

# Fire Prevention for High-Risk Populations: Age and Disability Factors

FPHRP:ADF-Student Manual

*1st Edition, 1st Printing-July 2003*



**Homeland  
Security**

DHS/USFA/NFA  
FPHRP:ADF-SM  
July 2003  
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***Fire Prevention for High-Risk Populations:  
Age and Disability Factors***



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# Fire Prevention for High-Risk Populations: Age and Disability Factors

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**Homeland  
Security**



**U.S. DEPARTMENT OF HOMELAND SECURITY**

**PREPAREDNESS DIRECTORATE**

**UNITED STATES FIRE ADMINISTRATION**

**NATIONAL FIRE ACADEMY**

**FOREWORD**

The U.S. Fire Administration (USFA), an important component of the Department of Homeland Security (DHS) Preparedness Directorate, serves the leadership of this Nation as the DHS's fire protection and emergency response expert. The USFA is located at the National Emergency Training Center (NETC) in Emmitsburg, Maryland, and includes the National Fire Academy (NFA), National Fire Data Center (NFDC), National Fire Programs (NFP), and the National Preparedness Network (PREPnet). The USFA also provides oversight and management of the Noble Training Center in Anniston, Alabama. The mission of the USFA is to save lives and reduce economic losses due to fire and related emergencies through training, research, data collection and analysis, public education, and coordination with other Federal agencies and fire protection and emergency service personnel.

The USFA's National Fire Academy offers a diverse course delivery system, combining resident courses, off-campus deliveries in cooperation with State training organizations, weekend instruction, and online courses. The USFA maintains a blended learning approach to its course selections and course development. Resident courses are delivered at both the Emmitsburg campus and its Noble facility. Off-campus courses are delivered in cooperation with State and local fire training organizations to ensure this Nation's firefighters are prepared for the hazards they face.



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# **UNIT 1: FIRE RISK FOR VERY YOUNG CHILDREN (AGES 5 AND UNDER)**

## **TERMINAL OBJECTIVES**

*The students will be able to:*

1. *Explain the risk-reduction process.*
2. *Identify and develop strategies to address fire and life safety risks among very young children (ages 5 and under).*

## **ENABLING OBJECTIVES**

*The students will:*

1. *Identify unique characteristics of preschool age children that influence how life safety programs are developed and delivered.*
  2. *Present ten characteristics of the preschool age group that contribute to their vulnerability in fire situations.*
  3. *Identify appropriate fire safety messages and successful methods of delivery to achieve program goals.*
  4. *List at least ten individuals, agencies, and organizations that can support and/or fund local efforts to address fire risk among very young children.*
  5. *Through scenario analysis, develop a plan to address a fire problem that is affecting a population of young children.*
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## **FIRE PREVENTION FOR HIGH-RISK POPULATIONS: AGE AND DISABILITY FACTORS**

### **Focus of the Course**

The course *Fire Prevention for High-Risk Populations: Age and Disability Factors* seeks to identify and understand high-risk fire populations. Unit 1 addresses "Fire Risk for Very Young Children (Ages 5 and Under)" and Unit 2 addresses "Fire Risk for Older and Disabled Populations." The course examines obstacles that face both the emergency services and society when addressing risk among these special groups.

The course content is organized into four components for each high-risk group.

- **Characteristics of the Population.**
- **Risk Factors.**
- **Successful Programs.**
- **Strategies for Reducing Risk.**

## **FIRE RISK FOR VERY YOUNG CHILDREN (AGES 5 AND UNDER)**

### **Terminal Objectives**

The students will be able to:

1. Explain the risk-reduction process.
2. Identify and develop strategies to address fire and life safety risks among very young children (ages 5 and under).

### **Enabling Objectives**

The students will:

1. Identify unique characteristics of preschool age children that influence how life safety programs are developed and delivered.
2. Present ten characteristics of the preschool age group that contribute to their vulnerability in fire situations.

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**FIRE RISK FOR VERY YOUNG CHILDREN (AGES 5 AND UNDER)**

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3. Identify appropriate fire safety messages and successful methods of delivery to achieve program goals.
4. List at least ten individuals, agencies, and organizations that can support and/or fund local efforts to address fire risk among very young children.
5. Through scenario analysis, develop a plan to address a fire problem affecting a population of young children.

## Activity 1.1

### Student Introductions

#### Purpose

1. To introduce you to other students in the class.
2. To provide an opportunity for you to focus on how communities may be changing and presenting various challenges to service professionals.

#### Directions

1. Select a partner who is seated at your table.
2. Interview your partner and be prepared to report on the following information:
  - a. Partner's name, place of residence, name and type of organization represented, size of community being protected.
  - b. Position in organization; length of time in fire/emergency services.
  - c. Identify how their community (area of service) has changed over the past 10 years (population, geography, economically, social/cultural, recreation, sports, business, tourist, etc.)
  - d. Identify why your partner is attending this course and what he/she wishes to obtain from the experience.
3. You will have 10 minutes to complete the interview and recording section. Each person then will have 2 minutes to introduce his/her partner to the class and overview the partner's community.

*(An example of a student introduction follows.)*

Example of a student introduction:

- I would like to introduce Maynard Delray. Maynard hails from Anywhere, USA, and is an active member of the Acme Fire Department. Anywhere has a population of 8,000 citizens, and the Acme Fire Department responds to about 700 calls each year. Maynard is a firefighter with the organization and has an interest in community risk reduction.
- The population of Anywhere is growing at a fast pace thanks to many new industries locating in the community. Many families with young children are relocating to Anywhere. In addition, the established population of Anywhere is aging. Many folks have lived in the community over 60 years.
- Maynard is attending the class to learn how risk-reduction efforts can be enhanced in Anywhere, USA.

## DESIGNING A SUCCESSFUL RISK-REDUCTION PROCESS

An important skill as a community educator is the ability to assess and address risk effectively. Community risk reduction is a **process** that requires understanding and effort. Carefully designed strategies and tactics are essential to the effective reduction of risk. Identifying the root causes of fire and injury problems is an essential first step in the process of addressing risk. Once the root causes have been exposed, the next step is to identify who can benefit and who can help with the risk-reduction process.

## PROCESS OF EFFECTIVE, SUCCESSFUL COMMUNITY RISK REDUCTION

The factual review of America's fire problem clearly identifies the rationale for enhanced community risk-reduction efforts. Following an organized **process** when addressing community risk is essential to a successful outcome.

**Important point**--Failure to follow an organized risk-reduction process often results in a failed effort!

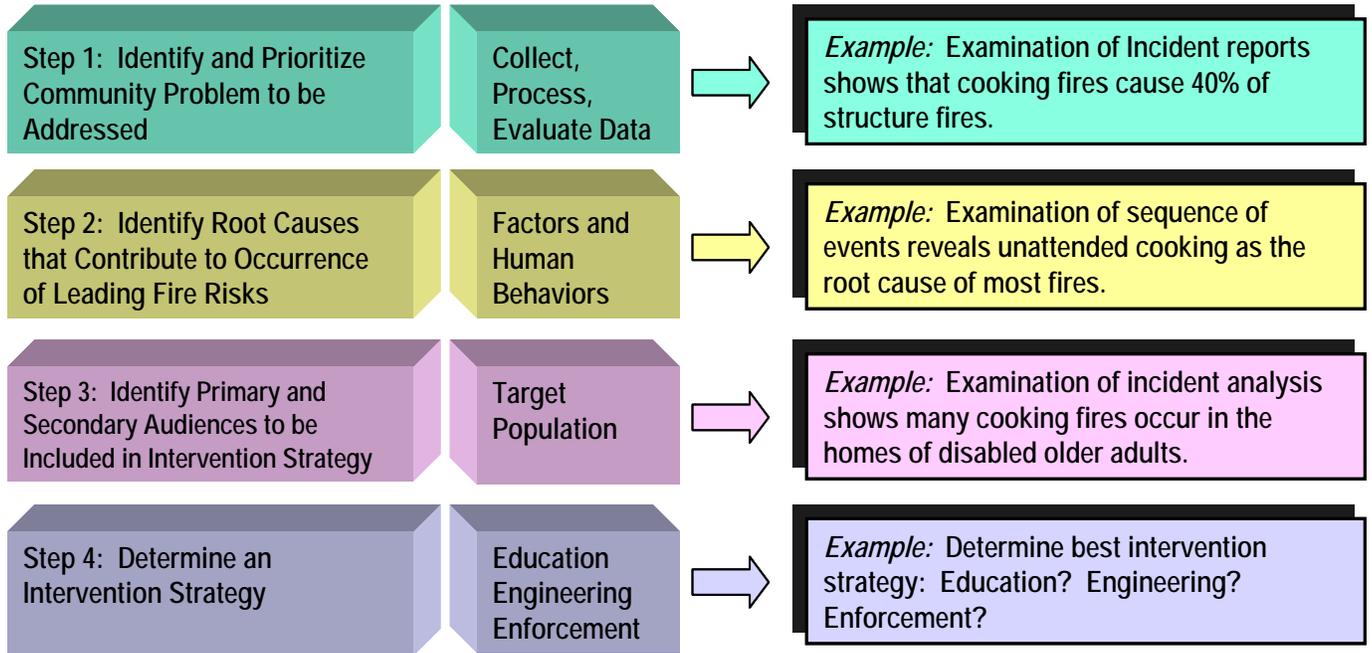
### Requirements for Successful Community Risk Reduction

- **Individual commitment:** At the center of every successful risk-reduction process, a catalyst will be found.
- **Organizational support:** Community education is an institutionalized value within organizations leading a successful risk-reduction process.

Institutionalized value means that the organization's leadership supports and dedicates resources to community education. Members of the organization support community education by willingly assisting with prevention efforts.

- **Community support:** Effective risk reduction requires active support from the community.

### The Community Risk-Reduction Process



## The Community Risk-Reduction Process

- **Step 1: Identify and prioritize the community problem to be addressed:** The comprehensive collection, processing, and **objective** evaluation of community-based data is an essential component of the risk-reduction process.

**Example:** A fire department examines 5 years of incident reports from **the department** and discovers that cooking fires cause 40 percent of structure fires in the community.

**Important point:** National statistics provide an overview of the **nationwide** fire problem. The review of local statistics will reveal the leading type of fires that occur in the **local** community.

- **Step 2: Identify root causes that contribute to the occurrence of leading fire risks:** Fires and injuries are understandable, predictable, and most often preventable. It is important to examine the factors and human behaviors that cause the fire to occur.

Examining the sequence of events that leads to the occurrence of a typical event can reveal root causes. Asking questions like, "But why is the incident occurring?" is another way to determine the underlying reasons that affect vulnerability to fire and injury.

**Example:** The fire department looks at the sequence of events that led to the occurrence of most cooking fires and asks, "Why are the incidents occurring?"

Investigation reveals unattended cooking as the root cause of most fires.

- **Step 3: Identify the primary and secondary audiences to be included in an intervention strategy:** When addressing community risk, it is critical to identify the target population responsible for creating the incident.

It is equally important to determine if those at risk are an established fire-risk population.

**Example:** Through incident analysis, the fire department discovers that many cooking fires occur in the homes of disabled older adults.

In addition, it also is important to identify audiences who may be able to help reduce the risk among the primary target audience.

**Example:** Thorough examination of community demographics reveals that most disabled older adults live in city-owned housing properties. Family members of the older adults, housing staff, and other community service providers may be able to help with the risk-reduction effort.

Conducting market research on proposed target populations can provide valuable information on how specific groups of people may best receive prevention information. A person or group with expertise in market research is a valuable resource to community educators.

- **Step 4: Determine an intervention strategy:** While a challenging process, the combined use of education, engineering, and enforcement initiatives is the most effective way to mitigate community risk. The intervention strategy must include the acquisition and careful use of community resources.

**Education interventions** are designed to raise awareness, provide information and knowledge, and ultimately produce the desired behavior. It is important to note that education is the root of the entire prevention intervention system. People must be aware of a problem and understand how their actions can bring about a solution. This includes populations who design engineering interventions or make public policy changes.

**Engineering interventions** are designed to change vehicles, products, materials, and processes to make them less hazardous, or to alter the environment to make it safer.

Examples related to fire safety include the various types of smoke alarms, flame-resistive furniture, self-extinguishing cigarettes, sprinkler systems, and "smart stoves."

**Enforcement interventions** refer to all the ways in which people are required to act to reduce fires and injuries.

Examples related to fire safety include laws and building codes that require the installation of smoke detection and sprinkler systems.

Appendix A provides an example of the process of community risk reduction.

## FACTORS THAT INFLUENCE RISK IN VERY YOUNG CHILDREN

The following information is important for community educators to consider prior to developing fire and life safety programs to address risk among young children:

According to the U.S. Bureau of the Census, *Population Estimates and Projections*:

- 69.5 million children reside in the United States (26 percent of the total U.S. population).
- 23 million are age 5 or under.
- The overall number of children under 18 is projected to grow to 77.6 million by the year 2020.

Together, older Americans and children make up the "dependent population." Children make up 67 percent of this dependent population. This number is projected to decrease as the number of older adults increases.

Racial and ethnic composition:

- 66 percent Caucasian , non-Hispanic;
- 15 percent African-American, non-Hispanic;
- 15 percent Hispanic;
- 4 percent Asian and Pacific Islander; and
- 1 percent Native American or Alaska Native.

The number of Hispanic children has increased faster than any other racial or ethnic group tracked. It is projected that, by 2020, more than 1 in 5 children in the United States will be of Hispanic origin. In 1997, nearly half of the Hispanic children had mothers who were born in the United States.

Asian and Pacific Islander children doubled in number (from 2 to 4 percent from 1980 to 1997). There is a projected increase to 6 percent by 2020. Both immigration and fertility are identified as contributors to this growth projection among these populations.

### Language

Children who have difficulty speaking English and speak languages other than English at home often have difficulty progressing in school. Later in

life, similar challenges face them in the labor market. In 1995, 5 percent of all school-age children (2.4 million) had such difficulty.

Due to the regional variation in concentration of immigrants and their descendants, a greater percentage of children who speak another language at home are found in the West (26 percent), versus the Midwest (6 percent). This includes children with or without difficulty speaking English. The majority of children found to have difficulty speaking English come from Hispanic (31 percent), Asian, or other (14 percent) origin since they are more likely to speak another language at home. This was compared to 1 percent of Caucasian or African-American non-Hispanic children.

### **Family Structure**

The amount and quality of resources (human and economic) available to a child often are related to the number of parents (caregivers) living with the child. Children growing up in a household with one parent are more likely to be living in poverty as compared to those growing up in a household with two parents (caregivers). It is estimated that, in the year 2000, 14 million children live below the poverty line in the United States (Source: Feed the Children Program, Oklahoma City, OK).

- In 1980, 77 percent of children in the United States lived with both parents; in 1997 this number decreased to 68 percent. This decline exists in all racial and ethnic groups.
- 24 percent of children in 1997 lived with their mothers only.
- 4 percent lived with their fathers only.
- 4 percent lived with neither of their parents.
- 75 percent of Caucasian children, 35 percent of African-American children, and 64 percent Hispanic children lived with two parents.

Among the factors leading to an increase in children living with one parent is the rise in the percentage of births to unmarried mothers. Children of unmarried mothers are at higher risk for low birth weight and infant mortality. They also are more likely to live in poverty than children living with married mothers. (Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System.)

Insufficient data exist regarding:

- specifics about children's living arrangements (biological parents, step-parents, adoptive parents, etc.);
- children's relationship and interactions with nonresident parents, especially fathers;
- child care for all ages and types of care, regardless of parents' working status (future reports to be available through the Survey of Income and Program Participation); and
- use of time (current studies being developed by member agencies of the Federal Interagency Forum on Child and Family Statistics).

Additional and updated information is available at the following Web address: <http://childstats.gov/index.asp>.

**Reflection Questions**

1. How does this section's information apply to your community?

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2. What significant demographics related to children exist in your community?

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3. What information presented in a demographic review can assist in developing messages, materials, and delivery of fire and life safety information?

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## GROWTH AND DEVELOPMENT INFORMATION

Understanding the developmental milestones of the very young child is critical when developing and conveying safety information to this population. Being aware of this process of motor skill growth and intellectual capability will assist the educator in designing applications for fire and life-safety education to young children.

Simply stated, **growth and development characteristics tell us "what's possible" for very young children to process cognitively.** This information should guide the messages being delivered and the method of teaching life-saving behaviors to very young children.

**Understanding when and how to present life safety education to young children will help ensure learning takes place.** This is especially important when dealing with preschool children who perceive the world very differently from older children.

Appendix B, "Stages of Human Growth and Development," provides additional information on this topic.



## Activity 1.2

### Identifying and Understanding Unique Characteristics of Very Young Children

#### Purpose

To identify and list the growth and development characteristics of very young children that should be considered when planning and delivering life safety education.

#### Directions

1. You will work in your table groups.
2. Your group will identify and list on an easel pad those characteristics that would influence fire safety program design and delivery for very young children.
3. With everyone in the small groups participating, the group will select and present at least two of the unique characteristics of the preschool child.
4. As each group presents, a class volunteer will record the characteristics discussed on a **master** easel pad sheet.
5. At the conclusion of all presentations, a spokesperson from each group will add any remaining issues or characteristics not already presented.
6. Each group will have 30 minutes to work on its list and prepare presentations, and 30 minutes for group presentation, feedback, and discussion.

At the end of the activity, the class will have compiled a working list of the unique characteristics of a very young child that make delivering safety messages a real challenge!



## MYTHS ABOUT CHILDREN, FIRE, AND FIRESETTING

From personal experience, and from what they read in the newspaper, see on television, in the movies, and hear on the radio, parents, caregivers, and professionals have some very interesting ideas about children and fire.

A lack of education and insight as to why children start fires can result in myths about firesetting.

Some common **myths**:

- "All children start a fire at some point in their lives."
- "It's just a phase--they'll grow out of it."
- "Show them burned bodies--that will make them stop."
- "Burn a child's fingers--show them what fire does."

