



National
Fire
Protection
Association

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A Study of Fatal Residential Fires



Willoughby Fire Department, Willoughby, Ohio

The body of a little girl is silhouetted on these smoke-stained sheets. She died with her mother, two sisters, and a brother in a fire in their home. This study is dedicated to preventing such tragic fires.



INTRODUCTION

Each year, some 700,000 fires occur in residential occupancies; almost 2,000 fires a day in one- and two-family homes, in apartments, in mobile homes and trailers. Some 6,600 people die in these fires; uncounted others are injured or left homeless, and over \$800 million worth of property is damaged or destroyed. Residential fires kill more than half of all the people who die in fires, and do more damage than fires in any other occupancy classification. These fires caused stark, unrelieved tragedy.

This study puts particular emphasis on fatal residential fires, and the predominant factors contributing to them. The goal of this study is to reduce the number of future tragedies as much as possible. To that end, we recommend ways to make every family and every home safer. None of these recommendations are new, but if every family were to follow them, there would be a significant reduction in fire deaths.

There are many different types of residences: small dwellings, huge mansions, luxurious apartment houses,

crowded tenements, mobile homes, and trailers. These residences show many similarities—the same type of furnishings, and the same kind of activities. The people who occupy these buildings are men, women, and children, from the very young to the very old — a mixture not encountered in most other types of occupancies. The home is seldom empty; most are occupied nearly 24 hours a day.

The fires which occur in these diverse types of buildings show marked similarities, too. The most tragic aspect of these fires is that they do occur in homes — homes where people relax from the cares of their jobs, where they find shelter from storm and strangers. Home is a haven for their loved ones, and contains their most cherished possessions. The home probably represents the biggest single expense in the family budget, too, whether it be rent, or mortgage payments and upkeep. Fire comes to homes as an unwanted but all too frequent guest. Perhaps the family who lived there invited fire, the unwanted guest, with a bit of carelessness.



The Fatal Residential Fire

Late at night, when the family is asleep, a fire starts. Perhaps it starts in a bedroom, where someone fell asleep while smoking. Or perhaps some careless soul dropped a cigarette on the couch, or a dilapidated heater or faulty wiring may have been the actual cause of ignition. Somehow, some material that would burn came in contact with spark or flame. When, how and where such fires start are shown in Figures 4, 5 and 6.

Within a minute after a fire starts, the temperature in some parts of the room can reach 1000° F. Within two to four minutes after ignition, most of the combustible furnishings and finish materials are burning, and some of the structural components are also ablaze. Swirling clouds of thick acrid smoke, laden with poisonous gases, accompany the roaring flames and fierce heat. (Even pure air is deadly when heated to 300° F or more.) No one could live in that room without special protective equipment. Even fire fighters, with their protective equipment of masks, helmets, and special clothing, could only stay in such a room a short time — and then only by keeping near the floor, where the temperature is lower.

In other rooms, untouched as yet by fire, temperatures have reached 300° F or more, and the toxic, choking smoke and gases are everywhere. Even in rooms some distance away from the start of the fire, the heat and smoke are intolerable. (See Table 1.) People are killed or seriously injured by even brief exposure to such conditions.

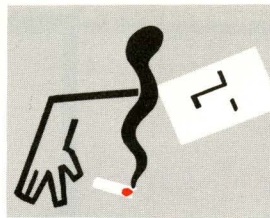
The time span of two to four minutes from first flame to deadly conditions throughout the home or apartment is not unusual. Some fires burn faster, almost incredibly fast; others may smolder for hours, and then go out, as did the one in Sarasota on this page. But the results are the same. Before the occupants are aware there is a fire, they die.

Willoughby, Ohio

(See photo on cover)

A family of six lived in a ten-room frame house. They had entertained a few friends and neighbors until about 2:30 a.m. Shortly after 4 a.m. the father awoke and detected a peculiar odor in his bedroom. He investigated and found smoke on the first floor. Without stopping to arouse his wife and children, he went down to the basement to get a garden hose. When he returned to the first floor, the fire had spread so rapidly and become so intense, he could neither fight it nor get through it to rouse his family. He ran to a neighbor's house to call the fire department.

