	62	(14%)	\$11	(6%)
Unclassified item first ignited	810	(7%)	15	(7%)	24	(5%)	\$11	(6%)
Structural material or framing	750	(7%)	12	(6%)	17	(4%)	\$13	(7%)
Interior wall covering	710	(6%)	16	(8%)	23	(5%)	\$20	(11%)
Exterior wall covering	650	(6%)	6	(3%)	11	(2%)	\$9	(5%)
Mattress or bedding	520	(5%)	31	(15%)	47	(11%)	\$9	(5%)
Appliance housing or casing	480	(4%)	2	(1%)	15	(3%)	\$5	(3%)
Insulation within structural area	470	(4%)	1	(0%)	8	(2%)	\$5	(3%)
Floor covering	420	(4%)	16	(8%)	14	(3%)	\$7	(4%)
Upholstered furniture	410	(4%)	21	(10%)	27	(6%)	\$9	(5%)

**B. One- or Two-Family Homes, Excluding Confined Fires**

<b>Item First Ignited</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Wire or cable insulation	13,700	(8%)	100	(5%)	340	(4%)	\$386	(6%)
Cooking materials	14,600	(9%)	100	(5%)	1,460	(18%)	\$317	(5%)
Unclassified item first ignited	8,400	(5%)	90	(4%)	300	(4%)	\$292	(5%)
Structural material or framing	18,000	(11%)	130	(6%)	340	(4%)	\$940	(16%)
Interior wall covering	6,600	(4%)	90	(4%)	220	(3%)	\$288	(5%)
Exterior wall covering	12,100	(7%)	30	(1%)	170	(2%)	\$401	(7%)
Mattress or bedding	7,200	(4%)	250	(11%)	910	(11%)	\$269	(5%)
Appliance housing	4,800	(3%)	30	(1%)	170	(2%)	\$115	(2%)
Insulation within structural area	5,400	(3%)	10	(0%)	80	(1%)	\$134	(2%)
Floor covering	4,200	(3%)	100	(4%)	210	(3%)	\$149	(2%)
Upholstered furniture	4,800	(3%)	370	(17%)	520	(7%)	\$251	(4%)

**Table 3-2. Leading Items First Ignited in Fires in  
Manufactured Homes and One- or Two-Family Homes  
Annual Average of 2007-2011 Structure Fires Reported to Fire Departments (Continued)**

**C. One- or Two-Family Homes, All Structure Fires Including Confined Fires**

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wire or cable insulation	15,200	(6%)	100	(5%)	350	(4%)	\$387	(6%)
Cooking materials	54,700	(21%)	100	(5%)	2,080	(23%)	\$326	(5%)
Unclassified item first ignited	21,800	(8%)	90	(4%)	350	(4%)	\$295	(5%)
Structural material or framing	18,400	(7%)	130	(6%)	340	(4%)	\$941	(16%)
Interior wall covering	6,800	(3%)	90	(4%)	220	(3%)	\$288	(5%)
Exterior wall covering	12,300	(5%)	30	(1%)	170	(2%)	\$401	(7%)
Mattress or bedding	7,400	(3%)	250	(11%)	910	(10%)	\$269	(5%)
Appliance housing	9,100	(3%)	30	(1%)	200	(2%)	\$117	(2%)
Insulation within structural area	5,500	(2%)	10	(0%)	80	(1%)	\$134	(2%)
Floor covering	4,300	(2%)	100	(4%)	210	(2%)	\$149	(2%)
Upholstered furniture	4,900	(2%)	370	(17%)	520	(6%)	\$251	(4%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are estimated to the nearest ten for manufactured homes and the nearest hundred for other one- or two-family homes. Civilian deaths and injuries are estimated to the nearest one for manufactured homes and the nearest ten for other one- or two-family homes. Direct property damage has been estimated to the nearest million dollars. Statistics include proportional allocation of fires coded as item first ignited unknown.

Statistics on one- or two-family home fires are taken from Marty Ahrens, *Home Structure Fires*, April 2013. One- or two-family home fires are identified by Incident Type 110-129 and Property Use 410-429. This definition includes all the fires counted here under manufactured homes except for those coded as Incident Type 120-121 with Property Use 400 and those coded as Incident Type 121 with Property Use ≠ 400-429.

Manufactured home fires are identified as Incident Type 121 with any Property Use or Incident Type 120 with Property Use 400-429. Manufactured home fires coded as Incident Type 110-118 with Mobile Property Type 17 are not included because nearly all fires with Incident Type 113-118 (confined fires) have Mobile Property Type blank, making it impossible to estimate relevant fires of this type. For this reason, fires coded as confined fires are excluded from comparisons of manufactured home fires to fires in all one- or two-family dwellings.

Source: NFIRS and NFPA survey.

**Table 3-3. Leading Areas of Origin in Fires in  
Manufactured Homes and One- or Two-Family Homes  
Annual Average of 2007-2011 Structure Fires Reported to Fire Departments**

**A. Manufactured Homes, Probably Excluding Confined Fires**

<b>Area of Origin</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Kitchen	2,260	(20%)	27	(13%)	126	(29%)	\$33	(18%)
Bedroom	1,560	(14%)	44	(21%)	94	(22%)	\$30	(17%)
Living room, family room or den	820	(7%)	60	(29%)	63	(14%)	\$18	(10%)
Unclassified function area	620	(5%)	25	(12%)	44	(10%)	\$12	(7%)
Laundry room or area	550	(5%)	6	(3%)	11	(2%)	\$7	(4%)
Crawl space or substructure space	550	(5%)	2	(1%)	7	(2%)	\$6	(3%)
Unclassified area of origin	480	(4%)	5	(3%)	6	(1%)	\$6	(4%)
Exterior wall surface	460	(4%)	1	(1%)	6	(1%)	\$5	(3%)
Unclassified structural area	460	(4%)	8	(4%)	9	(2%)	\$8	(5%)
Bathroom	420	(4%)	3	(2%)	10	(2%)	\$6	(3%)
Wall assembly or concealed space	390	(3%)	1	(0%)	3	(1%)	\$8	(4%)
Heating equipment room or area	390	(3%)	4	(2%)	4	(1%)	\$4	(2%)