The need is to educate parents, caregivers, and professionals with factual information about fire and children as a part of an overall plan to address fire safety with very young children.

## CONTRIBUTING FACTORS RELATED TO THE FIRE PROBLEM AND VERY YOUNG CHILDREN

This section provides an introduction to childhood curiosity as it relates to fire and the role this plays in the high fire death and injury picture for this vulnerable age group. Other areas discussed will include how children typically perceive fire and its use, and how they learn to respect its power.

Since much of the responsibility for providing safety and supervision of very young children rests with their parents and caregivers, it is important to review and discuss the myths that adults have about children and fire, and facts that would bring about a clearer understanding of prevention and safety behaviors.

As you review the information provided in this section, consider the question: **What do we know about young children and fire?**

The combination of childhood **curiosity**, the **availability of fire tools**, and children left **unattended** or **unsupervised** are major factors leading to the high incidence of unintentional fires set by children.

**Unattended** means left completely alone with no adult or babysitter; **unsupervised** means left in the care of an adult or babysitter who was not with them at the time of the fire.

Trends and studies conducted by the National Fire Protection Association's (NFPA) Research and Data Division and The Center for High Risk Outreach indicate that annually, **fires set by young children out of curiosity or experimentation account for over:**

- 99,000 fire incidents;
- 2,800 injuries;
- 350 deaths; and
- \$280 million in property loss.

Recognizing the power of fire and how to harness and control this element to best serve humanity has been a work in progress for humans since the beginning of time. Unlike other substances in our environment that enhance our daily living, the presence of fire creates a fine line between control, usefulness, and disaster. The properties of fire alone--bright, glowing, calming, colorful, dynamic, provides warmth, etc.,--are a natural magnet to the appetite for learning exhibited by very young children.

From their very first birthday, when taught to "blow out the candles" **children get the messages that indicate**

- Fire is to be "celebrated."
- Close proximity to a flame is OK.
- Fire can be controlled magically--I blew it out!

This initial contact with fire, reinforced by the smiles and applause from those around them, is an up close and personal experience with fire that is not easily forgotten.

Around the age of 2 or 3, children begin taking notice of fire in their environment and the use of fire tools (lighters, matches, etc.) by adults. Some children begin wondering how and when they can "make fire," like the grownups around them. Curiosity about fire often prompts children to be especially cognizant of where lighters and matches are stored.

The fact that one match or lighter in the hands of a young child can create a fire that quickly spreads to burn down an entire building, destroying lives and property, is a concept that is foreign to many parents and caregivers.

To a young child, the fact that an uncontrolled fire is "dangerous and deadly" may not make sense when their only frame of reference is seeing fire in its controlled, positive, and useful form.

Interest in fire, especially among very young children, is normal and natural. **Setting fire is not!** Access to fire tools and the lack of supervision are the two primary reasons why very young children set so many fires.

**Young curious firesetters may be boys or girls.** They account for approximately 60 percent of all fires set by children. The child does not intend to be destructive, or to do damage to life and property. Usually these are "one time only" firestarts, but they are not **accidents!**

A sequence of events and circumstances typically lead up to the fire. Factors contributing to the incident often include a poor understanding of fire behavior and unidentified hazards in the environment where the fire is set.

According to the NFPA, **preschool children are twice as likely to die in a fire than any other age group.** Fires are the leading cause of unintentional death in the home for preschool children under age five (Hall, J., "Children Playing With Fire, U.S. Experience," NFPA).

**Not all children who are injured or die in fires are firesetters!** Some are innocent victims, who don't know what to do when fire strikes, whose behaviors may be dictated by fear and the need to hide. About 300 children, ages five and under, die annually because they or another child started a fire with matches or lighters. Another 800 are injured (NFPA/NFIRS). The numbers are staggering!



### Activity 1.3

#### Factors Contributing to High Fire Risk Among Very Young Children

##### Purpose

To identify factors that contribute to a high fire risk among very young children.

##### Directions

1. You will work in your table groups.
2. Each group will identify factors and/or environmental circumstances that place very young children at highest risk for fire death and injury. Information should be drawn from text resources, personal, and professional experience.
  - a. **Remember**--Identifying the root causes that contribute to the occurrence of leading fire risks is a critical component of successful risk reduction.
  - b. **Important point**--Be sure to consider a broad spectrum of factors. Think about the physical, cognitive, behavioral, and environmental factors that may place very young children at high risk.
3. Your group will have 20 minutes to complete this task. Responses should be posted on an easel pad for review.
4. A spokesperson from each group will give the class a summary of its findings during the last 10 minutes of the activity.



## SUCCESSFUL PROGRAMS ADDRESSING VERY YOUNG CHILDREN

At one time, it was thought that preschool children were far too young to learn about fire and fire safety behaviors. Their safety was totally reliant on the care and attention provided for them by parents and caregivers. While the majority of the responsibility for their protection and safety still rests with parents and caregivers, landmark studies in 1980, done by Children's Television Workshop™ (CTW™) (the producers of Sesame Street™), identified how preschool children (ages 3 to 5) would interpret televised fire and burn safety messages. Their findings apply to nontelevised programs, as well as televised programs, and have guided fire and life safety program development throughout the years. This also resulted in the *Sesame Street™ Fire Safety Resource Book* prepared by Children's Television Workshop™ under a grant from the U.S. Fire Administration in 1982.

The following are highlights of the CTW™ study:

- **Showing a dangerous activity, even while warning against it, is not recommended for preschoolers.** Children may respond only to what they see, not what they hear. Preschoolers need positive modeling. An example of this would be to tell children not to touch matches and lighters, while showing them a child lighting matches in a closet. A child will remember, and perhaps imitate, the strong visual, while not remembering the message.
- **Three to five year olds have an extremely limited vocabulary.** This limits the number and complexity of fire and burn safety concepts that can be understood. Words like hot, fire, and meeting place can be understood, while scald, prevent, appliance, and boil are beyond their comprehension.

Avoid abbreviations such as SCBA for self-contained breathing apparatus. Also avoid acronyms, sarcasm, abstract examples, and adult humor with very young children. This age group has no frame of reference to assist them in understanding what it is you're trying to tell them!

- **Very young children have difficulty relating one event to another, or making complex decisions.** Preschool children must be taught to respond to single events with a single action that is most important. (Example--If the smoke alarm sounds, leave!) Intermediate steps, such as touching the door to test for heat, are not covered in detail for preschoolers.

- **Young children are unpredictable in how they view the world.** They may focus on one part of a story and completely miss the beginning or end. It is hard for them to link events. Linking the beginning and end of the simplest story can be challenging for this age group. They do not necessarily link a problem and its solution.

Additional research and testing was done by the National Fire Protection Association®--Center For High Risk Outreach in developing and producing their "Learn Not To Burn®--Preschool Program." The program consists of eight key fire safety behaviors that 3 to 5 year olds are capable of learning. The lessons are interactive and reinforced with original fire safety songs by folksinger and songwriter Jim Post. Each song covers one main behavior, simply and with repetition. A major emphasis is placed on telling parents what is being taught in the day care center or preschool classroom. Parents are also involved in reinforcing fire safety concepts at home and reminded of their responsibilities as applied to fire safety.

In their effort to provide additional materials directed at the very young child and his or her family, the NFPA--Center For High Risk Outreach developed and produced an 8-minute videotape, and presentation guide for parents and caregivers entitled "A Lighter Is Not A Toy." This tape emphasizes their responsibilities to place lighters and matches in out of reach, secure areas, to supervise young children at all times, and to have and practice a home escape plan.

During the development phase of a public service announcement (PSA) directed at 3, 4, 5, and 6 year olds, the NFPA Center For High Risk Outreach conducted some preliminary one-to-one surveys with the children. Messages in the PSA would be limited to: "If you find matches or lighters, don't touch! Tell an adult to put it up high, out of reach."

Results indicated that the 5- and 6-year-old children had little difficulty in recognizing the messages as they were designed and depicted. The 3 and 4 year olds, however, had difficulty recognizing the lighter, as well as repeating the messages as delivered. Three- and four-year-old children also had difficulty with the word "adult." "Grownup" was more familiar to them and better understood. As a result of this preliminary testing, the decision was made not to complete the production of the PSA, and to emphasize that using mass media to reach very young children may not be the preferred method of delivery.

## STRATEGIES TO ADDRESS FIRE RISK EFFECTIVELY AMONG VERY YOUNG CHILDREN

**Successful programs and program materials exist** to address various fire and nonfire issues with the high-risk population of very young children.

The most **successful programs use age-appropriate strategies and instructional methods** that appeal to the learning capabilities of very young children.

Fire safety **programs need to include take-home information so parents and caregivers are aware of the information presented to students.** Extension activities should be designed so parents and caregivers can reinforce the lessons learned by children.

Before using any prepackaged fire and life safety program, or in designing your own, ask yourself:

- Does this program reflect the learning capabilities of very young children?
- What methods are used that make components of the program age-appropriate?
- Are materials broad based and sensitive to avoid biases and stereotyping?
- Are the materials and concepts representative of your community and its children?
- Are there activities so parents and caregivers can extend the lessons within the home environment?
- Would you use these materials for your fire safety programs with an audience of very young children (or base the design of your program on the package you are reviewing if it addresses a non-fire issue)?



## Activity 1.4

### Addressing High Fire Risk Among Very Young Children

#### Purpose

To identify strategies with a proven history of reducing fire risk effectively among very young children.

#### Directions

##### Step 1

1. Please work **individually** and identify strategies with a proven history of reducing fire risk effectively among very young children. You are allotted 5 minutes for this task.
2. Include strategies from all three areas of prevention interventions (education, engineering, and enforcement).

##### Step 2

1. Each table group should create an easel pad sheet for each of the three levels of interventions (education, engineering, and enforcement).
2. Using a "pass the pencil" format, list your responses under the respective intervention title. You have 15 minutes for this task.
3. A "pass the pencil" activity allows table group members to take turns listing their responses on the easel pad. Rotation takes place among table group members until all responses have been listed.

##### Step 3

Each student group will provide a **2-minute** overview of its responses in each intervention category. Copy the class list under the "Notes" section of your SM.



## **SEEKING SUPPORT FOR LOCAL EFFORTS TO ADDRESS FIRE RISK AMONG VERY YOUNG CHILDREN**

Effective risk-reduction efforts require supporting resources.

Resources may include direct funding, in-kind, and people-related services. Prior to designing a risk-reduction effort, consider agencies and organizations that may be able to provide support services.



## Activity 1.5

### Seeking Support for Local Efforts to Address Fire Risk Among Very Young Children

#### Purpose

To identify agencies and organizations that could assist with fire risk-reduction efforts among very young children.

#### Directions

1. Your group has 5 minutes to brainstorm a list of agencies and organizations that have been, or may be, interested in providing support (funding, in-kind, people, etc.) and/or partnerships to local and State efforts to address fire risk among very young children.
2. Perform a "pass the pencil" activity with a representative from each table group taking turns submitting the group's responses to a **master** list on an easel pad.



## Activity 1.6

### Developing Strategies to Address Fire Risk Among Specific Populations

#### Purpose

To design a strategy that addresses a specific fire risk affecting a simulated community.

#### Directions

1. You will work in your table groups.
2. Read the scenario on the following page.
3. The following format should be used in preparing your plan:
  - a. Identify and prioritize the problem(s) to be addressed.
  - b. Identify the root causes that contribute to the occurrence of leading fire risk.
  - c. Outline the typical sequence of events that led to the occurrence of the problem.
  - d. Identify the primary and secondary target audiences to be included in an intervention strategy.
  - e. Create an intervention strategy that includes the following:
    - Explanation of how combined prevention interventions could be used to address the fire risk.
    - Identification of resources needed to facilitate the risk-reduction process.
    - Potential partners needed for the prevention process to be effective.
4. You also are encouraged to draw from personal knowledge and experience as you contribute to this activity.
5. You will have 60 minutes to prepare your plan. The final 30 minutes of this activity will be the feedback session from each group and general class discussion.
6. Use the Worksheet that follows the Scenario to record your plan.

## **Scenario**

This is a town of 5,000 citizens located in a rural portion of the southeastern United States. The community is very family-oriented, as several generations have been raised in and around the town. Many families with numerous children reside in modest single-family structures.

The majority of the working population is employed at a raw-materials mine that is located in the town. The company is a family-owned business, providing many services to its employees. Services include a quality health care plan, a monthly newsletter, and quarterly social events. The company also sponsors a child-care center that is used by many families who work at the mine.

The local fire department responds on approximately 250 annual calls for service. The department recently conducted an outcome evaluation that identified smoking-related incidents as the leading cause of structure fires in the community. Fire loss has been substantial, and in several cases deadly. During the past 5 years, seven young children (ages 3 to 5) have perished in four separate smoking-related fires.

Close examination of the fires reveal that 80 percent have involved citizens (ages 25 to 40) who emptied the smoldering remains from ashtrays into trash containers. Once ablaze, the trash containers ignited nearby combustible materials. All fires have occurred between 0400 and 0700 hours. Smoke alarm protection was either absent or disabled in all fatal fire incidents.

Study of the fatal fires reveal that in each case it appeared the children were moving about the burning home but failed to escape through available means of egress. All families who lost a child had at least one family member employed at the local mine.

**Worksheet**

1. Identify and prioritize the problem(s) to be addressed.

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2. Identify the root causes that contribute to the occurrence of the leading fire risk.

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3. Outline the typical sequence of events that led to the occurrence of the problem.

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4. Identify the primary and secondary audiences to be included in an intervention strategy.

**Primary Audience**

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**Secondary Audience**

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5. Create an intervention strategy that includes the following:
  - a. Explanation of how combined prevention interventions could be used to address the fire risk.
  - b. Identify resources needed to facilitate the risk reduction process.
  - c. Potential partners needed for the prevention process to be effective.

## SUMMARY

The frequency and numbers of very young children who lose their lives, or are injured by fire annually is staggering! Becoming aware of and understanding the growth and development characteristics of very young children will assist in planning and delivering effective fire and life safety programs.

Identifying what contributes to the very young child's vulnerability and high-risk position for fire death and injury, will provide direction to those planning intervention strategies.

Natural curiosity about fire, access to fire tools, lack of supervision, inability to escape dangerous fire situations due to fear, no fire safety information, and poor physical ability to withstand serious burn injury are some of the contributing factors leading to their high-risk status.

Focusing on both the high risk for fire factors, and connecting with "what's possible" for children ages 3 to 5, will assist in building a sensitivity to very young children and their living situations, allowing you to tailor fire safety program efforts and achieve success.

Many organizations and individuals are involved in issues relating to the welfare, education, and safety of very young children. Developing partnerships will support your program goals.



**APPENDIX A**

**SAMPLE COMPLETED RISK-  
REDUCTION PROCESS**



## Appendix A

### Sample Completed Risk-Reduction Process

#### Scenario

This is a town of 10,000 citizens located in the eastern United States. The community is home to a substantial number of older adults. Many of these older adults have some form of disability. Most of this population resides in city-owned housing complexes. Residents of the complexes receive many visits from family members, and the units boast strong tenant associations.

The city's fire department responds annually to approximately 950 calls for service. Examination of fire-response data has identified unattended cooking as the leading cause of fire and fire-related injury in the community. Forty percent of fires and 38 percent of fire injuries result from this problem.

Investigation of the cooking fire problem reveals that it occurs most often in the city-owned housing complexes. The majority of fires occur between 1500 and 2200 hours. Ninety percent of these fires have involved grease left unattended by an adult who has left the kitchen to watch television and forgot about the cooking process. Since the complexes are fully sprinkled, property damage has been moderate and no deaths have occurred.

Closer examination of the problem identifies that 80 percent of the city's fire-related injuries occur at the housing complexes. Most injuries involve adults who have been burned while making various incorrect attempts to extinguish stovetop fires. Nearly all of the injured adults have suffered from either visual or mobility impairment, sometimes both.

Determined to address the problem effectively, fire officials interviewed many of the citizens who had been injured by a stovetop fire at the housing complexes. In nearly all cases, the resident was alerted to the fire by a smoke alarm. Many reported a delay getting to the stove due to their mobility problem. Several also reported they had trouble seeing their stove's controls. They noted that perhaps they had inadvertently placed the stove on a high heat setting prior to their fire.

All of the interviewees were embarrassed about having a fire and getting hurt. Many said they fought the fire after they became frustrated at not being able to turn off the stove. It was interesting to note that two tenants, both hearing impaired, indicated they were confused by the bright flashing lights (strobe lights from the fire alarm system) that were blinking in their apartment during the fire. None of the citizens who were interviewed knew that unattended cooking was the leading cause of fire and fire-related injury in the city.

1. **Identify and prioritize the community problem to be addressed.**

Cooking Fires.

2. **Identify the root causes that contribute to the occurrence of leading fire risk.**

- Heat possibly turned to high setting.
- Person leaves the kitchen.
- Person inappropriately and incorrectly fights fire.

3. **Outline the typical sequence of events that led to the occurrence of the problem.**

- Person places oil in pan and turns on heat (perhaps on high setting).
- Person leaves kitchen to watch television.
- Hot oil ignites in pan.
- Smoke alarm alerts person to fire.
- Person is delayed returning to kitchen.
- Person inappropriately and incorrectly fights fire.
- Aggressive spread of fire and consequential actions.

4. **Identify the primary and secondary audiences to be included in an intervention strategy.**

**Primary audience**

Adult population residing at the city-owned housing complexes. A special focus also may be placed on those who suffer from a disability.

### **Secondary audience**

- Families, extended families, and friends of the population residing at the city-owned housing complexes.
- The tenant associations at the housing complexes.
- City housing authority that owns the structures and has daily interaction with their tenants.
- Community service providers who provide home visitation and interact with tenants on a daily basis. Special consideration may be given to groups that provide service to those with disabilities.
- Insurance companies interested in loss-prevention opportunities.
- Political audiences who could provide support for engineering and enforcement initiatives.