Fire fighters arrived quickly from a station less than a mile away, but the mother and four children had already succumbed. Hot gases which had traveled up the stairs and into their bedroom had killed them. There was no fire damage in the rooms where the victims died.



Smoking and Fires

Smoking materials — cigarettes, cigars, pipes and tobacco ash — are the most common causes of fatal residential fires. Usually the fire starts in bedding or upholstered furniture. Occasionally it's clothing, papers, or trash that becomes ignited first, but the results are quite the same.

These fires could have been prevented, and lives saved, by following these simple precautions:

1. Don't smoke when you are very tired or have been taking medicines or alcohol, or lying down.
2. Check the chairs and couch for still-burning cigarettes before going to bed. Wait until the morning to empty ashtrays, so any still-glowing embers won't ignite paper or trash.

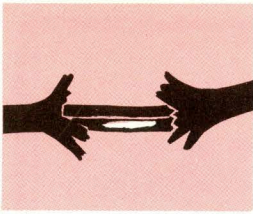
Sarasota, Florida

The maid arrived about 8:30 a.m. at the home of her employer. Since no one appeared to be up, she let herself in with her own key. When she opened the door, black smoke rolled out. The smoke was so thick she could not get in, so she ran to a neighbor.

The neighbor called the fire department. Fire fighters arrived to find the fire had virtually burned itself out by consuming all the oxygen in the tightly closed house. The occupants, an elderly couple, were both dead. Investigators determined that the woman had been smoking in bed sometime during the previous evening, and the bed had ignited. (The clock was stopped at 11:05 p.m.) Smoke and deadly gases asphyxiated her, and also her husband. The fire in the bed had already burned itself out by the time the fire was discovered. Investigators noted there were thick smoke stains on the walls down to within two feet of the floor all over the house, indicating unusually heavy smoke conditions.

McLean (Fairfax County), Virginia

About 7 p.m., a man arrived home from work to find his house afire. After a short, unsuccessful search for his wife, he called the fire department. Fire fighters controlled the fire quickly. The man's wife was found dead on the living room floor. She had been sitting in a chair, smoking a cigarette. The chair ignited, and so did the victim's nightgown. The fire spread to the carpet and floor. Eventually, part of the floor burned away, and the chair fell into the basement. Fire officials estimated the fire had been burning for two hours or more before being discovered.



Heating, Wiring, and Fires

Heating and wiring in homes tend to be forgotten or ignored. First, they are out of sight — hidden in the walls, or down in the basement. Secondly, they are unusually durable for consumer-oriented products. Furnaces frequently last thirty years or more, and electric wiring may go even longer without trouble. But both systems control a vast amount of energy. Should that control be lost, a major fire can result. Worse yet, the fire will spread unseen in walls and floors, through heating ducts, wire channels, and pipe chases. It may have involved a substantial portion of the building before being discovered, as did the examples which follow.

Heating and wiring should be checked by competent technicians at regular intervals. If any problems arise, the electricity or fuel should be shut off at once. None of these utilities should be used for anything except the purpose for which they were intended. Misuse of them, such as using a heating stove to dry clothes, can lead to serious fires.

The first signs of electrical problems could be fuses blowing, circuit breakers tripping, flickering lights, arcs at switches, or shocks when touching appliances. The first signs of heater or stove problems might be excessive or inadequate heat, or failure of a thermostat to control the unit.



Photo: Daniel Orfont, Newburyport, Mass.

This fire started in the wiring of a house. The fire spread into the second floor and attic. It also broke through paneling along the stairs.

Amboy, Illinois

A woman and her six children lived in a small 1½-story frame dwelling. Shortly after 2 a.m., one morning, when all the family was asleep, a faulty oil heater ignited wooden flooring. The fire spread to engulf the whole house. Apparently it had been burning for about a half hour before being discovered by a neighbor.

Two sons and a daughter died in the fire. They were asphyxiated in their beds. The mother and the other children were treated for burns and smoke inhalation. The house and its contents were totally destroyed, and the survivors driven out into - 22° F temperatures.

The fire department had adequate manpower and an ample water supply. But the fire had gained such headway before they arrived they could not rescue the victims nor save any part of the house or its furnishings.

