

U.S. Fire Administration/National Fire Data Center

Non-Residential Structure Fires in 2000

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Findings

- In 2000, 126,000 non-residential structure fires resulted in 90 fatalities, 2,200 injuries, and \$2.8 billion in property loss.
- On average, non-residential structure fires were less injurious and deadly than structure fires generally, but the monetary property loss was higher.
- The highest percentage of non-residential structure fires occurred in storage structures, which included parking garages.
- The leading cause of non-residential fires was incendiary/suspicious (arson) fires.
- No smoke alarm was present in 72% of non-residential structure fires.

Non-residential structures are ubiquitous in American lives. We work, meet, learn, shop, dine, park cars, and store things in non-residential structures. A fire in a non-residential structure can impact a business, the economy of a city, an entire industry—not to mention the deaths and injuries that can result from such incidents. Based on data taken from the National Fire Incident Reporting System (NFIRS), non-residential structure fires account for only 8% of all fires in the United States, and only one-quarter of all fires that take place in structures; however, they are among the most costly of all fires.^{1,2} There were an estimated 126,000 non-residential structure fires in 2000, resulting in 90 fatalities, 2,200 injuries, and \$2.8 billion in property loss.³

LOSS MEASURES

As Figure 1 shows, non-residential structure fires have a higher rate of property loss than all structure fires and all fires generally. They are, however, less deadly and injurious than all structure fires (three-quarters of which are residential structures).⁴

**FIGURE 1. LOSS MEASURES FOR
NON-RESIDENTIAL STRUCTURE FIRES**

Loss Measure	All Fires	All Structure Fires	Non-Residential Fires
\$ Loss/Fire	\$6,601	\$16,219	\$24,671
Fatalities/1,000 Fires	2.4	5.7	1.0
Injuries/1,000 Fires	15.2	39.9	23.4

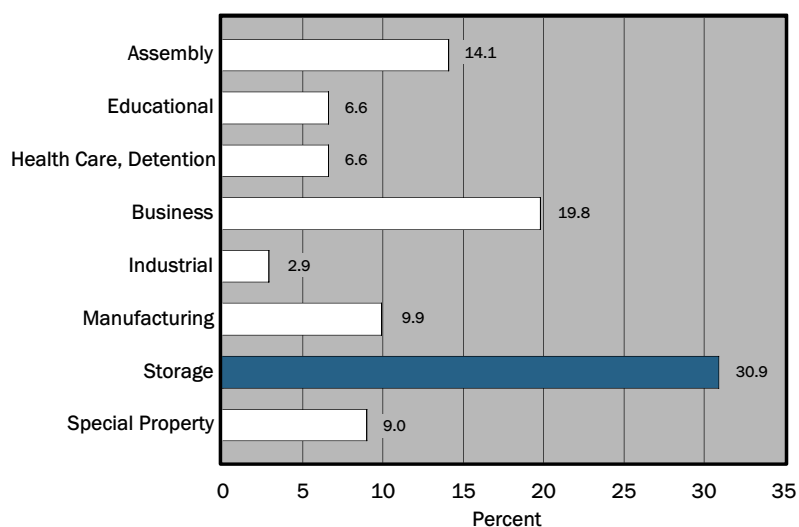
Source: NFIRS only

The higher property loss might be because non-residential structures are often larger and more expensive than residential structures and the contents of the structures have high value. For example, non-residential structures include parking garages, which are filled with costly vehicles. Unlike in homes, fire evacuation procedures may be in place in non-residential structures, which may explain the comparatively lower rates of death and injury. Additionally, fire codes often require inspections of non-residential structures; such inspections are not as prevalent for residential structures. This may be another reason for the lower rate of incidence, death, and injury in non-residential structure fires.

WHERE FIRES OCCUR

The highest percentage of non-residential structure fires take place in storage facilities (Figure 2); and the highest percentage of storage fires are in parking garages. Industrial structures account for the lowest percentage of non-residential structure fires. Figure 3 shows that the leading area of fire origin in non-residential structure fires is vehicle storage areas, which is consistent with the fact that the highest percentage of non-residential structure fires take place in storage facilities. This is not necessarily unexpected. Of all non-residential structures, parking garages may be the most susceptible to fires. They are enclosed structures housing gasoline-filled cars and perhaps other flammable materials, and cars left alone are often arson targets.