### **5. Create an intervention strategy that includes the following:**

- Explanation of how combined prevention interventions could be used to address the fire risk.
- Identification of resources needed to facilitate the risk-reduction process.
- Potential partners needed for the prevention process to be effective.

### **Intervention strategy: (Example)**

- Education.
  - An aggressive campaign to educate target populations about the local problem, who is responsible, and what solutions exist to solve the problem. A smart strategy would be to involve the housing authority and tenant association in the early stages of the planning process.
  - The educational campaign must address the primary risk behaviors that contribute to the incident.
  - The campaign would encourage behavioral/environmental changes within the adult population who reside at the housing complexes.

- The primary behavioral change sought would be for the tenant population to remain in the kitchen during the cooking process. Alternative cooking methods like baking or microwaving could be suggested. Dining out or food delivery also are options.
- An environmental modification could be to place a portable television set in the kitchen. Stoves could be replaced or supplemented by microwave ovens.
- The issue of injuries to the population occurring from fighting fires also must be addressed. The tenants must understand how the fire detection and suppression system operates. They also must know the appropriate actions to take during a fire. Most importantly--they should be instructed not to fight fires in progress.
- Engineering.
  - Assure the presence and operability of the automatic fire detection and suppression system.
  - The higher order issues such as a rapid extinguishing system above the stove, operation alarms, smart stoves, and nonflammable cooking liquid should be considered and pursued.
- Enforcement.
  - Support and enhance local life safety codes that require automatic fire detection and rapid suppression systems.
  - Support legislation for enhanced cooking systems and products.
  - Consider penalties for unsafe cooking practices.

**Potential resources that may be needed to facilitate the risk-reduction process.**

- Community support: people, money, in-kind services (materials and products), assistance from the media and the housing authority.
- Political support for engineering and enforcement initiatives. The most effective place to begin is at the local level. Consider extending to the State and national level.

**Potential partners for the prevention process.**

- Fire department and extended network to include USFA, NFPA, etc.
- Adult population residing at the housing complexes.
- Family and friends of those who reside at the complexes.
- City housing authority that owns the buildings.
- Tenant association at the housing complexes.
- Local community-service providers.
- Local business and industry.
- Local political leaders.
- Local media.
- Local medical community.
- Insurance industry.
- American Home Appliance Manufacturers (AHAM).



**APPENDIX B**

**STAGES OF HUMAN GROWTH  
AND DEVELOPMENT**



## Appendix B

### Stages of Human Growth and Development

**Stages of Development:** Steps in the growth of children which are qualitatively distinct from previous functioning and which occur in a fixed order.

Simply stated, a person grows and develops in stages that build upon the previous ones.

#### Stages of Intellectual Development

**Sensorimotor Stage**--First stage of intellectual development. Birth to age 2. Infants construct an understanding of the world by coordinating sensory experiences (seeing/hearing) with motor actions (doing).

**Example:** An infant perceives a ball as a round object that can be held, thrown, or bounced.

**Pre-operational Stage**--Second stage of intellectual development. Ages 2 to 7. Children begin to represent the world with words, images, and drawings. They acquire ability to think about objects that are not present in the immediate environment. Children can represent the objects in mental pictures, sound, images, and words. Children can imitate behavior. They often violate rules to test the response of providers.

**Examples:** A young child knows a smoke alarm makes a beeping sound. A young child can ignite a cigarette lighter after observing an adult perform the behavior.

**Concrete Operational Stage**--Third stage of intellectual development. Ages 7 to 11 years. Children can perform "operations." Operation is a basic cognitive structure that is used to transform information or "operate" on it.

Simply stated--the person can do something with the information he/she has received.

Logical reasoning replaces intuitive thought as long as it can be applied to **specific or concrete examples**. The child (or adult) can reason well about things physically present but has difficulties with abstractions or complex hypothetical propositions.

Positive example--Children can understand the relationship between the presence of smoke, the sound of a smoke alarm, and the need to escape a burning building rapidly.

Negative example--Children in the early concrete operations stage often respond that the safest and fastest way to escape the upper stories of a burning building is to jump out the window.

**Formal Operational Stage**--Fourth stage of intellectual development. Appears between the ages of 11 and 15. Individuals move beyond the world of actual, concrete experiences and think in abstract and more logical terms. Individuals can develop images of ideal circumstances. They can think systematically to develop hypotheses about why something is happening the way it is. They then can test the hypotheses in deductive fashion.

**Example:** A teenage parent decides not to leave her son unsupervised for fear that he might endanger himself.

It should be noted that portions of the population at large may not function in the formal operational stage of intellectual development to their fullest potential. Genetics, as well as environmental and social experiences, can influence development.

What in the world does this have to do with life safety? **Everything!** Understanding how and at what level to present material helps to ensure learning will take place. The community educator must understand the stages of human development so **effective** learning experiences can be designed for all populations.

### **Designing Structured Learning Opportunities**

Strategies exist to create a positive learning environment.

**Active Learning**--Involving students in the learning process. Learning by writing and speaking, discovery, critical thinking, problem-solving, and developing products.

There is a strong relationship between the amount of time students are engaged actively in instruction (as opposed to passive engagement, such as listening to a lecture) and high mastery levels.

There is no correlation between additional work time and students' drop in attention, so long as students remain motivated by the task at hand.

**Language Use**--the presenter must use language the student can understand. If the presenter's rate of speech is too fast, if vocabulary is beyond the student's comprehension, or if the syntax (language use) is too complex, students will not gain meaning from the educational experience. This concept is true for **all** audiences!

### **Critical Teaching Skills for Special Needs Audiences**

1. Make a personal commitment to take the time required to reach the goal of successfully exchanging information with the intended target population. Be patient!
2. Organize an effective information sharing environment.
3. Minimize potential distractions prior to interaction.
4. Gain the attention of the target audience.
5. Review the information/knowledge/skills possessed by the target audience as they relate to the issue at hand.
6. Make the target audience aware of the objectives intended to be presented. Provide a simple rationale for action. Ensure the "big picture" is presented.
7. Structure the process; proceed in small steps but at a brisk pace.
8. Provide many examples; use visuals and simple printed mediums as warranted.
9. Encourage audience response to the material being presented. When asking for audience response to a question, provide adequate "wait time" so participants have sufficient time to process information.
10. Provide regular reviews of key instructional points. Check for understanding. Provide positive feedback.
11. Entice the audience into caring about what it is learning.
12. If skill training is part of the objective, provide guided practice with corrective feedback. Follow up with independent practice with corrective feedback.

### **Summary Statement**

A structured environment is critical to an effective learning experience. All audiences respond well to structure. Populations with learning challenges demand it!



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*Contact:* The National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02269  
(617) 770-3000  
E-mail: <http://www.nfpa.org>

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16825 South Seton Avenue  
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<http://www.usfa.fema.gov>

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Public Education  
820 NW 5th St.  
Oklahoma City, OK 73106  
(405) 297-3314

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*Contact:* Paula Peterson  
Public Education Specialist  
St. Paul Fire Department  
St. Paul, MN  
(651)224-7811

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# **UNIT 2: FIRE RISK FOR OLDER AND DISABLED POPULATIONS**

## **TERMINAL OBJECTIVE**

*The students will be able to develop sensitive and practical approaches for providing fire and life safety to older and disabled populations.*

## **ENABLING OBJECTIVES**

*The students will:*

- 1. Given current fire experience and national population trends, establish a rationale for identifying and addressing fire-risk issues affecting older and disabled populations.*
  - 2. Given background information, explain the process of aging and identify common characteristics of older and disabled populations that qualify the group to be at high risk from fire.*
  - 3. Review and discuss an example of a successful program being used to address risk among older and disabled populations.*
  - 4. Through scenario analysis, design a strategy to address a specific fire risk within a population of older and disabled adults.*
-



## THE REALITY OF GROWING OLDER

Thinking about the reality of aging can produce feelings of both optimism and anxiety. On one hand, older adults may look forward to retirement, with more time for leisure and family activities. On the other hand, fear of failing health and one's own mortality is depressing for some people.

Developing an understanding of older and disabled populations is an important first step in the process of addressing risk among the group.



## Activity 2.1

### Personal Beliefs and Observations About the Aging Process

#### Purpose

To encourage you to reflect on the reality of aging.

#### Directions

1. Take 5 minutes of individual reflection time to record your personal beliefs and observations on growing older.
2. Partner with another student and interview each other on your responses. You will have 5 minutes to conduct the interview.
3. You will be given 5 minutes to share your **partner's** response with the class.



## **RATIONALE FOR IDENTIFYING AND ADDRESSING FIRE-RISK ISSUES AFFECTING OLDER AND DISABLED POPULATIONS**

National data identify that members of the older and disabled populations can be at higher risk from fire. (Sources--National Fire Protection Association (NFPA) and the U.S. Fire Administration (USFA).)

Examining characteristics of the rapidly growing older and disabled populations in the United States, contrasted with the fire problems facing this group, provides the rationale for identifying and addressing fire risk among older adults.

This Student Manual (SM) and USFA's *Fire Risks for Older Adults* will be used as text references for this unit.



## Activity 2.2

### Rationale for Identifying and Addressing Fire Risk Affecting Older and Disabled Populations

#### Purpose

Given current fire experience and national population trends, to establish a rationale for identifying and addressing fire-risk issues affecting older and disabled populations.

#### Directions

1. Each small group will conduct brief research on a topic identified in the *Fire Risk for Older Adults* publication. Each group then will act in the capacity of a subject matter expert to report your **findings** and **opinions** to the class. Page numbers where answers can be found are noted.
2. Each group will be given 20 minutes processing time. Each group will have 5 minutes of presentation time.
3. Group 1.
  - a. Provide an overview of the projected population growth of older adults in the U.S. (Answers--pp. 3, 7, and 8)  
\_\_\_\_\_
  - b. Explain what effects this population's growth may have on society at large. (Answers--pp. 8 and 9)  
\_\_\_\_\_
  - c. Explain what effects this population's growth may have on the U.S. fire problem. (Answers--pp. 9 and 10)  
\_\_\_\_\_
  - d. Offer an opinion as to how this population's growth may affect the fire service. (Answers--subjective)  
\_\_\_\_\_

4. Group 2.

- a. Provide a current profile of the U.S. fire problem and older adults. (Answers--pp. 3, 9, and 12)

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- b. Identify common casualty characteristics of older adults involved in fire incidents. (Answers--pp. 9 to 12, 23)

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- c. Offer an explanation as to why smoking is the leading cause of fire death among older adults. (Answers--pp. 3, 10 to 12, 23)

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- d. Offer an explanation as to why cooking is the leading cause of fire related injuries among older adults. (Answers--pp. 3, 10 to 12, 23)

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5. Group 3.

Overview and provide examples of how each of the following may place the older adult at higher risk:

- a. Physical changes and disabilities. (Answers--pp. 3, 13 to 15, 23)

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- b. Cognitive and behavioral changes. (Answers--pp. 3, 13, and 23)

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- c. Social and economic conditions. (Answers--pp. 3 and 4, 15 and 16, and 23)

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- d. Living arrangements. (Answers--pp. 3 and 4, 17, 23)

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6. Group 4.
  - a. Your group represents the Acme Fire Department. You have been invited into the home of an older adult whose mobility is very limited and asked to provide advice on fire safety.
  - b. Using the information from *Fire Risks for Older Adults* as a guide, provide an overview of actions that your organization may take in response to this request. (Answers--pp. 19 and 20, 23)



## THE PROCESS OF GROWING OLD AND ITS ASSOCIATED PHYSICAL AND COGNITIVE CHANGES

The number of older and disabled adults living in the United States will increase significantly during the next two decades. As this population expands, the risks from fire will increase. To prepare for these challenges, the emergency services must have a factual understanding of the population.

There are many realities about aging. Unfortunately, there are also stereotypes about the older and disabled populations.

As community educators, it is important to be aware of the demographics of aging. Age alone is **not** the best criteria for determining the needs of older adults. There is enormous variation in how adults respond to the aging process.

In **general**, there are significant differences between the "young old" (ages 65 to 74) and the "old old" (ages 85+). (Source--Ohio Aging Network Project.)

### "Young Old"

- Tend to be relatively healthy and active.
- May or may not be retired.
- Are interested in meaningful ways to spend their time--in self-fulfillment and/or participation in community activities.

### "Old Old"

- Declining health is common. Although some are healthy and active, the likelihood of chronic illness and disabilities increases.
- Most require supportive health and social services, making dependency on others more likely.
- This population also is more likely to be economically disadvantaged. Health bills and inflation often have drained savings and income.

- Older adults may experience many physical and cognitive changes associated with the aging process.

Physical changes in the following body systems may occur during the aging process:

- loss of homeostatic mechanisms;
- vision, hearing, and speech;
- taste, touch and smell;
- depth perception;
- decline in physical strength and flexibility;
- mobility and balance;
- reaction time;
- loss of bone mass;
- diminished sense of pain; and
- decline in efficiency of body organ systems.

Additional changes may occur during the aging process:

- diminished memory and thinking skills;
- depression;
- heightened sense of fear; and
- predisposing beliefs.

### **Definition of Disability**

Disability is a physical or mental impairment that substantially limits one or more of the major life activities. Nearly half of the population over age 65 can be classified as having a disability.

**Disability by Age**

<b>Age</b>	<b>Percentage of Population</b>		
	<b>With a Non-Severe Disability</b>	<b>With a Severe Disability</b>	<b>With any Disability</b>
Under 22	8	2	10
22-44	9	6	15
45-54	13	12	25
55-64	14	22	36
65-79	20	28	48
Over 80	18	54	72

Source: United States Bureau of the Census.



## Activity 2.3 (Optional)

### Developing Sensitivity About Being Disabled

#### Purpose

To encourage you to think critically about the physical and psychological challenges that can be associated with the process of aging.

#### Directions

1. This activity is a small group effort where everyone completes the experiences together and sequentially.
2. Once the specific experiences have been encountered, your group will reconvene and reflect upon the activity.

#### Experience # 1--Diminished Visual Acuity

**Step 1**--If you are nearsighted, simply remove your glasses and hold the medicine bottle 12 to 15 inches away. If you have no current visual impairments, put on the scratched nonprescription glasses.

**Step 2**--Attempt to read and copy the instructions on the medicine bottle.

#### Experience # 2--Compromises in Mobility and Reaction Time

**Step 1**--Remove shoes and add several unpopped popcorn kernels to the heel of each shoe. Replace shoes.

**Step 2**--Group facilitator will sound the smoke alarm and direct the group to exit the building. Follow the facilitator's instructions and return to the classroom in a timely manner.

#### Experience # 3--Challenges with Dexterity

**Step 1**--Write your name on a piece of paper using your **dominant hand**. Now do the same with your **nondominant hand**. Compare the results.

**Step 2**--Place a dime on the table in front of you. Place your hand in ice for 2 minutes. Attempt to pick up the dime.

**Step 3**--Place a dime on the table in front of you. Attempt picking up the dime without using your thumb.

### **Experience # 4--Challenges with Hearing**

**Step 1--**Partner with a group member.

**Step 2--**One person fills his or her ears with cotton. The partner reads a brief summary of a portion of this course to the person whose ears are filled with cotton.

**Step 3--**The person with cotton in his or her ears summarizes what the partner has reported.

**Step 4--**Reverse your roles.

### **Experience # 5--Challenges with Memory**

**Step 1--**Partner with a different group member.

**Step 2--**Read your partner an excerpt (to be identified) from a complex set of instructions.

**Step 3--**The partner repeats back the instructions.

**Step 4--**Reverse your roles.

### **Experience # 6--Challenges with Depression**

**Step 1--**This is a combination of reflection/recording time and a three-step interview.

**Step 2--**Individually reflect and record a paragraph response to each of the following questions:

- a. What may your quality of life be like if faced with one or more of the previously experienced challenges?
  - b. How might you feel emotionally if you are faced with the situation of living without any family or community support system?
3. Table groups have 10 minutes to discuss how this activity is relevant to risk reduction. Groups will answer the following questions:

**Questions**

1. Why it is important to have an understanding of the aging process?

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2. What impact will an older population have on the future of community risk reduction?

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3. Each group's spokesperson will give a brief overview of his or her group's responses.



## ADDRESSING RISK AMONG OLDER AND DISABLED POPULATIONS

In addition to physical, cognitive, and social issues, other factors can contribute to the older and disabled population being considered a "high risk" target audience. If a person has predisposing beliefs about fire, these beliefs may contribute to various risky behaviors.

Building an effective working relationship with older adults requires an understanding of their population at large. Spending time with older adults to learn more about the population is a smart strategy.

Interacting with older and/or disabled populations can provide valuable insight into how educators should design efforts to address risk among the group. Addressing community risk among these populations can produce success and be a very enjoyable and rewarding process. It also can be challenging!



## Activity 2.4

### Identifying Additional High Fire-Risk Factors

#### Purpose

1. To encourage critical thinking about additional factors and challenges that may contribute to placing older adults at high risk from fire, most specifically, predisposing beliefs about fire and risk behaviors that may be exhibited.
2. To identify potential benefits and challenges associated with risk reduction among older and disabled populations.
3. To identify opportunities where interaction with members of older and disabled populations may occur.

#### Directions

1. Working in your table groups, each person has 2 minutes to record **individually** as many ideas as possible about his/her group's assigned topic. Record this individual "brainstorming" time on a sheet of paper.
2. The small group then is given 5 minutes for each person to take a response from his or her list and post it on an easel pad. Each person uses a different color marker. Several rotations take place, so a comprehensive list can be generated.
3. The group assignments follow:
  - a. Group 1.
    - Identify predisposing beliefs older adults may have about fire that could place them at higher risk.

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- As a summary to the list created, explain why predisposing beliefs should be identified and addressed.

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b. Group 2.

- Identify risk behaviors that older and disabled populations may exhibit that qualify them as groups at high risk from fire.