Countryside, Illinois

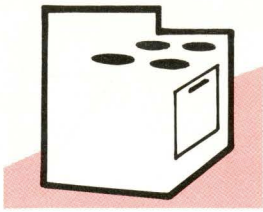
All the family was asleep in this mobile home when the oil furnace overheated and ignited plywood paneling. In less than five minutes, the fire had cut off all escape from the back bedroom where a young lady was trapped and burned to death. Her father tried repeatedly to pass through the flames to rescue her but was not successful. His wife ran to summon help. When she returned to the mobile home, she had to drag her husband out and beat out the flames in his clothes. He died about 15 days later from the severe burns he received.

The fire department controlled and extinguished the fire with one 1½-inch line and two booster lines. The mobile home was a total loss.

Hallstead, Pennsylvania

A father and mother and their nine children lived in a small frame house. The house was heated by a wood stove. Clothes, hung over the stove to dry, ignited from the stove. About 4 a.m., the father woke up and discovered the house was on fire. He roused the family and got all but two of the children outside. He, his wife, and one older son went back inside the burning house to rescue the missing two. Instead of rescuing them, all five perished. Meanwhile, the daughter ran half a mile in her bare feet to telephone the fire department.

The fire spread until the house was reduced to a pile of debris. The five victims died of asphyxiation, according to the coroner. They were also burned beyond recognition.



Cooking and Fires

A cookstove is necessary for healthy and appetizing meals, but never forget it controls a lot of energy. If that energy is misused or gets out of control, it can heat any nearby combustible materials to their kindling point, and they will burn.

A cookstove should not be used for drying clothes. Combustible materials such as clothes, paper, and wood should be far enough away from the stove that they do not become uncomfortably hot to the touch when the stove is in use. The stove should be checked regularly — at least once a year — by someone who knows stoves, to ensure it is in safe and proper operating condition. If some member of the family notices something wrong with the stove between inspections, he or she should make sure the stove is not used until it is fixed.

Blythe, California

(See Figure 1)

A man lived with his wife and seven children in a one-story six room house. One night, while all the family plus a guest were asleep, a malfunctioning electric range ignited the wooden flooring. The guest woke up about 2:30 a.m. and found smoke throughout the house. She aroused the parents and started rousing the children. Meanwhile, the father ran approximately a quarter of a mile to a phone to get help. The guest, the mother, and two daughters escaped. When the father returned, it was impossible to rescue any others.

Five children were asphyxiated in the fire; girls ages 13, 7, 5, and 3, and a 9-year-old boy. Sheriff's deputies said it appeared the victims had been lying in bed, and had not made any attempt to escape. They were buried, as they had died, together. Fire fighters found the building enveloped in flames, and the roof caving in when they arrived. The house and its contents were totally destroyed. The parents and the two surviving daughters were unable to salvage any belongings from the fire. The picture shows the extent of the destruction.

Flint, Michigan

A large family lived in a house. Someone had hung clothing over the stove to dry before he went to bed. About 6 a.m., when all the family was asleep, the clothing ignited and the fire spread throughout the house.

Two of the children, an 18-year-old girl, and a 12-year-old boy, escaped by jumping from a second floor window into the 14° F cold. They were hospitalized for treatment of burns and other injuries they received while escaping.

Meanwhile, a passing police patrol had discovered the fire and summoned fire fighters. The fire department responded immediately, but when it arrived, it was



Dick Draper photo, Blythe, California

Figure 1. Fire raged through this rural Blythe, California dwelling, leaving nothing standing but the walls. Here, a sheriff's deputy inspects the fire ruins.

not possible to rescue any others. The mother, six children ranging from 18 years to one month of age, and two visitors were killed by the fire. The bodies of five of the victims were found near the window from which the two survivors escaped. Apparently, they had hoped to escape the same way. The other four had not left their bedrooms, and probably were not aware of the fire when they succumbed.



Children and Fires

Approximately 5 percent of the fatal residential fires involve children playing with fire, children left unattended, or both. Young children cannot be expected to foresee the results of what they do. They must be watched constantly. Hazardous objects which might appeal to their curiosity, such as matches and cigarette lighters, should be kept out of their reach and sight.