FIGURE 2. NON-RESIDENTIAL STRUCTURE FIRES BY PROPERTY TYPE



Source: NFIRS

FIGURE 3. NON-RESIDENTIAL STRUCTURE FIRES BY LEADING AREAS OF ORIGIN

Area of Origin	Fires (%)
Vehicle Storage Area, Carport	11.0
Cooking Area, Kitchen	9.9
Wall Surface, Exterior	6.4
Storage Area, Other	5.1

Source: NFIRS

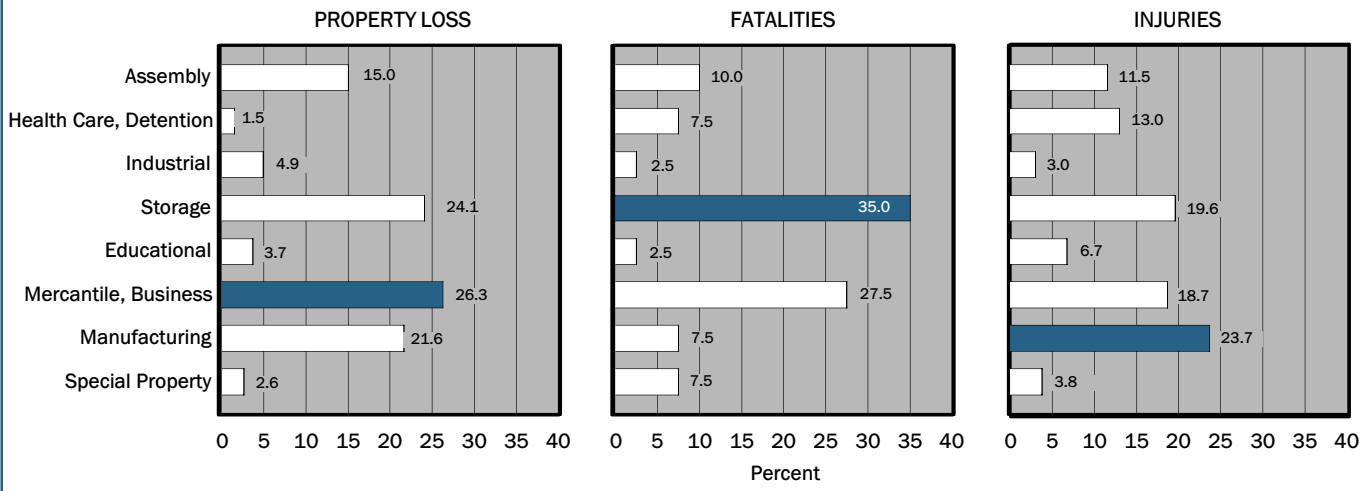
When examining losses, the highest percentage of property loss occurs in mercantile-business structures, deaths in storage facilities, and injuries in manufacturing structures (Figure 4).

CAUSES AND HEAT SOURCES

The highest percentage of non-residential structure fires are incendiary/suspicious (Figure 5). This is consistent with the fact that the leading type of property in non-residential fires is storage facilities. Many parking garages and storage facilities are susceptible to arson because they are not as closely monitored, well lit, or protected as other non-residential structures, such as office buildings and manufacturing plants. Other key leading causes of non-residential structure fires are electrical distribution and cooking. Comparatively, a much higher percentage of residential structure fires are caused by cooking and heating.