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- As a summary to the list created, explain why these potential risk behaviors should be identified and addressed.

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c. Group 3.

- Identify potential benefits associated with addressing risk among older and disabled populations.

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- As a summary to the list created, explain why these potential benefits should be identified.

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d. Group 4.

- Identify potential challenges associated with addressing risk among older and disabled populations.

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- As a summary to the list created, explain why these potential challenges should be identified and addressed.

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4. **All groups** identify possible locations for interaction with older and disabled populations. (A second round of "pass the pencil" works well here.)

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5. You will have 2 minutes of individual "brainstorming" time, and 5 minutes to post ideas.

6. A spokesperson from each group will present a 2-minute overview of group work to the class.

## COMMUNITY INVOLVEMENT--AN ESSENTIAL COMPONENT OF RISK REDUCTION

Effective risk reduction requires research, planning, resources, and commitment from your organization **and** the community. Reducing community risk can be a very challenging process--especially among established high-risk groups such as older and disabled adults.

Most effective community risk-reduction efforts share a common root factor--they involve the community in problem-solving and solutions. Several core factors may help facilitate successful community involvement and behavioral change:

- While people generally resist being controlled, a majority of the population wants to learn, work, socialize, and be proud of personal/group accomplishments.
- It is important to meet the community at its level, learn what is important to it, and develop community-based strategies.
- The most effective community leaders quite often come from the proposed target population. It is essential to encourage leadership from within the community.
- Most importantly--people must know about, understand, and believe they can do something about the risk issue.

Each of these factors can be applied easily to community risk reduction.

### Critical Thinking Questions

**When preparing to address risk, why is it important to know the community, its people, and the associated risk issues?**

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**When preparing to address risk, why is it important to analyze how well a proposed target population's basic human needs (food, water, sanitation, shelter, security, etc.) are being met?**

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**When preparing to address risk, why is it important to involve the community in the process?**

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**When preparing to address risk, why is it important to consider seeking partnerships with other community organizations?**

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**SEEKING SUPPORT FOR LOCAL EFFORTS TO ADDRESS FIRE RISK  
AMONG OLDER AND DISABLED POPULATIONS**

Effective risk-reduction efforts require supporting resources. Resources may include direct funding, in-kind, and people-related services. Prior to designing a risk-reduction effort, it is important to consider agencies and organizations that may be able to provide support services.

## Activity 2.5

### Seeking Support for Local Efforts to Address Fire Risk Among Older and Disabled Populations

#### Purpose

To identify groups, agencies, and organizations that could assist with risk-reduction efforts among older and disabled populations.

#### Directions

1. Your group will be given 5 minutes to brainstorm a list of agencies and organizations that have been, or may be, interested in providing support (funding, in-kind, people, etc.) and/or partnerships to local and State efforts to address fire risk among older adults (ages 65 and older).
2. Perform a "pass the pencil" activity with a representative from each table group taking turns submitting the group's responses to a **master** list on an easel pad.



## PROVEN INTERVENTION STRATEGIES TO ADDRESS FIRE RISK AMONG OLDER AND DISABLED POPULATIONS

As mentioned **repeatedly**, it is essential to seek community support for risk reduction. For efforts to be successful, support must come from proposed target populations and the community at large.

It also is critical to identify who will be the recipient of prevention interventions, what interventions will be used, and how interventions will be accomplished.

Addressing community risk can be a complex process that sometimes includes multiple target populations.

Arguably, **education** is the root of integrated prevention interventions. To respond to prevention initiatives, people must be aware of risk, understand its cause, and realize solutions exist. This concept applies to target populations **and** those who make public policy decisions.

It is a smart strategy to conduct the **local** research required to be reasonably sure the intended target audience will receive and process the educational messages being presented.

### Suggestions

- Consider the use of a professional marketing specialist who can direct local market research and suggest message delivery strategies.
- Consider the use of focus groups.
- Direct citizen contacts--conduct interviews with the older adult population to seek input on appropriate message delivery strategies.

People, including older and disabled adults, are diverse. Spend time with the populations and learn the demographics of the groups through direct contact and interviews. Remember that various message media and intervention strategies may be required. Be flexible. Adapt efforts based on evaluation results.

## REMEMBERING WHEN PROGRAM

*Remembering When* is a fire and fall prevention program developed by the NFPA. NFPA used focus groups comprised of older adults and marketing specialists to help design the product.

The program is an excellent example of the caliber of product that can be developed when members of a high-risk population are involved in the planning process.

The NFPA *Remembering When* program is a model example of a risk-reduction program that is educationally, behaviorally, and technically sound.

The report of the focus group considering program design for the *Remembering When* program provides an **excellent** review of why and how the NFPA program was developed. Their recommendations include the following suggestions:

- Collaborate with **local** subject matter experts who have experienced success with various efforts affecting the older adult population.
- Locate and review successful efforts that have occurred in other communities.
- Determine the most promising delivery systems based upon **facts**.

## DESIGNING A QUALITY MESSAGE DELIVERY SYSTEM

It's always best to use as many message mediums as possible. Strive for "market saturation." Use newspaper, television, and radio; community signage (billboards, posters, handouts, etc.); supplements to utility bills; messages on grocery bags; or Internet services and Web sites.

The "message" itself should be positive--tell people what to do, not what **not** to do (e.g., when using the stove, stay in the kitchen).

Create a simple and consistent message. Remember that generic safety messages still apply.

Ensure that the message is educationally sound, i.e., at the appropriate reading level. Avoid stereotyping the target audience. (See *Fire Risks for Older Adults* and *Solutions 2000* publications for references.)

Consider and act on bilingual issues.

### **Print Media**

- Use appropriate font size and spacing--size 12 font (at least), sans serif type.
- Select appropriate colors--black type on light paper; red is the first color to be obscured as vision deteriorates.
- Choose uncoated paper with matte finish (buff color instead of white) to cut down on glare.
- Portray older adults in positive, active roles in all artwork.

The supplementary and handout materials for the *Remembering When* program provide excellent examples of appropriately designed printed materials. They can be found in the plastic holders that accompany the *Remembering When* guide.

### **Broadcast Media**

If using broadcast media, the narrator must speak clearly. Evaluate both male and female choices. Ask the opinion of a focus group.

Limit background noise and music, and avoid "overstimulating" visuals--those that have too much action.

The spokesperson, whether a narrator in a video program or a stand-up presenter, should be credible to the target audience.

There are many factors to consider in a spokesperson's credibility, including age. A focus group comprised of members of the target audience may be helpful in selecting a credible and effective spokesperson.

Be sure to pilot and evaluate all efforts. The first formative evaluation of the *Remembering When* program provides an excellent overview of a professional evaluation.

Remember--Effective community risk reduction requires use of a well-planned process.

## COMPONENTS OF THE RISK-REDUCTION PROCESS

Prior to the culminating activity for this unit, it is important to pause and review the overall process that is required to mitigate risk effectively among the older adult population.

1. **Identify and prioritize the community problem to be addressed.** The collection, processing, and **objective** evaluation of community-based data is an essential component of the risk-reduction process.
2. **Identify the root causes that contribute to the occurrence of leading fire risks.** Fires and injuries are understandable, predictable, and most often preventable. It is important to examine the factors and human behaviors that cause the fire to occur.
3. **Identify the primary and secondary audiences to be included in an intervention strategy.** When addressing community risk, it is critical to identify the target population responsible for creating the incident.
4. **Determine an intervention strategy.** While a challenging process, the combined use of education, engineering, and enforcement initiatives is the most effective way to mitigate community risk. The intervention strategy must include the acquisition and careful use of community resources.

## Activity 2.6

### Developing Strategies

#### Purpose

To design a strategy to address a specific fire risk affecting a population of older and disabled adults.

#### Directions

1. You will work in table groups.
2. Read the scenario on the following page.
3. The following format should be used in preparing your plan:
  - a. Identify and prioritize the problem(s) to be addressed.
  - b. Identify the root causes that contribute to the occurrence of leading fire risk.
  - c. Outline the typical sequence of events that led to the occurrence of the problem.
  - d. Identify the primary and secondary audiences to be included in an intervention strategy.
  - e. Create an intervention strategy that includes the following:
    - Explanation of how combined prevention interventions could be used to address the fire risk.
    - Identification of resources needed to facilitate the risk-reduction process.
    - Potential partners needed for the prevention process to be effective.
4. Use the Worksheet that follows the Scenario to record your plan.

## Scenario

This community is a densely populated county of 150,000 located in a major metropolitan corridor of the northeastern United States. The county is a bustling bedroom community to a nearby large city. The community experiences harsh winters and includes a significant older adult population residing in aging single-family structures.

The county fire/rescue system responds annually to approximately 18,000 calls for service. Outcome evaluation has identified fires involving overheated wood-burning stoves as a leading cause of structure fire in the community.

Close examination of the fires reveal that 65 percent occur in the private homes of consumers over 60 years of age. Ninety percent of the fires have been related to overheated flue pipes caused by a lack of appliance maintenance and overstocking the stove with wood. Most stoves have been in place over 15 years and are the primary heat source for the home. The fires are occurring mostly between the hours of 1800 and 0300 hours.

Postfire interviews with victims identify the reasons for poor maintenance to be a lack of education about required maintenance and lack of financial resources to pay for it.

Annual property loss from this problem is currently \$1.2 million. Three deaths have occurred in the past 2 years. Smoke alarm protection was either absent, disabled, or inoperable in all fatal fire incidents.

**Worksheet**

1. Identify and prioritize the problem(s) to be addressed.

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2. Identify the root causes that contribute to the occurrence of leading fire risk.

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3. Outline the typical sequence of events that led to the occurrence of the problem.

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4. Identify the primary and secondary audiences to be included in an intervention strategy.

**Primary Audience**

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**Secondary Audience**

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5. Create an intervention strategy that includes the following:
  - a. Explanation of how combined prevention interventions could be used to address the fire risk.
  - b. Identify resources needed to facilitate the risk-reduction process.
  - c. Potential partners needed for the prevention process to be effective.

## SUMMARY

Older and disabled adults make up a significant portion of the U.S. population.

Common characteristics exhibited by the older and disabled adult populations may place them at risk from fire and make reaching them with safety messages challenging.

Message delivery systems may require adaptation to reach the older adult population successfully.

Community partnerships are an essential component of the risk-reduction process.

Selection and prioritization of the appropriate target audience(s) is critical.

The use of combined prevention interventions (the Three E's) is the most effective strategy for reducing fire risk among older and disabled populations.

The emergency services are primary stakeholders in the effort to reduce fire risk among older and disabled populations.





# **APPENDIX A**

## **FIRE RISKS FOR OLDER ADULTS**



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# **FIRE RISKS FOR OLDER ADULTS**

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OCTOBER 1999

This publication was produced by TriData Corporation under subcontract to Ogilvy Public Relations Worldwide for the United States Fire Administration.

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## OVERVIEW OF THE 'FIRE RISKS' SERIES

This report is one in a series of four that discuss the increased fire risks for four groups of the general population:

- Older adults
- The mobility impaired
- The deaf or hard of hearing
- The blind or visually impaired.

Older adults—those over 65 years of age—represent one of the highest fire risk groups in the United States, in large part because they are the fastest growing segment of the U.S. population. Of course, many older adults may also fall into the other three groups since the elderly suffer some or all of these impairments to a much greater degree than do the general population.

People who are deaf or have hearing impairments, those who are blind or have vision impairments, and those with mobility impairments may face unique challenges in an emergency. Their ability to detect a fire or escape its effects may be hindered by their impairments. As a result, people with these impairments are at a greater risk of death or injury due to fire.

As might be expected, many of the fire safety issues are of concern for all four groups. This commonality is reflected in the reports, particularly in the fire safety tips, most of which apply to all the groups. These safety tips are presented in an appendix at the end of each report, organized in three sections: before the fire, during the fire, and fire prevention. The tips that are common to all four groups are summarized here:

### *Before the Fire*

- Identify the nearest fire exit
- Install smoke alarms
- Live near an exit
- Plan and practice escape plans
- Involve the fire department

### *During the Fire*

- Get out and stay out
- Test doors before opening them
- Stay low and go
- What to do if you are trapped
- Stop, drop, and roll

### *Fire Prevention*

- Cooking
- Electrical safety
- Smoking
- Space heaters
- Heating
- Fireplaces



## EXECUTIVE SUMMARY

Older adults represent one of the highest fire risk populations in the United States. As a result of progressive degeneration in physical, cognitive, and emotional capabilities, older adults present unique challenges in the fields of fire protection, prevention, and safety. Complications associated with aging increase the likelihood that an elderly person will accidentally start a fire and at the same time reduce his or her chances of surviving it. As the nation's elderly population grows, the fire death toll will likely rise in direct proportion to that growth unless measures are taken to ameliorate the risks associated with this group. The fire safety community must address the fire safety needs of older adults or be faced with the potential for a severe public health problem.

The key findings of this report are summarized below:

### *The Fire Problem and Older Adults*

- People over the age of 65 are the fastest growing segment of the American population.
- Over 1,200 Americans over the age of 65 die as a result of a fire each year. Older adults comprise over 25 percent of fire deaths of all ages, and 30 percent of fire deaths that occur in the home.
- Fires and burns are a leading cause of deaths from unintentional injuries among older adults.
- Residential fires injure an average of 3,000 older adults each year.
- Fires caused by smoking are the leading cause of fire deaths in the elderly.
- Fires caused by cooking are the leading cause of fire-related injuries in the elderly.
- Elderly fire victims usually come in close contact with the heat source that starts the fire.
- Adults in the age group between 65 and 75 have a fire death rate twice that of the national average; between 75 and 85, three times the national average; and over 85, four times the national average.

### *Fire Risks*

- The aging process, with its associated illnesses and impairments, leaves a person vulnerable to a variety of accidental injuries, including fires and burns.
- The likelihood of experiencing a severe disability increases with age. Impairments associated with the aging process, such as blindness or deafness, predispose the elderly to accidental injuries, including fires.
- Approximately 30 percent of noninstitutionalized older adults live alone, placing them at higher risk for accidental injury.

- Group assisted-living facilities and nursing homes pose unique fire risks to both their residents and firefighters.
- Nearly 20 percent of older adults live at or below the poverty line, and the relationship between poverty and fires is a compounding fire risk.
- Many older adults take multiple medications, the interaction of which can cause a variety of side effects, including confusion, that may alter the decision-making process and increase the potential for accidents.
- The impairments caused by the combination of alcohol and prescription drugs in older adults can be significant. Such impairments may lead to an increased likelihood of accidentally starting a fire, not detecting a fire, and not being able to escape a fire.

## INTRODUCTION

This report investigates the nature of the fire problem faced by older adults in the United States. It also describes the characteristics of the elderly that expose this subset of the population as a disproportionately high fire risk. For the purposes of this report, the terms *older adult* or *elderly* refer to any individual over the age of 65.

This report is divided into three principal sections, the first of which analyzes the fire problems of older adults. This section discusses the growing elderly population, the number of fire casualties over the age of 65 each year, the characteristics of fires that injure the elderly, and the nature of elderly fire casualties.

The second section discusses those aspects of the elderly population that place this group at such a high fire risk. Physical, cognitive, and behavioral changes associated with the aging process are discussed in relation to fire and burn injury incidence. In addition, demographic and socioeconomic variables commonly associated with the elderly population are evaluated as fire risks.

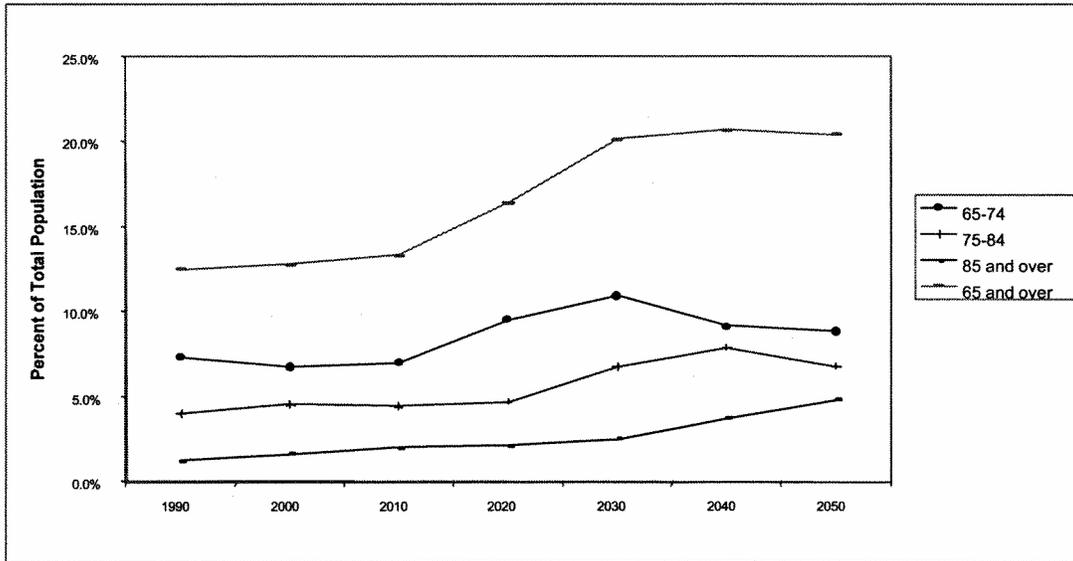
The final section provides tips to fire service professionals for enhancing fire safety for people with disabilities. A reproduction-ready appendix presents fire safety tips. Fire service professionals may photocopy the appendix for use in public education activities.