They are also likely to panic in case of a fire, and may not think to use available exits. They may even seek refuge under a bed, or in the bathroom, or their parent's room. They do not realize that the home, which has always sheltered them before, is a poor shelter from fire. Even in a fire that they do not start, they will need help to escape, as the following examples show.



Tewksbury Fire Department, Tewksbury, Mass.

Figure 2. Fire billows from the windows of this house as a fire fighter prepares to put the first hose line in operation. Four children were left alone here. One of them started a fire which killed the other three.

Tewksbury, Massachusetts

(See Figure 2)

Four children and their mother lived in a 1½-story frame dwelling. It was just two days before Christmas, and they must have been eager with anticipation of the holidays. The mother had gone out. The oldest, a 12-year-old boy, was trying to light a Christmas candle when he dropped either the candle or the match on the couch in the living room. He tried to beat out the fire, while calling to his brothers and sisters to run out of the house. Perhaps they were afraid of the smoke and fire, because they would not leave.

The 12-year-old, realizing he could not put out the fire, ran to the neighbors for help. While one neighbor called the fire department, two others tried to get the children out of the house, but could not. When fire fighters arrived, flames were coming out of several windows. (See photo.) The fire was quickly controlled, but three children — a 10-year-old boy, his 7-year-old sister, and his 5-year-old brother — did not live to enjoy Christmas.

Washington, D.C.

Three little boys — two 4-year-old twins and their 2-year-old brother — were left alone while their mother and grandmother went shopping. Shortly after, a passerby noticed smoke coming from a second floor window of their two-story home, and called the fire department. The fire department controlled the fire quickly with two small hand lines, but not quickly enough to save the boys. They had been playing with matches, and had ignited their bedding. All three died from massive burns.

Dollar loss to the house and contents was only \$700.

Close That Bedroom Door!

Just a simple thing like closing the bedroom doors will help keep a family alive until help can arrive — or until they can rouse themselves and make their escape. An ordinary solid-core wooden door, if closed, can give you three times as much time to get out than if open. A summary of such times is shown in Table 1.

Open bedroom doors figure significantly in several of the previous cases. The fire which follows provides a clear example of what a closed bedroom door can do to save lives.



Chicago Fire Department, Chicago, Illinois

Figure 3. This picture shows how an ordinary door can hold out heat. The interior of the room was not damaged, but the hallway and exterior of the door were heavily damaged. Note that papers on the dresser (left) and the bed clothes (lower right) show no sign of fire or smoke damage.

Moncton, New Brunswick, Canada

A man, his wife, and ten children lived in a five-room apartment. Two bedrooms opened off the kitchen. The door to one of them had been removed sometime before. The interior finish was unusually combustible, consisting of laminated paperboard and wood sheathing.

One morning, the parents started about 2:30 a.m., for a relative's funeral in another city. The children were asleep, except one son who was already at work. About 3 a.m., a fast-spreading fire swept through the apartment. The oldest son, helped by neighbors, rescued the three younger boys while a neighbor called the fire department. Fire fighters arrived quickly from a station less than a mile away, but all the occupants who survived escaped or were rescued before the fire department arrived. The fire officer who investigated the fire felt the victims were dead before the survivors were aware there was a fire.

Five children did not escape, but died in the fire. All the victims were in the bedroom without a door, and all the survivors were in the bedroom with the door closed. The bedrooms were adjacent, so they would have been exposed to fire of the same intensity and for the same length of time. The only significant difference between the two rooms was that the door to the survivors' room was closed, and the victims had no such protection.

Fire Detectors in the Home

Fatal fires usually occur when the family is asleep. (See Figure 4.) While sleeping, people are less likely to notice the smells and sounds of a fire. The fire can, and frequently does, grow rapidly. Bedrooms some distance away from the fire can become death traps in two minutes or less. Two minutes is just about the length of time you would need to rouse your children and get them out of the house. (See Table 1.)

A fire detection system of an approved type, properly installed and maintained, will ensure that occupants get the full time available. These devices detect a fire in its early stages and sound an alarm which can waken even a heavy sleeper. Recommendations for home fire alarm systems are contained in NFPA No. 74, Standard for Household Fire Warning Equipment, available for \$1.00 from the Publications Department, NFPA, 60 Batterymarch Street, Boston, MA 02110.