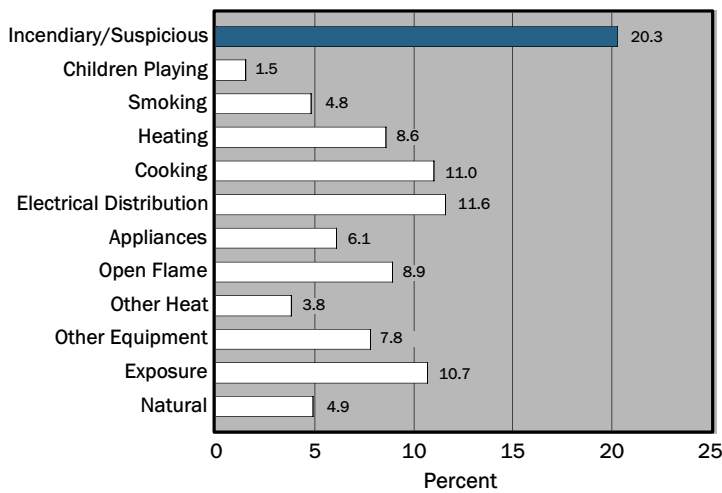
Radiated and conducted heat from operating equipment is the leading heat source in non-residential structure fires, followed by electrical arcing and heat, sparks, or flame from operating equipment (Figure 6).

FIGURE 4. FIRE LOSSES IN NON-RESIDENTIAL STRUCTURES



Source: NFIRS

FIGURE 5. CAUSES OF NON-RESIDENTIAL STRUCTURE FIRES (unknowns apportioned)



Source: NFIRS

FIGURE 6. NON-RESIDENTIAL STRUCTURE FIRES BY LEADING HEAT SOURCES

Heat Source	Fires (%)
Radiated or conducted heat from equipment	21.7
Electrical arcing	14.3
Heat from operating equipment, other	7.2
Spark, ember, or flame from operating equipment	7.0

Source: NFIRS

WHEN FIRES OCCUR

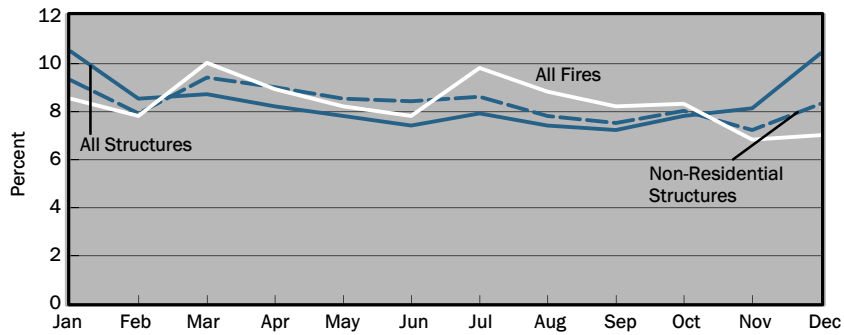
Unlike structure fires, non-residential structure fires do not follow a discernable seasonal trend, as shown in Figure 7. This is likely because structure fires generally are caused by cooking and heating—which have seasonal relationships—while 20% of non-residential structure fires are ignited by incendiary/suspicious causes, which are not seasonally linked.

Non-residential structure fires follow the same trend for time of day as all structure fires and fires generally, but not as dramatically. Although all structure fires peak at the dinner hour, the highest percentage of non-residential structure fires ignite between 2 and 3 p.m (Figure 8).

SMOKE ALARMS

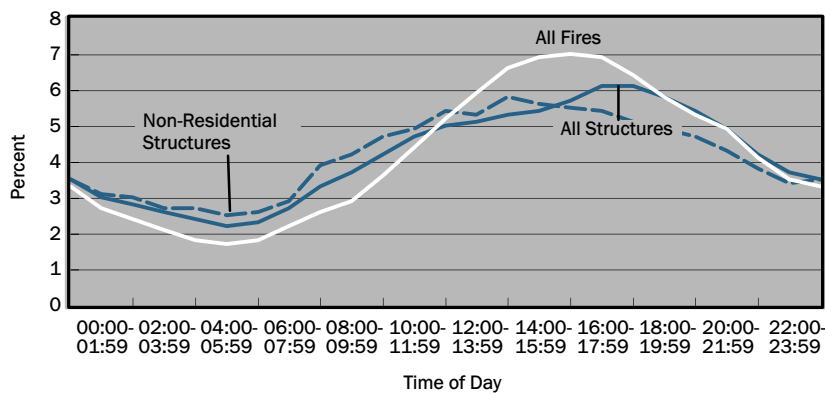
No smoke alarm was present in 72% of non-residential structure fires; alarms were present and operated in only 17% of non-residential structure incidents (Figure 9). From these statistics, it can be inferred that working and effective smoke alarms in non-residential structures are detecting fires, which are then extinguished before it is necessary to report them. Another possibility is that non-residential structures with alarms—evidence of responsible building management or compliance with fire codes—also have comprehensive fire prevention plans that are effectively working in preventing fires.