## THE FIRE PROBLEM AND OLDER ADULTS

### The Graying of America

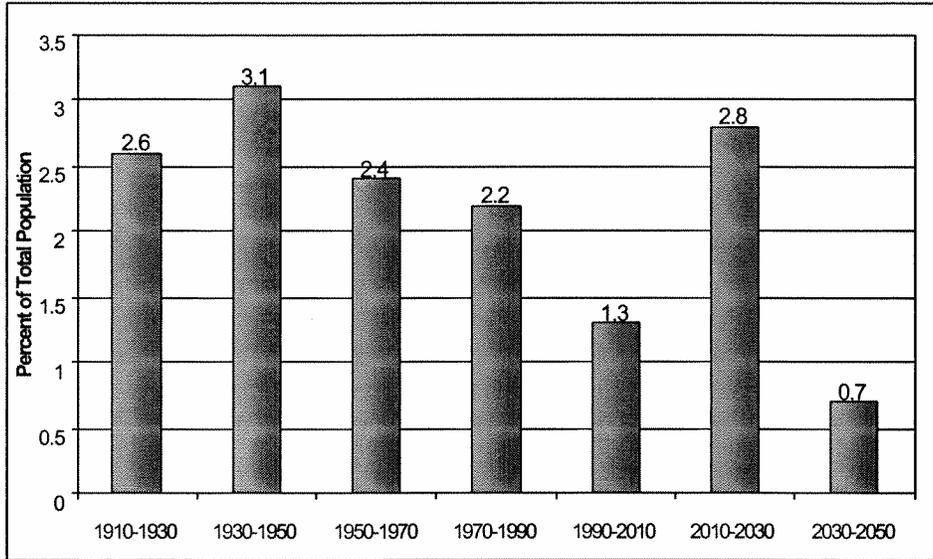
The elderly population in the United States, although currently growing at a moderate pace, will increase dramatically in the near future. Those who are aged 65 and older currently represent 12.5 percent of the total population and number 34 million, an all-time high (Reference 1). In what is known as the “graying of America,” we are fast becoming a nation of the elderly. Over the past century, the number of persons over the age of 65 has tripled (Reference 2). Between now and the year 2050, the elderly population is expected to double, reaching 80 million, or 20 percent of the American population (Figure 1).



Source: United States Bureau of the Census

**Figure 1. Population Projections—Age 65 and Over**

Most of this growth is expected to occur between the years 2010 and 2030, when the Baby Boom generation enters retirement. This group of 75 million people born between 1946 and 1964 currently constitutes nearly one-third of the entire U.S. population and will be entering their 60s between 2010 and 2030 (Reference 3). Over the course of these two decades, the elderly population is expected to grow by 2.8 percent annually, as opposed to 1.3 percent from 1990 to 2010 and 0.7 percent from 2030 to 2050 (Figure 2).



Source: United States Bureau of the Census

**Figure 2. Average Annual Growth Rate of the Elderly Population—1910–2050**

The “oldest old” (aged 85 and older) is the most rapidly growing age group among the elderly. Between 1960 and 1994, their numbers rose by 274 percent. In contrast, the elderly population in general rose by 100 percent, and the entire U.S. population grew by only 45 percent. By 2050, the oldest old will number 19 million, or 24 percent of the elderly and 5 percent of the total U.S. population (Reference 2).

In 1997, almost 2 million people in this country celebrated their 65<sup>th</sup> birthday, while only 1.7 million persons over the age of 65 died. This resulted in a net increase in the elderly population of over 200,000 people in just 1 year (Reference 4). Advancements in medicine and health care have allowed people to live longer, as evidenced by the ever-increasing life expectancy. Geriatric medicine in particular has significantly contributed to the prolonged average life span of Americans today. On average, Americans who reach age 65 can expect to live an additional 17 years (Reference 5).

Table 1 shows the steady climb in the average life expectancy over the past century—an increase of more than 60 percent. At the turn of the century, infectious disease was the leading cause of death and was largely responsible for limiting the average life span to about 50 years. Today, thanks to widespread immunizations and sophisticated medical research, we have eradicated all but a few of the most deadly killers of this century. In the latter half of this century, however, heart disease and cancer have replaced infectious disease as the leading causes of death in the United States. Further, as the average age of a population changes, so does the picture of health for that population. As people live longer and longer, there will be a substantial increase in the numbers who face dependency as the result of chronic illness or disability.

**Table 1. Average Life Expectancy (from birth)**

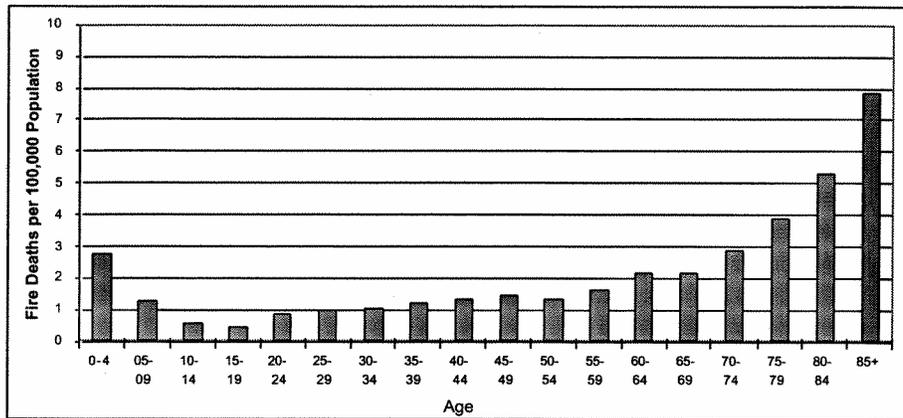
Year	Both Sexes	Male	Female
1900	49.7	48.2	51.1
1910	51.9	50.2	53.6
1920	57.4	56.3	61.6
1930	59.8	58.1	65.2
1940	62.9	60.8	65.2
1950	68.2	65.6	71.1
1960	69.7	66.6	73.1
1970	70.8	67.1	74.7
1980	73.7	70.0	77.4
1990	75.4	71.8	78.8
1995	75.8	72.5	78.9

Source: *National Vital Statistics Report*, National Center for Health Statistics, Vol. 47, No. 13, December 1998.

While the newly retired tend to live with relative ease and independence, nearly one out of every four Americans over the age of 85 resides in a nursing home. There are still other elderly who, although not institutionalized, rely on outside assistance to accomplish one or more daily functional activities. Furthermore, as the young adult population wanes, the pool of persons who can care for the elderly will shrink, making it increasingly difficult to provide resources to older adults that enable them to lead productive lives.

**Elderly Fire Casualties**

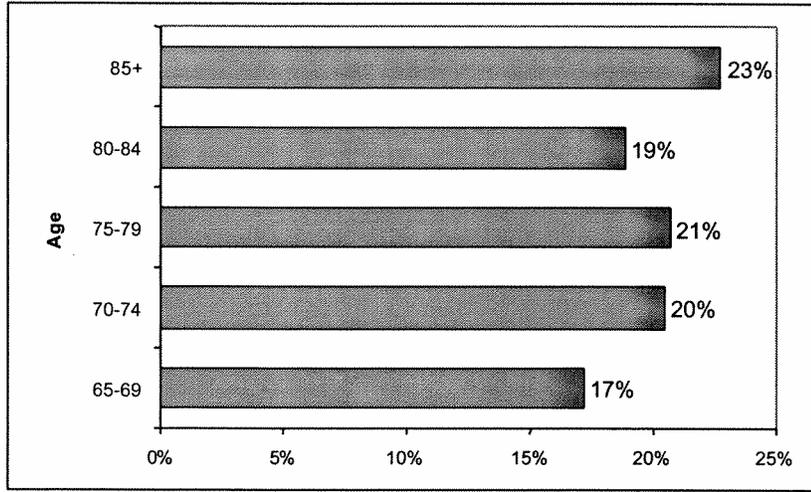
Unintentional injuries take the lives of approximately 30,000 elderly each year (Reference 6). Of those fatalities, fires and burns cause approximately 1,200 deaths per year. In comparison to the rest of the population, older adults have significantly higher fire death rates (Figure 3). The fire death rate for people over 60 is 20 percent higher than the national average. For those over the age of 75, the rate is double the national average, and for those over 85, the rate is four times the national average (Reference 7).



Source: Centers for Disease Control and Prevention, National Center for Health Statistics

**Figure 3. Fire and Flame Death Rates—1995**

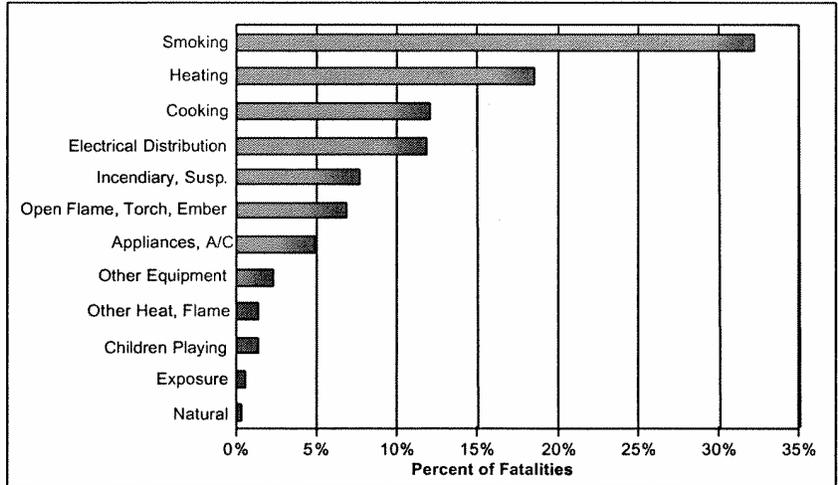
Older adults face an unusually high risk of dying in a fire. The elderly population has the highest risk of dying in a residential fire—where the majority of civilian casualties (fatalities and injuries) occur (Reference 7). The largest number of elderly fire fatalities (23 percent) occurs in victims over the age of 85, followed closely by those aged 75 to 79 (21 percent) and those aged 80 to 84 (19 percent) (Figure 4). As the elderly population swells, especially among the most elderly, a corresponding increase in fire deaths among older adults is likely.



Source: Centers for Disease Control and Prevention, National Center for Health Statistics

**Figure 4. Distribution of Fire and Flame Deaths by Age Group for Ages 65 and Older—1995**

Figure 5 depicts the leading causes of fire deaths for older adults. Fires caused by smoking are the leading cause of fire deaths among older adults. Approximately 15 percent of the elderly population smokes tobacco products (Reference 8). This behavior poses distinct health problems in the elderly, such as asthma, emphysema, and lung cancer. Additionally, medications that cause drowsiness or the use of alcohol increase the risk of starting a fire with a smoking material. Fires of this nature are particularly injurious as the most commonly ignited material is the victim's clothing or bedding, a situation that substantially reduces the victim's ability to extinguish or escape a fire before being overcome.

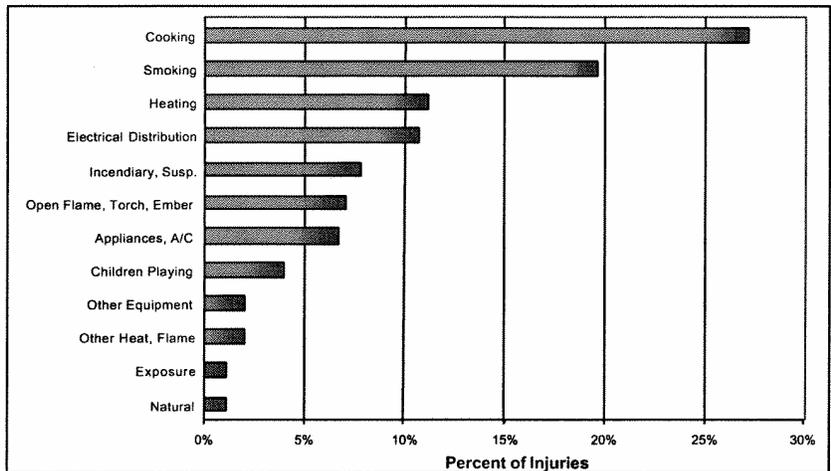


Source: U.S. Fire Administration, National Fire Incident Reporting System

**Figure 5. Leading Causes of Fire Deaths in the Elderly**

Cooking and heating fires are responsible for a smaller, yet significant portion of fire deaths in the elderly. Like carelessly handled smoking materials, cooking and alternative heating sources commonly ignite clothing or other materials on or near the victim.

Figure 6 compares the leading causes of fire-related injuries in the elderly population. Older adults suffer most fire-related injuries when they are cooking. Common scenarios are accidentally igniting loose-fitting sleeves, forgetting to turn the burner off, and leaving food cooking on the stove. Grease fires and hot oil scalds are also not uncommon. Depending on the severity of the injury and the speed with which medical assistance is rendered, these incidents may result in death as a result of complications that arise during a prolonged healing process. Smoking and heating fires are the second- and third-leading causes of fire-related injuries in older adults.



Source: U.S. Fire Administration, National Fire Incident Reporting System

**Figure 6. Leading Causes of Fire Injuries in the Elderly**

## Casualty Characteristics

Nearly one-fifth of all people over 65 who die in fires are bedridden or challenged by some other physical disability (Reference 9). Impairments of this kind significantly reduce the older adult's ability to escape a fire. Older fire victims are more likely to be located in the same room in which the fire originated. In fact, nearly two-thirds of bedridden fire fatalities were located in the room where the fire originated (Reference 9).

According to current National Fire Incident Reporting System (NFIRS) data analyses, elderly fire victims tend to be in close contact with the source of the fire that kills them. In fires started by smoking, heating, and cooking—the three leading causes—victims are often injured or killed when their clothing, bedding, or upholstery ignite.

While smoke inhalation is the leading cause of fire deaths, there is a direct correlation between the age of the victim and deaths from burns: as the age of the fire victim increases, the percentage of burn-induced deaths also increases. Two-fifths of those aged 65 and over die from burns, contrasted with only one-fourth of the fire deaths among the rest of the population. Of these burn deaths, approximately 25 percent involved clothing ignition—a significant factor decreasing the ability of the victim to extinguish or escape the fire (Reference 10).

Two-thirds of fire deaths in the elderly occur when the victim is sleeping or trying to escape. One-third of fire injuries in the elderly occur as the victim is escaping, and a significant portion occur when the victim attempts to extinguish the fire. This pattern is similar to that of other age groups. Incapacitation, as a factor in fire casualties, affects the elderly four times as frequently as it does adults ages 10 to 64. Although it is often unknown whether the incapacitated fire victim was involved in causing the fire, the victim is nonetheless prevented from escaping (Reference 11).

## FIRE RISKS

### The Aging Process

Older adults experience myriad physical and cognitive changes associated with the aging process that place them at a heightened risk of starting a fire or being injured by a fire. Older bodies experience a decline in virtually every functional organ system, beginning at the cellular level. Perhaps the most detrimental loss is the progressive reduction in the body's homeostatic mechanisms. Such systems are responsible for maintaining equilibrium in the internal environment and aiding in the recovery from illness or injury. Burns in older adults are complicated by existing deficiencies in body water concentration, skin elasticity, temperature control, and healing mechanisms. As a consequence, the elderly have a higher morbidity and mortality associated with smaller body surface area burns than the younger population. Older adults have a burn death rate more than twice that of the rest of the population (Reference 12).

Sensory impairments are a common complication of aging. The elderly tend to experience diminished visual acuity, depth perception, hearing, and sense of smell, as well as deficits in mobility and balance. Any one of these deficiencies can make an individual more vulnerable to the dangers of fires and burns. For example, the inability to smell smoke coupled with existing respiratory problems increases the likelihood of succumbing to toxic fumes and smoke inhalation. Older adults, however, often experience many, if not all, of these deficiencies simultaneously.

Older adults have a diminished sensation of pain, further contributing to a delay in treatment of serious burn injuries. It has been shown that the mortality from burns for individuals over the age of 65 increases fivefold when treatment is delayed from 2 to 5 hours (Reference 13). In addition, an older adult may be less aware of burns as a result of decreased perception of heat and sensitivity to pain. Coupled with chronic illnesses, weak bones, and slower reflexes, the elderly population is significantly more likely to incur accidental injuries and less likely to survive them.

Dementia and age-related neurologic disorders can also increase an older adult's likelihood of being injured in a fire. Alzheimer's disease—a progressive, degenerative disease that attacks the brain and results in impaired memory, thinking, and behavior—affects 1 in 10 persons over 65 years old and nearly half of those over 85 (Reference 14). Because these conditions can cause individuals to experience an altered level of awareness, they may not recognize the danger presented by a fire or act accordingly.

It has been estimated that at least 10 percent of the elderly population suffers from depression (Reference 15). This psychiatric disorder substantially affects the social functioning and quality of life of older adults. Social isolation and functional disability related to the aging process are some of the reasons postulated for the incidence of depression in the elderly. A correlation between alcohol and smoking—both independent fire risks—in clinically depressed patients has been identified (Reference 16). The combined use of alcohol and drugs used to combat depression can lead to even riskier behavior and increased fire risk.

The elderly also exhibit certain behaviors that place them at greater risk for having a fire. Many older adults rely on alternative heat sources, such as space heaters and electric blankets, due to poor internal thermoregulatory mechanisms associated with aging. The use of a space heater increases the chances of starting a fire, especially if the unit is not maintained or operated properly. Repeated washing of electric blankets can compromise their wiring structure and create fire risks. An added complication is that many older adults live alone and are less likely to receive prompt help in fire emergencies.

**Disabilities**

The term *disability* is defined by the Americans With Disabilities Act of 1990 (Reference 17) as “a physical or mental impairment that substantially limits one or more of the major life activities.” The likelihood of developing a disability increases with age, as shown in Table 2. Nearly half of the population age 65 or over can be classified as having a disability. Nearly three-quarters of the population over the age of 80 have some level of disability. Also, as shown in Table 3, nearly one-third of all disabled persons are adults over age 65. As the population ages and continues to live longer, we can expect to see this number rise.

**Table 2. Disability by Age**

Age	Percent of Population		
	With a Non-Severe Disability	With a Severe Disability	With any Disability
Under 22	8	2	10
22-44	9	6	15
45-54	13	12	25
55-64	14	22	36
65-79	20	28	47
Over 80	18	54	72

Source: United States Bureau of the Census, *Population Profile of the United States: 1997*.