**B. One- or Two-Family Homes, Excluding Confined Fires**

<b>Area of Origin</b>	<b>Fires</b>		<b>Civilian Deaths</b>		<b>Civilian Injuries</b>		<b>Direct Property Damage (in Millions)</b>	
Kitchen	29,800	(18%)	320	(15%)	2,170	(27%)	\$762	(13%)
Bedroom	20,800	(13%)	520	(24%)	1,770	(22%)	\$775	(13%)
Living room, family room, or den	10,400	(6%)	520	(24%)	950	(12%)	\$484	(8%)
Unclassified function area	6,900	(4%)	220	(10%)	460	(6%)	\$302	(5%)
Laundry room or area	8,200	(5%)	30	(2%)	270	(3%)	\$188	(3%)
Crawl space or substructure space	4,500	(3%)	50	(2%)	170	(2%)	\$168	(3%)
Unclassified area of origin	4,100	(3%)	40	(2%)	70	(1%)	\$127	(2%)
Exterior wall surface	8,200	(5%)	10	(0%)	110	(1%)	\$172	(3%)
Unclassified structural area	4,700	(3%)	70	(3%)	130	(2%)	\$247	(4%)
Bathroom	4,800	(3%)	30	(1%)	180	(2%)	\$96	(2%)
Wall assembly or concealed space	6,200	(4%)	30	(1%)	110	(1%)	\$196	(3%)
Heating equipment room or area	2,800	(2%)	20	(1%)	110	(1%)	\$101	(2%)

**Table 3-3. Leading Areas of Origin in Fires in  
Manufactured Homes and One- or Two-Family Homes  
Annual Average of 2007-2011 Structure Fires Reported to Fire Departments (Continued)**

**C. One- or Two-Family Homes, All Structure Fires Including Confined Fires**

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	85,000	(33%)	330	(15%)	2,970	(33%)	\$776	(13%)
Bedroom	21,200	(8%)	520	(24%)	1,780	(20%)	\$775	(13%)
Living room, family room or den	10,900	(4%)	520	(24%)	960	(11%)	\$484	(8%)
Unclassified function area	7,500	(3%)	220	(10%)	470	(5%)	\$302	(5%)
Laundry room or area	8,900	(3%)	30	(2%)	270	(3%)	\$188	(3%)
Crawl space or substructure space	4,900	(2%)	50	(2%)	180	(2%)	\$168	(3%)
Unclassified area of origin	6,100	(2%)	40	(2%)	70	(1%)	\$127	(2%)
Exterior wall surface	8,300	(3%)	10	(0%)	110	(1%)	\$172	(3%)
Unclassified structural area	5,000	(2%)	70	(3%)	140	(2%)	\$247	(4%)
Bathroom	5,200	(2%)	30	(1%)	190	(2%)	\$97	(2%)
Wall assembly or concealed space	6,300	(2%)	30	(1%)	110	(1%)	\$196	(3%)
Heating equipment room or area	5,300	(2%)	20	(1%)	130	(1%)	\$102	(2%)

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are estimated to the nearest ten for manufactured homes and the nearest hundred for other one- or two-family homes. Civilian deaths and injuries are estimated to the nearest one for manufactured homes and the nearest ten for other one- or two-family homes. Direct property damage has been estimated to the nearest million dollars. Statistics include proportional allocation of fires coded as area of origin unknown.

Statistics on one- or two-family home fires are taken from Marty Ahrens, *Home Structure Fires*, April 2013. One- or two-family home fires are identified by Incident Type 110-129 and Property Use 410-429. This definition includes all the fires counted here under manufactured homes except for those coded as Incident Type 120-121 with Property Use 400 and those coded as Incident Type 121 with Property Use ≠ 400-429.

Manufactured home fires are identified as Incident Type 121 with any Property Use or Incident Type 120 with Property Use 400-429. Manufactured home fires coded as Incident Type 110-118 with Mobile Property Type 17 are not included because nearly all fires with Incident Type 113-118 (confined fires) have Mobile Property Type blank, making it impossible to estimate relevant fires of this type. For this reason, fires coded as confined fires are excluded from comparisons of manufactured home fires to fires in all one- or two-family dwellings.

Source: NFIRS and NFPA survey.



## Appendix A. How National Estimates Statistics Are Calculated

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

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/documentation/design/NFIRS\\_Paper\\_Forms\\_2008.pdf](http://www.nfirs.fema.gov/documentation/design/NFIRS_Paper_Forms_2008.pdf).

NFIRS has a wide variety of data elements and code choices. The NFIRS database contains coded information. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is impossible to tell the portion of each from the coded data.

### **Methodology may change slightly from year to year.**

NFPA is continually examining its methodology to provide the best possible answers to specific questions, methodological and definitional changes can occur. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.*

### **NFPA's fire department experience survey provides estimates of the big picture.**

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; 3) the number and nature of non-fire incidents; and (4) 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. Reports for incidents in which mutual aid was given are excluded from NFPA's analyses.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the specific basic 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.