The incidents in Amboy, Illinois (page 3), Blythe, California (page 4), and McLean, Virginia (page 2), are examples of what can happen when a fire is not detected until it has been burning for some time. The following example shows what a detection and alarm system can do.

Alexandria, Virginia

Late one night, when the family was asleep, a short circuit ignited bedding in an unused bedroom. About eight months earlier the owner had installed a home fire detection and alarm system. The system met all the applicable NFPA standards. The system detected the fire and sounded an alarm, rousing the occupants. Neighbors also heard the alarm and called the fire department. The owner, his wife, their daughter, and a pet chihuahua — all the occupants of the house — escaped without injury before fire fighters arrived. The fire was extinguished with little damage. This happy result was undoubtedly the result of rapid detection and immediate calling of the fire department. This fire could have been another tragic fatal fire had it not been for the detection and alarm system.

When Fatal Residential Fires Start

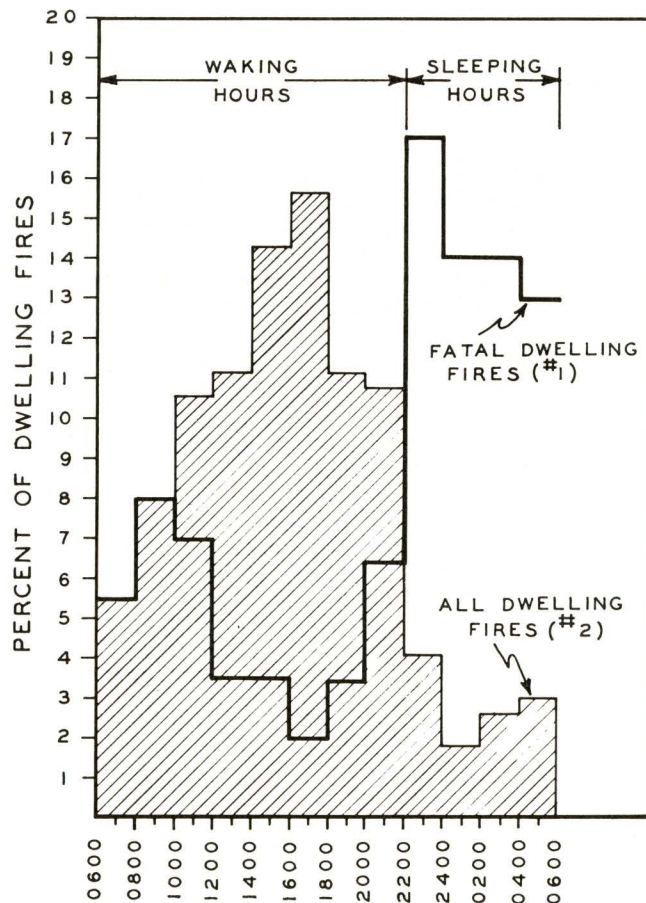


FIGURE 4

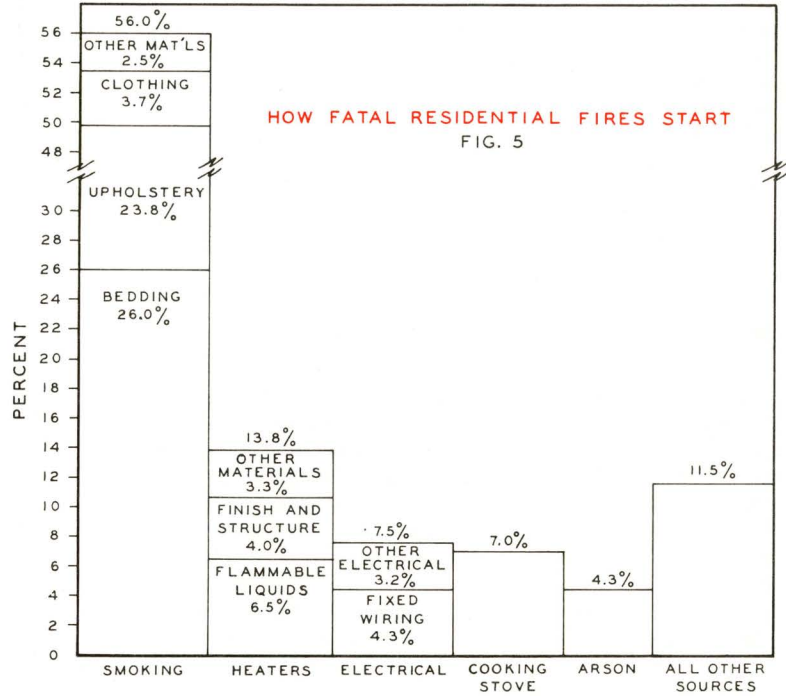
1. See Multiple-Death Fires, 1971, *Fire Journal*, May 1972.