**Table 3. Age Distribution of the Disabled**

Age	Percent of Population
Under 22	15
22-44	26
45-54	13
55-64	14
65-79	22
Over 80	10

Source: United States Bureau of the Census, *Population Profile of the United States: 1997*.

Disabilities present a significant challenge to fire safety. In the elderly population, hearing and vision loss are the most frequently reported disabilities, but many older adults experience loss of mobility to varying degrees.

Over half of all wheelchair users are over the age of 65, as indicated in Table 4. Mobility deficits in the elderly are most commonly associated with degenerative illnesses, such as Parkinson's Disease and osteoporosis. These illnesses can hinder an afflicted individual's ability to escape fire in a timely manner.

**Table 4. Reported Disability Type by Age**

Age	Percent of Disability Group	
	Mobility Impaired (Uses Wheelchair)	Vision Impaired
0-64	45	41
65-79	29	34
Over 80	26	25

Source: Vital and Health Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention, *Current Estimates From the National Health Interview Survey*, Series 10, No. 192, 1994.

Hearing impairments are one of the most commonly reported disabilities among older adults, affecting 40 percent of the elderly population (Reference 18). People 65 years and older are eight times more likely to have a hearing impairment than people aged 18 to 32 (Reference 18). The elderly deaf and hard of hearing often lack an appropriate smoke alarm or other specialized devices to help them compensate for their impairments, possibly due to the expense of installing such alarms, lack of awareness of their availability, or denial of the impairment (Reference 19).

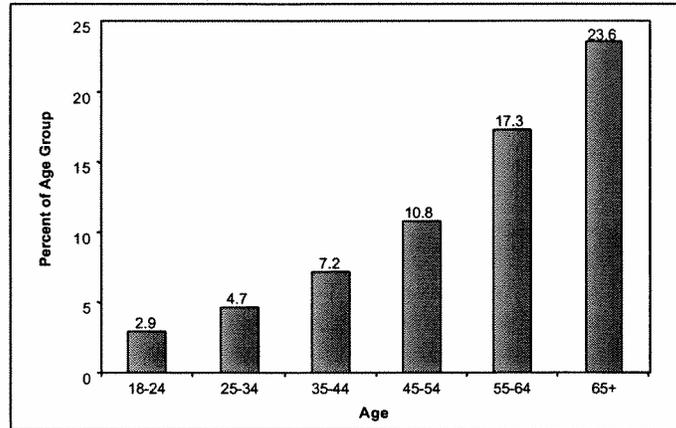
Blindness and other visual disturbances commonly associated with aging are a result of a variety of degenerative diseases and conditions (see *Fire Risk for the Blind or Visually Impaired*). Nearly two-thirds of the blind and visually impaired population in this country are over the age of 65 (Reference 20). Vision loss significantly reduces an individual's ability to interact with the environment. Progressive degeneration of sight requires the individual to readjust to once-familiar and now-foreign surroundings. Those who suffer from these conditions must restructure their home environments to reduce the risk of accidents. Older adults with deteriorating vision or complete vision loss may be at an increased risk for sustaining burn injuries. The fire hazards associated with cooking are increased when the burner or flames are not visible. Similarly, a sight-impaired person could easily start a fire with smoking materials by unintentionally knocking an ashtray off a table.

**Medications and Alcohol Use**

Patients over the age of 65 receive 35 percent of the prescribed medications in this country (Reference 21). Additionally, elderly patients may be taking several prescribed medications simultaneously. Taken together or individually, medications may cause drowsiness or impaired judgment. These effects increase the chance of unintentionally starting a fire and decrease the possibility of detecting and escaping a fire. Medications prescribed for ailments commonly seen in

older adults may also interfere with the homeostatic healing mechanisms of the body, further complicating and prolonging the healing process from a burn injury.

In a recent nationwide survey of alcohol use in the United States, almost one-quarter of the respondents over the age of 65 claimed to drink at least one alcoholic beverage nearly every day (from 21 to 31 days per month), as shown in Figure 7 (Reference 22). Since most older adults take medication daily, it is likely that many of those respondents are also taking prescription drugs in conjunction with alcohol. Because the use of alcohol along with prescription drugs reduces a person's cognitive and physical abilities, especially in older adults, the risk of starting a fire is increased and the ability to escape is impaired.



Source: Behavioral Risk Factor Surveillance System, Online Prevalence Data, 1995

**Figure 7. Alcohol Consumption (One or More Drinks 21 to 31 Days per Month) by Age**

### Poverty

Approximately 20 percent of the older adult population lives at or below the poverty line, compared with 10 percent of the population aged 18 to 64 (References 23 and 24). Poverty has long been associated with an increase in fire risk. Individuals living below the poverty line are less likely to receive and comply with fire safety messages for a variety of reasons. Low household income significantly limits the extent to which a home is equipped with fire protective measures. Housing available to low-income tenants is less likely to have adequate smoke alarms, and even when these devices are provided, they are less likely to be properly maintained. Lower income individuals are also less likely to be able to afford to install and maintain safe heating systems or to replace or repair malfunctioning equipment. As a result, many indigent persons rely on dangerous alternative sources of heat such as space heaters or even open flame. In addition, electrical wiring and other systems in low-income households may be unsafe or fall short of code standards (References 23 and 24).

## **Living Arrangements**

More than two-thirds of older adults live in their own homes. Of these, nearly half live alone (Reference 4). In addition to being at risk for sustaining accidental injuries due to the gradual decline of physical, mental, and social abilities, the elderly are also prone to ignore common household fire hazards. They are less likely to reduce potentially flammable clutter and replace unsafe electrical appliances.

Older adults who live alone tend to fashion their daily lives into systematic, repetitive routines. They often overlook such fire safety measures as changing the batteries in the smoke alarm or cleaning the chimney. Some elderly individuals who live alone have a support system consisting of family, friends, or neighbors who can clean and maintain smoke alarms, reduce flammable clutter, clear electric cords from walkways, and rectify other fire hazards. Unfortunately, many other older adults have no such safety nets and either neglect or are unable to perform such fire safety measures.

Approximately 1.5 million Americans live in a group home setting, such as a nursing home or assisted-living facility. Ninety percent of these individuals are over the age of 65, and more than 35 percent are over the age of 85; once an individual reaches 75, the likelihood of living in one's own home decreases, and by age 85, nearly one in four people live in a nursing home (Reference 25). Older adults receiving care in nursing homes often suffer from debilitating illnesses or other conditions that necessitate constant assistance or supervision. As a result, the majority of these facilities are staffed with medical personnel, with the residents typically outnumbering the staff (Reference 26).

A fire emergency places the residents of group living facilities at significant risk for a variety of reasons. First, the ratio of residents to staff often increases at night since, as a rule, fewer staff are on duty during this shift (Reference 26). Bedridden or incapacitated residents are totally dependent on the staff to help them evacuate in the event of a fire. As a result, those with less severe disabilities are often unattended during an emergency as staff assistance is directed toward those with more pressing needs.

Another risk factor is the type of construction used in nursing and other group living homes. These facilities are often designed with large, open-air living spaces that facilitate the passage of smoke and toxic gases upward through several stories (Reference 27). In a study of fires occurring in nursing home facilities, most of the injuries and deaths were attributed to relatively small fires that produced toxic fumes before being detected or activating suppression devices (Reference 28). Many older retirement homes were built with limited means for egress, combustible interior finishes, and a lack of automatic sprinkler systems (Reference 28).

Still another risk factor for nursing homes is the presence of fire hazards. These include pressurized oxygen, flammable liquids and gases, electrical equipment, and carelessly used smoking materials.

## Home Health Care

An increasing number of elderly Americans are choosing to live in their own homes with regular medical assistance. The rapid growth in home health care and advances in medical technology have permitted many older adults to postpone, perhaps permanently, costly institutional health care. From 1992 to 1995, the number of home health care patients over the age of 65 jumped by nearly 30 percent, and as of 1995, nearly 73 percent of all home health care patients were over 65 (Reference 29).

Medical equipment and services once restricted to the hospital are now in the hands of family members, visiting nurses, and other home health care providers. One such example is home oxygen therapy. Fires caused or exacerbated by smoking in the presence of oxygen can be swift in nature and are often fatal. In addition to oxygen, various types of electronic monitoring equipment may be situated in the home, potentially overloading electrical circuits.

One benefit that has accompanied the increase in home health care is the conversion of ground floor rooms into sleeping areas. The impetus behind this movement is usually to avoid using the stairs. However, relocating the bedroom to the ground floor also improves the individual's chance of escaping or being rescued from a fire.

## FIRE SAFETY FOR SPECIAL-NEEDS POPULATION: TIPS FOR FIRE SERVICE PROFESSIONALS

You have been asked to provide advice on the fire safety needs of older adults. Where do you begin? There are the “generic” fire safety tips routinely given out to all who ask, but how do you tailor your recommendations to those with special needs? The first thing to remember is that the generic fire safety tips still apply. Individuals with physical impairments or disabilities are people first and foremost, and will benefit from the years of conventional wisdom that created existing fire safety programs.

### **Recommendations for Assisting Older Adults in an Evaluation of Their Fire Safety Needs**

Focus groups found that being identified as “special” or “needy” was a concern for individuals with mobility impairments (Reference 30). This mirrors the findings of a 1981 fire safety report from the National Center for a Barrier Free Environment. That study concluded that impaired individuals often feel that official concern for fire safety can restrict their freedom of choice—for example, denying an impaired student a bedroom on the upper floor of a college dormitory (Reference 31). These opinions also reflect those expressed at the Solution 2000 Conference, held by the U.S. Fire Administration and the North American Coalition for Fire and Life Safety Education in April of 1999. In addition, individuals in the focus groups also worried about falling victim to crime if their home was marked for fire department recognition of their needs. The key to dealing with individuals with a mobility impairment is to acknowledge their ability to help themselves, while guiding them to recognize their limitations in an emergency situation without drawing undue attention to them as impaired individuals.

The importance of exit drills should be stressed to assist older individuals in recognizing their physical limitations in crisis settings. If the individual lives on an upper floor or requires other special assistance, it is important for the fire service to be involved in these drills, if at all possible. Older adults may have an unrealistic view of the capabilities of the fire department. There may be unforeseen obstacles or barriers to exit or rescue. These should be identified and addressed before a fire occurs.

The use of smoke alarms must be *strongly* advocated. The U.S. Fire Administration considers smoke alarms to be the single most important piece of fire safety technology employed today. The importance of early recognition of a fire cannot be stressed enough in populations where physical limitations may increase the time needed to safely exit a burning building.

If you are called upon to assess the needs of an older adult, the Center for Fire Research at the National Institute of Standards and Technology (formerly the National Bureau of Standards) recommends assessment of the following seven risk factors (Reference 32):

- *The risk that the individual will resist leaving the structure.* For example, is the individual fearful of leaving with a stranger; unwilling to leave pets, belongings, and cherished items; or exhibiting confusion or other symptoms consistent with possible mental impairments?
- *The individual's response to fire drills.* For example, does the individual's escape plan work during drills?
- *The individual's response to instructions.* For example, are there language or other communication barriers?
- *The individual's mobility impairments (and the resources necessary to overcome them).* For example, is the individual capable of reasonably safe self-rescue from a burning structure? How much can the person assist his or her rescuers?
- *The need for extra help.* This may be related to the actual egress or the period immediately following. For example, a ventilator-dependent quadriplegic may require medical resources once outside the structure involved.
- *The individual's waking response to alarms.* Will there be a difference between the daytime and nighttime fire safety needs of the individual concerned?
- *The probability that the individual will lose consciousness in an emergency.* For example, is the individual dependent on specific equipment for life support? Is there adequate backup to provide for emergency situations?

Note the emphasis on performance-based assessment. The risk assessment cannot be based on an individual's impairment, but rather must be based on his or her demonstrated abilities to evacuate a structure in an emergency.

### **Building Design and Codes**

The following recommendations are based on *Design for Accessibility*, a guide for architects on designing barrier-free environments (Reference 33). They should provide some insight into the role of building design in the fire safety needs of elderly residents.

- Provide exit signs set to flash (less than 5 hertz) when a fire alarm sounds. These signs should be connected to the emergency power system.
- Provide audible fire alarms that exceed the average ambient sound level by a minimum of 15 decibels (15 phones). These alarms should exceed a noise of 30 seconds' or less duration by a minimum of 5 decibels (5 phones). The maximum audible emergency signal should not exceed 120 decibels (120 phones).
- Provide visual/light alarm signals in all areas occupied by individuals who are deaf or hard of hearing.
- Provide under-pillow vibrating alarm signals in bedrooms for deaf or hard-of-hearing individuals.

- Provide a minimum of two accessible exits or horizontal exits for all accessible areas of all buildings.
- Where there is only one accessible exit, provide a minimum of one fireproof refuge area (fire-rated enclosed elevator lobby preferred, or enlarged landing area in a fire-rated stair enclosure). The fire refuge area should be a minimum of 16 square feet (1.5 square meters) outside of exit circulation paths. Provide an occupancy/call system from refuge areas to fire department enunciator location or entrance vestibules.
- Cover open fireplaces with tempered glass doors and guard them by a 9- to 18-inch (23- to 46-cm) raised hearth.
- Provide fire detectors, especially in institutions, in accordance with the recommendations presented in the table below:

**Recommended Smoke Alarms**

Area of Residence in Which To Install Alarm	Type of Smoke Alarm			
	Rate of Temperature Rise	Fixed Temperature, Adjustable	Fixed Temperature, Permanent Setting 175° to 240°F (79° to 116°C)	Smoke/Products of Combustion
Kitchen	Preferred			
Basement	Preferred	Acceptable		
Storage	Preferred	Acceptable		
Trash	Preferred	Acceptable		
Garage		Preferred		
Accessible Attic			Preferred	
Sleeping Area				Preferred
Hallways	Acceptable			Preferred

Source: Based on Robert James Sorensen, *Design for Accessibility* (New York: McGraw-Hill Book Company), 1979.

**Instructional Materials**

In addition to the reproduction-ready fire safety materials provided in the appendix at the end of this report, other materials, such as “Emergency Procedures for Employees With Disabilities in Office Occupancies,” is available from the U.S. Fire Administration Publications Office or on its web site at <http://www.usfa.fema.gov>.



## CONCLUSIONS

Older adults are the fastest growing segment of the American population and are also one of the groups at highest risk for fire deaths. The risk of dying in a fire rises significantly once an individual reaches the age of 65 and even more so for those over the age of 80. Characteristically, elderly fire casualties are in close contact with the source of the fire that kills them, and they often have physical impairments that impede their escape. In many cases, the elderly person's clothing or bedding catches fire, which significantly reduces his or her ability to extinguish or escape the fire. Moreover, physical impairment or incapacitation often prevents older adults from performing life-saving actions such as stop, drop, and roll.

Conditions associated with the aging process place older adults at increased risk for fire injury and death. Chronic illness, disabilities, and impairments limit mobility and cognitive functions and increase the potential for accidentally igniting a fire. Aging bodies have decreased healing mechanisms. As a result, older adults tend to die from smaller burns, have longer hospital stays, and require more time to recuperate from burn injuries. Furthermore, many medications prescribed to treat ailments of the elderly can cause confusion, lethargy, and stupor—conditions that can be multiplied greatly with the consumption of alcohol.

Sociological issues play a role in the potential risks of fire incidence and casualties among older adults. Poverty, a well-documented fire risk factor, affects nearly 20 percent of the elderly population. A fixed income forces many older adults to retain unsafe appliances, use high-risk alternative heat sources, and forgo the purchase of smoke alarms and batteries. The home environment that older adults inhabit and the degree of support they receive from family, friends, and neighbors also affect their fire risks. Group assisted-living homes can increase risk because the residents who require assistance generally outnumber the staff available. Construction elements and design as well as hazardous medical supplies and equipment may create additional dangers in the event of a fire.

Individuals living alone and without social support are more susceptible to unduly high fire risks. They are also less likely to engage in basic fire prevention practices due to physical limitations. Outside assistance may be necessary to install and maintain smoke alarms, clean grease buildup from the stove, or replace worn or frayed electrical wiring.

By practicing a few simple fire safety tips, older adults can reduce their chances of experiencing a fire and subsequent injury or death. While self-empowerment is an important component, the general population must also engage in activities that reduce the risk that fires pose to the elderly. Caregivers, family members, and friends of the elderly must contribute actively to maintaining fire safety measures for their aging parents, patients, and friends. As the Nation's elderly population grows, the fire safety community must address the needs of older adults or be faced with the potential for a massive public health problem.



## APPENDIX: FIRE SAFETY TIPS FOR OLDER ADULTS

The following fire safety tips are organized in three sections: before the fire, during the fire, and fire prevention. While these tips represent many fire safety approaches, the use of smoke alarms and exit planning should be considered the most crucial. The U.S. Fire Administration considers smoke alarms to be the single most important piece of fire safety equipment available today. Exit planning is also extremely important, especially for individuals who may have difficulty exiting a burning building.

These fire safety tips are reproduction ready. They may be used as education material by fire service, life safety, or health educators. Permission to reproduce them for that purpose is granted. Proper credit should be given to the U.S. Fire Administration and the Federal Emergency Management Agency. These tips are printed in large font to enable people with vision impairments to read them more easily.



## Before the Fire

***Identify the Nearest Emergency Exit.*** Whether you are at home or elsewhere, you should always know the location of the nearest exit. This could save your life in an emergency.

***Heed Fire Safety and Design Guidelines.*** Walkways and doorways should accommodate any mobility impairment the individual may have. For example, doorways should accommodate a wheelchair's width, and flooring material should accommodate artificial limbs, walkers, or canes.