FIGURE 7. NON-RESIDENTIAL STRUCTURE FIRES BY MONTH



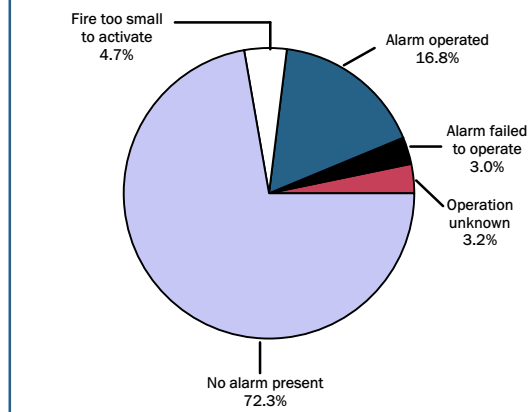
Source: NFIRS

FIGURE 8. NON-RESIDENTIAL STRUCTURE FIRES BY TIME OF DAY



Source: NFIRS

FIGURE 9. SMOKE ALARM PRESENCE AND OPERATION IN NON-RESIDENTIAL STRUCTURE FIRES



Source: NFIRS

EXAMPLES

December 3, 1999: Six firefighters were killed in a fire in an abandoned cold storage warehouse in Worcester, MA. Firefighters were searching for two homeless individuals known to live in the building when they became disoriented and trapped. Other firefighters searching for their missing colleagues also became trapped and perished in the blaze. The fire was caused by a candle that had tipped over. Six firefighters were lost in this blaze.⁵

October 16, 2000: Firefighters in Gettysburg, PA responded to a multiple-alarm building fire in a warehouse. The building was fully engulfed in fire upon their arrival. The fire began to spread to an apartment building across the street, but firefighters managed to control the fire before it caused significant damage to that building. Officials suspect the fire was intentionally set.⁶

January 2, 2002: Firefighters battled a fire that damaged much of a historic Philadelphian landmark building that was built in 1815. The building had recently undergone a \$4.5 million renovation. A faulty wire supplying a ceiling fan caused the fire.⁷

CONCLUSION

Fires in non-residential structures are serious, costly, and dangerous. In addition to taking lives, these fires can have a significant economic impact on a community—sometimes leading to lost jobs and closed businesses. A key aspect of reducing non-residential structure fires is reducing arson, the leading cause of non-residential structure fires.

Business owners and managers of non-residential structures must be vigilant in installing and maintaining smoke alarms, even if not required by local ordinance. Such devices have proved effective in saving lives and reducing property losses resulting from fires.

Individuals can also participate in the prevention of non-residential structure fires. People should learn the emergency evacuation procedures of the office buildings they work in, the stores and businesses they frequent, and the parking garages in which they leave their cars. They should also inquire about the presence of smoke alarms and overall security in these structures—and be sure to report anyone acting strangely or mysteriously.

To request additional information, comment on this report, or review the detailed methodology used in this analysis, visit <http://www.usfa.fema.gov/feedback/>.

Notes:

1. Structure fire statistics in this report do not include mobile structures.
2. Distribution statistics are based on data from the National Fire Incident Reporting System (NFIRS 2000). At the time of this report, NFIRS is transitioning from version 4.1 to 5.0. Approximately 79% of the fire incident data for 2000 was reported to the USFA in NFIRS 4.1 format and converted to 5.0.
3. Estimates of the U.S. fire problem are taken from the National Fire Protection Association's (NFPA's) annual survey, *Fire Loss in the United States*.
4. Loss measures and rates are based on NFIRS 2000 data.
5. "Six firefighters missing in blaze at vacant building," *The Worcester Telegram & Gazette*, December 4, 1999.
6. "PA Bravest Battle Arson Fire," *Firehouse* Web site, November 8, 2000. <http://www.firehouse.com>
7. "Fire damages historic engine house: Building's heart of \$24M restoration," *The Philadelphia Inquirer*, January 2, 2002.