TABLE 1

Time Available to Escape Fire

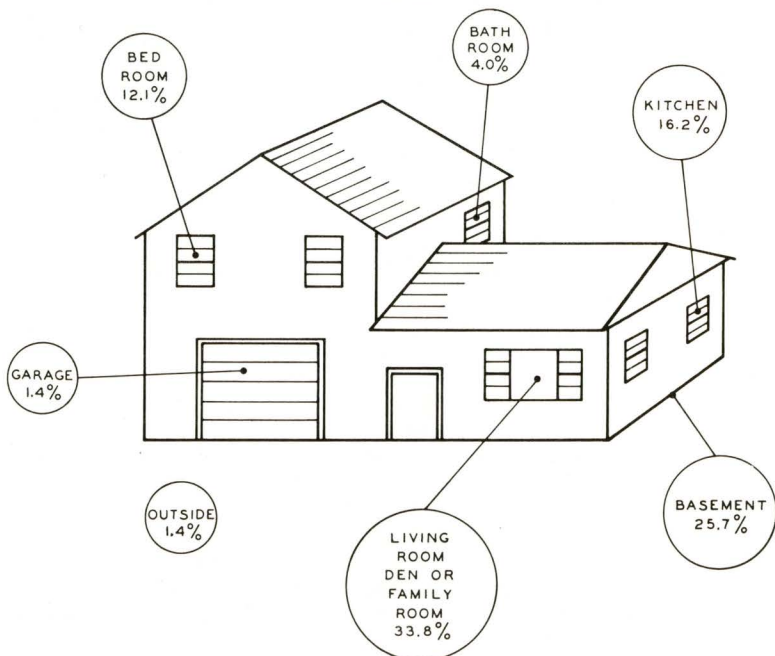
Interior Finish	Bedroom Door	Time (Minutes)
Combustible	Open	1.8
	Closed	5.6
Noncombustible	Open	2.5
	Closed	11.7

Time was taken from ignition of fire in living room until intolerable conditions are produced in bedrooms. (See NFPA Fire Quarterly, April 1960, p. 308)



WHERE FATAL RESIDENTIAL FIRES START

FIG. 6



How to Make Your Home Safer

Before a fire starts —

- Close the doors to all bedrooms when you go to bed at night.
- Have an escape plan, which gives everyone two ways out of the house, a normal exit, and an alternate one.
- Set up a place to meet after your family escapes from the house. The front yard might be a good place.
- Try your escape plan with the whole family — and try it again and again until it works well, and keep practicing it frequently.
- Inspect appliances, stoves, and heaters for wear and unsafe or erratic operation. If you find any defects, shut the unit off.
- Get an approved home fire detection and alarm system. It will stand watch while you sleep, the time when most fatal residential fires occur.
- Don't leave young children alone.
- Don't smoke when lying down, or when your judgment is impaired by fatigue, medicine, or alcohol.

After a fire starts —

- Rouse all occupants immediately.
- Get out of the building immediately, using your escape plan.
- Get the whole family together and keep them together — don't let anyone go back in the building, even to attempt a rescue.
- Call the fire department. If you call by telephone, stay on the line until you're sure the dispatcher has the location of your house. If you use a fire alarm box, stay at the box so you can show the fire department where the fire is when they arrive.



NATIONAL FIRE PROTECTION ASSOCIATION

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