***Install Smoke Alarms.*** The single most important step you can take to save your life during a fire is to install a smoke alarm that suits your needs. A working smoke alarm can make a vital difference in the event of a fire and may reduce the risk of dying in a fire by as much as 60 percent. A properly functioning alarm can alert you to the presence of deadly smoke while there is still time to escape. Place alarms next to each sleeping area and on every floor of your home. Keep smoke alarms clean by vacuuming or having them vacuumed regularly. Test batteries monthly, and replace them annually. Ask friends, family members, building managers, or someone from the fire department to install and test the batteries of a smoke alarm if it is hard to reach. If your smoke alarms are hardwired (connected to the electric circuitry of your residence), make sure they are also equipped with battery backups.

To accommodate wheelchair users in public buildings, manual alarm pull stations should be mounted no higher than 48 inches from the floor. If manual alarms are mounted higher than 48 inches, these devices should be retrofitted with attachments that make them accessible to a wheelchair user.

***Have a Fire Extinguisher—and Learn How To Use It.*** If you are confined to a wheelchair, consider mounting (or having someone mount) a small “personal use” fire extinguisher in an accessible place on your wheelchair and become familiar with its use. Then, if you can-

not “stop, drop, and roll” during a fire, you should “pull, aim, squeeze, and sweep.”

***Live Near an Exit.*** If you live in an apartment building, try to get an apartment on the ground floor. If this is not possible, know where the exit stairwell is and plan to wait there for help if you cannot take the stairs in the event of a fire.

If you live in a multistory house, try to sleep on the ground floor. Make sure a phone (or a TTY/TDD if you use one) is next to your bed, within arm’s reach. Keep emergency telephone numbers and hearing aids (if necessary) handy as well. If necessary, construct an exit ramp for emergency exits. It is recommended that ramps be at least 36 inches wide. Guardrails and handrails should be 44 to 48 inches high and 34 to 38 inches wide.

***Plan and Practice Escape Plans.*** Knowing your escape plan is one of the most important steps you can take to save your life in a fire. Plan your escape around your capabilities. Know at least two exits from every room. Make sure you can unlock all your doors and windows. Be sure you know how to open your windows. If security devices, such as bars, are installed across the windows, ensure that they release from the inside. Make any necessary accommodations (such as installation of exit ramps) to facilitate escape.

***Involve the Fire Department.*** Ask the fire department to help you plan an escape route, and inform them of your special needs. Ask the fire department to help identify any fire hazards in your home and explain how to correct them. Any areas you plan to use as a rescue area must be identified and agreed upon by you and officials from the fire department. Learn the fire department’s limitations, and make fire officials aware of yours.

## During the Fire

***Get Out and Stay Out.*** Leave your home as soon as possible. Do not try to gather personal possessions or attempt to extinguish a fire. Do not use the elevator. Once out, **do not go back inside.**

***Test the Doors Before Opening Them.*** Using the back of your hand, reach up high and touch the door, the doorknob, and the space between the door and the frame. If anything feels hot, keep the door shut and use your second exit. If everything feels cool, open the door slowly and exit as low to the ground as possible if smoke is present.

***Stay Low and Go.*** Crawl low and keep under the smoke, if you are physically able. If not, try to cover your mouth and nose to avoid breathing toxic fumes, and make your way to safety as quickly as possible.

***What To Do If You Are Trapped.*** Close all the doors between you and the fire. Fill cracks in doors and cover all vents with a damp cloth to keep smoke out. If possible, call the fire department and tell them where you are located. Signal rescuers from a window with a light-colored cloth.

***Stop, Drop, and Roll.*** If any part of you catches fire, do not run and do not try to extinguish the flames with your hands. Cover your face with your hands. Drop to the ground, rolling over and over. If you have a disability that prevents your taking these actions, try to keep a flame-resistant blanket or rug nearby to smother any flames.

## Fire Prevention

***Cooking.*** Never leave the stove unattended while cooking. If you need to step away from the stove, turn it off. Wear tight-fitting clothing when cooking over an open flame, and keep towels and potholders away from the flame. If food or grease catches fire, smother the flames by sliding a lid over the pan and turning off the heat. Do not try to use water to extinguish a grease fire. When deep-frying, never fill the pan more than one-third full of oil or fat. Never put foil or other metals in

the microwave. Make sure the stove is kept clean and free of grease buildup. Turn pot handles away from the front of the stove so they cannot be knocked off or pulled down.

**Electrical Safety.** Electric blankets should conform to the appropriate standards and have overheating protection. Do not wash blankets repeatedly as this can damage their electrical circuitry. If an appliance begins to smell suspicious or emit smoke, unplug it immediately. Replace all frayed or broken electrical cords. Never use an appliance with exposed wires. Never overload extension cords, and keep them out of traffic areas. Use only tested and UL-listed electrical appliances.

**Smoking.** Never smoke in bed. Make sure that you are alert when you smoke. If a gas stove or oxygen source is nearby, do not smoke. Place signs stating that oxygen is in use and warning visitors to refrain from smoking. Do not smoke while under the influence of alcohol or if you are taking prescription drugs that can cause drowsiness or confusion. Never leave smoking materials unattended, and collect them in large, deep ashtrays. Check around furniture, especially upholstered furniture, for any discarded or smoldering smoking materials. Soak the ashes in the ashtray before discarding them.

**Space Heaters.** Give space heaters space. Keep heaters at least 3 feet from any combustible material, including people. Follow the manufacturers' directions regarding operation, fueling, and maintenance of your space heater. Do not use heaters or other heating devices to dry clothing.

**Heating.** Have your heating systems and chimneys checked and cleaned annually by a professional. Never store fuel for heating equipment in the home. Keep fuel outside or in a detached storage area or shed.

*Fireplaces.* Open fireplaces can be hazardous; they should be covered with tempered glass doors and guarded by a raised hearth 9 to 18 inches high.

**For more information, contact:**  
The United States Fire Administration  
Office of Fire Management Programs  
16825 South Seton Avenue  
Emmitsburg, MD 21727

**Or visit the USFA website:**  
[www.usfa.fema.gov](http://www.usfa.fema.gov)



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## **APPENDIX B**

# **CHILDREN AND FIRE IN THE UNITED STATES: 1994-1997**



**CHILDREN AND FIRE IN THE UNITED STATES: 1994-1997**

**Federal Emergency Management Agency  
United States Fire Administration**

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## **Introduction**

The purpose of this report is to analyze and discuss the incidence of fires involving children. According to National Center on Health Statistics data, there has been a consistent decline in child mortality from fire over the past decade. However, hundreds of child deaths from fire continue to occur each year. Children playing fires account for a large portion of child fire deaths and the majority of fire-related deaths among children are the result of residential fires. This report devotes sections to each of these factors.

## **Methodology**

### **Data Sources**

This report uses two primary data sources as the basis of analysis. The National Center on Health Statistics (NCHS) data from 1994-1996 on child mortality from accidents due to fire and flames (ICD code 890-899) and general population data are used to identify:

- number of annual deaths reported for each of three age groups (infant, 1-4, and 5-9)
- deaths/million population
- risk factor based on age and ethnicity of victims (white and African-American)

Portions of the National Fire Incident Reporting System (NFIRS) data from 1994-1997 are used to describe fires associated with child injuries and deaths. All states, and fire departments within them, have been invited to participate in NFIRS on a voluntary basis. Participating fire departments collect a common core of information on fire and casualty reports using a common set of definitions. In 1995, thirty nine states and the District of Columbia were reporting to NFIRS with 39% of the more than 33,000 fire departments providing data to the system.<sup>1</sup> NFIRS data provide information on fires of all types and are used in studies conducted by many agencies including the Consumer Product Safety Commission, Department of Transportation and the Department of Housing and Urban Development.

In addition to the primary data sources, findings from the Consumer Product Safety Commission (CPSC) are used to support some of the findings of the primary analysis.

CPSC data analysis uses NFIRS data and the National Fire Protection Association's (NFPA) annual survey of fire departments.

### **Definitions**

**Child** - For the purpose of this report, a child is defined by the ages of birth through nine years. This age range was chosen for two reasons. Using this age range corresponds to the current age categories used by NCHS of: under one year, one to less than five years, and five through nine years. Using this definition also enables comparison of findings of the 1993 Children and Fire Report as well as other studies.

**Adjusted Percentages** – Where data sets contained unknowns, percentages were adjusted by weighting the unknown incidents based on occurrence of known incidents. The adjusted percentage was computed using only those incidents for which the cause was provided. This, in effect, distributes the fires for which the cause is unknown in the same proportion as the fires for which the cause is known. This method was used to account for unknown data since the distribution of the unknowns is assumed to follow the distribution of the knowns. It is the best method available without additional knowledge of the nature of the unknown and is suggested and described in detail by both Hall and Harwood<sup>2</sup> and in the tenth edition of *Fire in the United States*.<sup>1</sup>

**Population Numbers** – Population numbers obtained from NCHS represent resident population only and are estimates for the years utilized in this report.

### **Limitations**

Although NFIRS is not a random sample, it is believed that the distribution of participating fire departments is a reasonable representation of all fire departments in the U.S. In 1995, over 835,400 fire incidents were collected by NFIRS; about 42% of the estimated total attended by fire departments.<sup>1</sup> The actual numbers available in NFIRS are cited in this report as the sample size ( $n =$ ) notation found in the tables and charts.

A second limitation is that the data sets used for this report collect information using different methods. Therefore, sample size numbers may vary among these data sets.

**Demographic Profile**

**Child Fire Death Rates**

Table 1 presents a general overview of the relationship of child mortality to overall population fire deaths reported for the years 1994-1996. Although the actual number of reported fire deaths for children has decreased over three years, the percentage of child fire deaths in relationship to population for the age groups shows only a minimal decrease. Table 1 shows the comparison of child fire deaths to that of the total population. The population of children from birth to 10 years of age has decreased from 16% in 1994 to 14% in 1996. This has been accompanied by a decrease from 23% to 18% of the total fire deaths. Table 2 shows the comparison of child fire deaths by age group. While the percentage of fire deaths in relationship to population has decreased somewhat over those years, it still remains higher for children than for the general population. This table also demonstrates the vulnerability of the 1 through 4 age group. Although decreasing from 65% on 1994, this age group still accounts for 60% of all the reported fire deaths for children.

**Table 1. Percent of Fire Deaths by Population**

<b>Age</b>	<b>Year</b>	<b>Population</b>	<b>% of Population</b>	<b>Fire Deaths</b>	<b>Total % of Fire Deaths</b>
<b>Birth –9 years</b>	1994	38,585,750	16	940	23
	1995	38,811,104	15	734	20
	1996	38,727,149	14	660	18
<b>Over 10</b>	1994	221,755,239	84	3046	77
	1995	224,144,166	85	3027	80
	1996	226,556,634	86	3081	82

Source: NCHS

Table 2. Percent of Child Fire Deaths by Age Group

Age	Year	Population	% of Population	Fire Deaths	Total % of Fire Deaths
<b>Under 1</b>	1994	3,870,185	3	93	2
	1995	3,848,106	1	64	2
	1996	3,769,485	1	56	2
<b>1-4</b>	1994	15,856,964	6	601	15
	1995	15,743,042	6	446	12
	1996	15,516,482	6	408	11
<b>5-9</b>	1994	18,858,601	7	246	6
	1995	19,219,956	8	224	6
	1996	19,441,182	7	196	5

Source: NCHS

**Variation in Risk**

The relative risk for fire death is determined by first determining the deaths per capita of the overall population (number of deaths reported for each year divided by the total population for the year). Then the deaths per capita for each age group is calculated and divided by the per capita death rate of the overall population. For example, if the deaths per capita for the general population for a given year was 19.32 and the deaths per capita for those under the age of four were 41.99, those under the age of four have a 2.17 relative risk for fire death – over twice that of the general population.

Table 3 presents a breakdown of the overall risk for children dying in a fire for the years 1994-1996. Overall, the relative risk of dying in a fire has decreased slightly over three years. However, the 1-4 age group is still 1 ½ times more likely to die in a fire than the general population (relative risk = 1.49).

The relative risk for children dying in a fire also varies considerably depending on gender and ethnicity. Table 4 presents the breakdown of risk according to gender and ethnicity for each age group. Ethnicity data is limited, since only white and African-American data are collected separately by NCHS. Data presented in Table 4 are for the year 1996

only. Girls have a higher risk of fire death under the age of one. In the other two age categories, boys have a higher risk.

Of particular concern is the variation in fire death risk based on ethnicity. African American children are at considerably higher risk of fire death relative to white children in all age categories. In 1991, African American males in the 1-4 age group were 6 times (relative risk = 5.95) more likely to die in a fire than white males.<sup>3</sup> Although down slightly from 1991, African American males in the 1-4 age group are still 5 times more likely to die in a fire than their white counterparts and remain at the highest relative risk (5.17) for fire death.

**Table 3. Relative Risk of Fire Death for Children**

<b>Age</b>	<b>Year</b>	<b>Fire Death Rate/million</b>	<b>Relative Risk*</b>
<b>Under 1</b>	1994	15.3	1.56
	1995	14.3	1.17
	1996	14.1	1.07
<b>1-4</b>	1994	15.3	2.08
	1995	14.3	1.62
	1996	14.1	1.49
<b>5-9</b>	1994	15.3	0.85
	1995	14.3	0.82
	1996	14.1	0.72

Source: NCHS

\*Relative risk of general population is 1.00 based on the fire death rate for each year per million population for the U.S. as a whole.

**Table 4. Relative Risk of Fire Death for Children Based on Gender and Ethnicity Compared to General Population**

Age	Gender/ Ethnicity	1996 Fire Deaths	Deaths/ Million	Relative Risk*
<b>Under 1</b>	White/Male	16	10.66	0.76
	White/Female	16	10.88	0.77
	African/ American/Male	9	32.14	2.28
	African/ American/Female	12	44.61	3.16
<b>1-4</b>	White/Male	141	22.42	1.59
	White/Female	84	14.04	1.00
	African/ American/Male	89	72.95	5.17
	African/ American/Female	75	63.56	4.51
<b>5-9</b>	White/Male	68	8.63	0.61
	White/Female	46	6.15	0.44
	African/ American/Male	40	25.48	1.81
	African/ American/Female	35	23.03	1.63

Source: NCHS

\* Relative risk of the general population is 1.00 based on a fire death rate of 14.1 per million population for the U.S. as a whole.

### **Patterns of Child Fire Deaths**

#### **Seasonal Patterns**

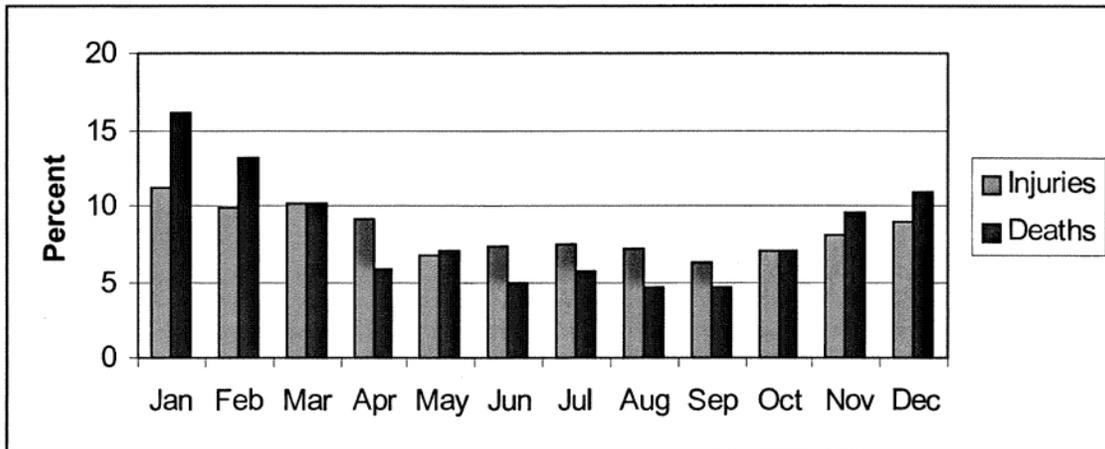
Table 5 presents the break down by month for child injuries and deaths due to fire for the years 1994-1997. Figures 1 and 2 display the annual average by month for child fire injuries and deaths for the years 1994-1997. Injuries and deaths appear to follow the same trends. The greatest percentage of child fire injuries and deaths has consistently occurred during the winter months. This can be attributed to a degree to the fact that people generally spend more time indoors during the coldest months and use heating sources including furnace, fireplace and space heaters.

Table 5. Percent of Reported Child Fire Injuries and Deaths by Month

	1994		1995		1996		1997	
	Injuries (n=1195)	Deaths (n=468)	Injuries (n=794)	Deaths (n=312)	Injuries (n=866)	Deaths (n=293)	Injuries (n=789)	Deaths (n=253)
Jan	12.5	18.8	9.9	12.5	9.5	18.6	13.0	14.6
Feb	11.5	9.9	8.8	21.2	10.9	11.7	8.5	10.1
Mar	9.7	12.8	10.6	9.7	8.4	9.3	12.1	8.9
Apr	9.5	7.9	8.9	6.0	10.7	4.9	7.4	4.4
May	6.4	6.9	7.1	6.4	6.3	6.3	7.1	8.4
Jun	7.5	4.6	7.1	3.2	7.7	6.3	7.1	5.6
Jul	7.1	4.6	7.7	6.4	7.1	5.8	8.1	5.6
Aug	7.2	4.6	7.1	4.6	7.6	5.3	6.9	3.9
Sep	6.8	6.6	6.4	1.8	4.7	3.9	7.3	6.1
Oct	6.2	4.2	7.8	8.7	7.9	5.8	6.0	9.5
Nov	6.0	8.9	10.1	7.4	8.4	9.3	7.4	12.3
Dec	9.0	9.9	7.9	11.5	10.3	12.2	8.5	10.1

Source: NFIRS

Figure 1. Average Percent of Child Fire Injuries and Deaths by Month



Source: NFIRS

**Weekday**

Table 6 presents the breakdown of child injuries and deaths due to fire by weekday.

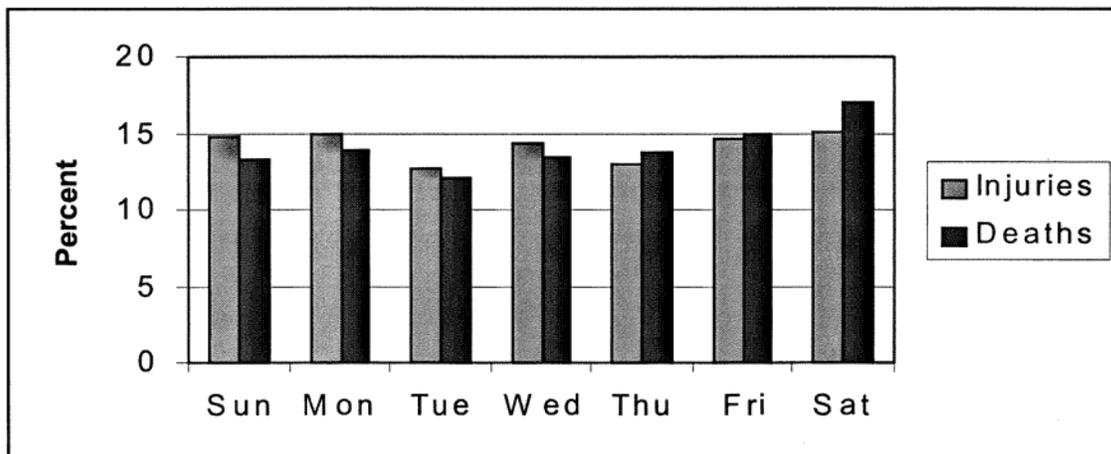
Figure 2 present the annual average of injuries and deaths for 1994-1997. Both injuries and deaths are distributed relatively evenly throughout the week.

Table 6. Percent of Reported Child Fire Injuries and Deaths by Weekday

	1994		1995		1996		1997	
	Injuries (n=1195)	Deaths (n=468)	Injuries (n=794)	Deaths (n=312)	Injuries (n=866)	Deaths (n=293)	Injuries (n=789)	Deaths (n=253)
<b>Sun</b>	11.6	12.5	14.3	14.8	16.8	14.7	16.5	11.2
<b>Mon</b>	14.3	14.8	14.1	13.4	14.6	10.7	16.5	16.8
<b>Tues</b>	13.4	11.5	13.9	10.1	12.2	14.7	11.4	12.3
<b>Weds</b>	15.5	13.8	12.3	10.6	15.5	13.7	14.0	15.7
<b>Thurs</b>	14.0	11.8	14.1	15.5	13.1	13.2	10.9	14.6
<b>Fri</b>	13.8	15.5	17.0	15.7	13.4	16.6	14.4	11.7
<b>Sat</b>	17.1	19.1	13.7	18.0	14.1	15.1	15.4	15.7
<b>Unk</b>		0.6		0.4		0.9		1.6

Source: NFIRS

Figure 2. Average Percent of Child Injuries and Deaths by Weekday



Source: NFIRS

### Time of Day

Table 7 presents the breakdown of child injuries and deaths due to fire by time of day. Figure 3 present the annual average of injuries and deaths for 1994-1997. With the exception of 1996, the greatest number of injuries occurred from 0800-1159. With the exception of 1994, the greatest number of deaths occurred between midnight and 0400. The least number of both injuries and deaths occurred from 0400-0759.

Both injuries and deaths are more frequent during nighttime hours (8:00 PM to 8:00 AM). Most household members are likely to be asleep during these hours. That, coupled

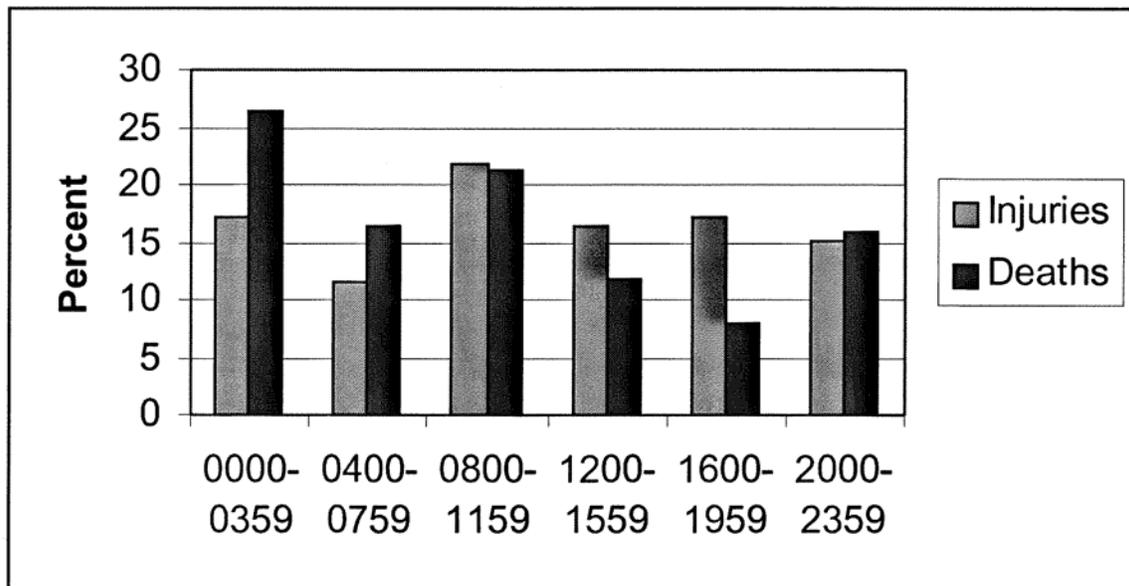
with the smoke detector data presented later in this report, may allow fires to extend farther before they are detected, thus decreasing the chance of escape.

**Table 7. Percent of Reported Child Fire Injuries and Deaths by Time of Day**

	1994		1995		1996		1997	
	Injuries (n=1195)	Deaths (n=468)	Injuries (n=794)	Deaths (n=312)	Injuries (n=866)	Deaths (n=293)	Injuries (n=789)	Deaths (n=253)
0000-0359	16.6	21.5	17.3	27.6	17.7	25.0	17.1	32.0
0400-0759	11.7	17.7	11.0	18.3	11.6	16.0	11.8	13.9
0800-1159	24.8	24.0	25.3	23.0	18.2	19.8	19.5	18.5
1200-1559	16.6	13.5	14.7	9.6	16.3	11.3	18.3	12.4
1600-1959	14.9	7.5	16.5	7.6	20.1	9.2	17.3	7.6
2000-2359	15.3	15.8	14.6	13.8	15.8	18.4	15.0	15.3

Source: NFIRS

**Figure 3. Average Percent of Child Injuries and Deaths by Time of Day**



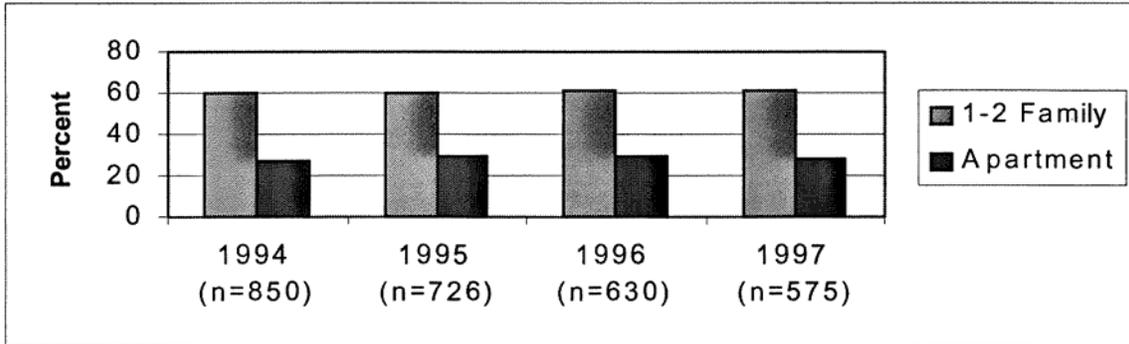
Source: NFIRS

**Residential Fires**

**Where Fires Occur**

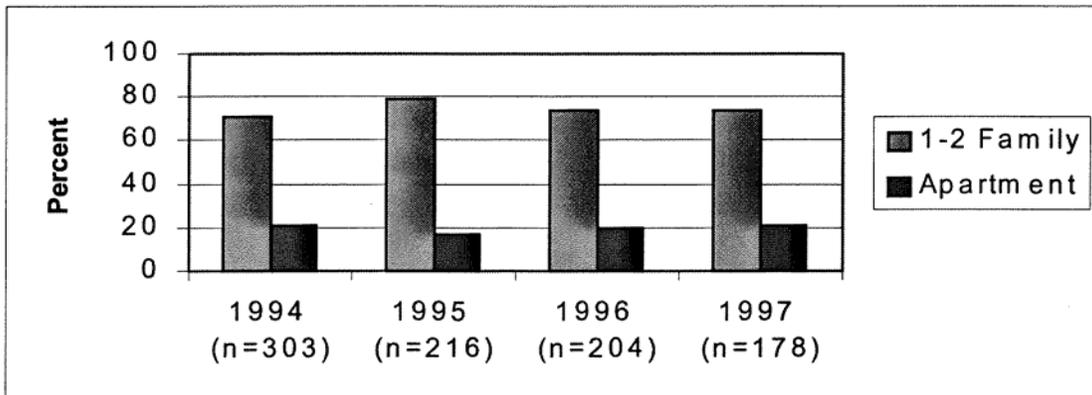
Figures 4 and 5 present the type of residential fires that resulted in child injuries and deaths for the years 1994-1997. The *n* noted is for number of reported incidents. Of the fires that resulted in child injuries, an annual average of 90% were residential. Of the fires that resulted in child deaths, an annual average of 94% were residential. The majority of residential fires continue to occur in one and two family dwellings and apartments. The percentage of fatalities attributable to residential fires in one and two family dwellings is somewhat higher (74%) than for injuries (61%) in one and two family dwellings. In contrast, the percentage of fatalities attributable to residential fires in apartments is somewhat lower (20%) than for injuries (29%).

**Figure 4. Types of Residential Fires Resulting in Child Injuries by Year**



Source: NFIRS

**Figure 5. Types of Residential Fires Resulting in Child Deaths by Year**



Source: NFIRS

**Area of Fire Origin**

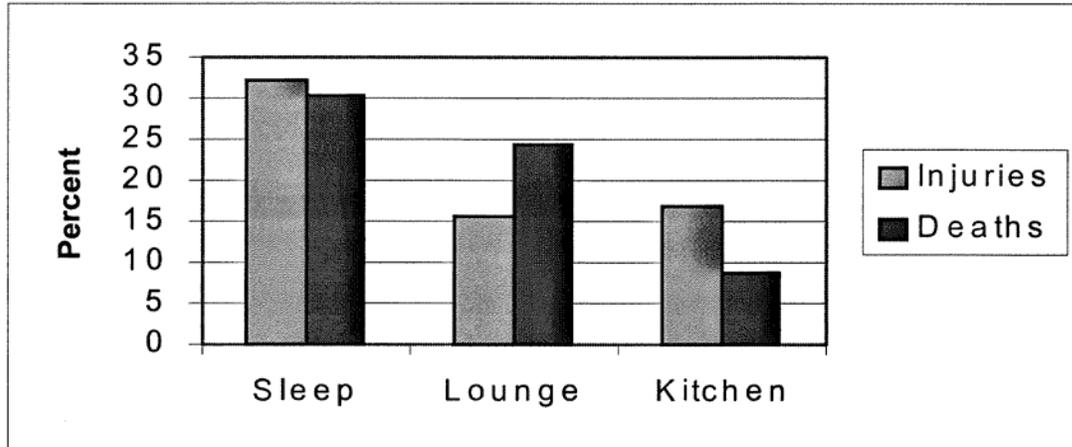
The top-ranking areas of fire origin for reported child fire injuries and deaths remain the same as those identified in the 1993 report: sleeping area, lounge area, and kitchen/cooking area. Although the total percentage reported related to these areas has decreased from the 71% in the 1993 report, they still account for over 60% of all child fire injuries and deaths. Table 8 presents the breakdown for each of these areas by year. Figure 6 compares the annual average for the years 1994-1997 for both injuries and deaths. The percentage originating in the sleep area resulting in deaths remained consistent with the findings (31%) of the 1993 report with the exception of 1996. The 25% noted for 1996 should be viewed as an isolated finding and not indicative of a decreasing trend. The percentage originating in the lounge area resulting in deaths has shown a slight decrease from the 31% noted in the 1993 report. The percentage of fires originating in the kitchen/cooking area that resulted in deaths showed a consistent decrease over the years of 1993 through 1996 (9% in 1993 to 6.8% in 1996). However, the percentage doubled to 12.3% in 1997. At this point, this should also be considered an isolated finding and further years should be studied.

**Table 8. Percent of Reported Child Fire Injuries and Deaths by Area of Origin Adjusted to Include Apportioned Unknown Responses, 1994-1997**

<b>Injuries</b>				
	<b>1994</b> (n=850)	<b>1995</b> (n=726)	<b>1996</b> (n=630)	<b>1997</b> (n=575)
<b>Sleep</b>	33.0	35.5	30.4	29.3
<b>Lounge</b>	16.1	17.0	15.8	13.7
<b>Kitchen</b>	13.4	12.9	21.1	20.5
<b>Unknown*</b>	5.0	4.0	5.1	5.5
<b>Deaths</b>				
	<b>1994</b> (n=303)	<b>1995</b> (n=216)	<b>1996</b> (n=204)	<b>1997</b> (n=178)
<b>Sleep</b>	32.6	33.3	25.0	30.3
<b>Lounge</b>	25.7	22.6	28.9	20.7
<b>Kitchen</b>	8.2	6.9	6.8	12.3
<b>Unknown*</b>	9.2	9.6	10.2	8.4

Source: NFIRS; \*Unknowns included for reference.

Figure 6. Average Percent of Child Fire Injuries and Deaths by Area of Origin



Source: NFIRS; Adjusted Percentages

### Causes of Fires

This section analyzes causes of reported fires involving child injuries and deaths for the years 1994-1997 from two aspects. The first aspect looks at equipment involved in ignition. The second aspect looks at the ignition factor.

#### Equipment Involved in Ignition

Approximately one-third of reported fires resulting in child injuries and deaths over the four years reviewed involved some type of equipment in ignition. Table 9 presents the breakdown of the four top-ranking equipment related causes for injuries and deaths. Cooking equipment was the leading cause of injuries with over two-thirds of the injuries the result of stoves. Heating systems were the leading cause of deaths.

**Table 9. Percent of Reported Child Fire Injuries and Deaths by Equipment Involved Adjusted to Include Apportioned Unknown Responses, 1994-1997**

<b>Injuries</b>				
	<b>1994</b> (n=850)	<b>1995</b> (n=726)	<b>1996</b> (n=630)	<b>1997</b> (n=575)
<b>Heating</b>	9.5	9.6	8.0	7.1
<b>Cooking</b>	10.0	9.4	15.9	17.7
<b>(Fixed Surface)</b>	(6.9)	(7.4)	(12.0)	(11.8)
<b>Electrical</b>	6.6	8.3	7.0	7.6
<b>Appliances</b>	4.2	4.2	3.0	3.7
<b>Unknown*</b>	15.2	15.3	15.3	14.1
<b>Deaths</b>				
	<b>1994</b> (n=468)	<b>1995</b> (n=312)	<b>1996</b> (n=293)	<b>1997</b> (n=253)
<b>Heating</b>	15.0	11.5	16.4	13.0
<b>Cooking</b>	3.2	5.1	3.1	5.1
<b>(Fixed Surface)</b>	(1.9)	(4.5)	(2.4)	(5.1)
<b>Electrical</b>	7.9	10.6	5.5	9.1
<b>Appliances</b>	1.7	2.9	1.7	3.2
<b>Unknown*</b>	27.3	26.3	23.9	29.6

Source: NFIRS; \* Unknowns included for reference

**Ignition Factors**

Data were reviewed for major forms of ignition and types and forms of material ignited. Over one-third of all fires involving child injuries and deaths were the result of open flame. Matches as the form of ignition remained relatively constant over the four years. There was a consistent yearly decrease in injuries (from 27% in 1994 to 18.4% in 1997) and in deaths (from 22.2% in 1994 to 12.6% in 1997) related to lighters over the four year period. However, matches and lighters still accounted for over two thirds of the reported open flame fires resulting in child injuries and deaths. Table 10 presents the percent of child injuries and deaths for 1994-1997 resulting from reported open flame fires as the form of ignition. It includes the breakdown of the percent of open flame fires attributed to matches and lighters.

**Table 10. Percent of Child Injuries and Deaths in Open Flame Fires Adjusted to Include Apportioned Unknown Responses, 1994-1997**

<b>Injuries</b>				
	<b>1994</b> (n=1195)	<b>1995</b> (n=794)	<b>1996</b> (n=866)	<b>1997</b> (n=789)
<b>Open Flame</b>	48.9	48.9	44.1	42.7
<b>Matches</b>	12.4	16.4	13.3	12.8
<b>Lighter</b>	27.0	21.5	20.1	18.4
<b>Unknown* Ignition Form</b>	21.6	19.3	17.9	21.7
<b>Deaths</b>				
	<b>1994</b> (n=468)	<b>1995</b> (n=312)	<b>1996</b> (n=293)	<b>1997</b> (n=253)
<b>Open Flame</b>	40.8	38.1	34.5	34.4
<b>Matches</b>	13.9	13.8	10.9	11.1
<b>Lighter</b>	22.2	19.2	13.7	12.6
<b>Unknown* Ignition Form</b>	35.5	43.9	34.2	43.2

Source: NFIRS; \* Unknown included for reference

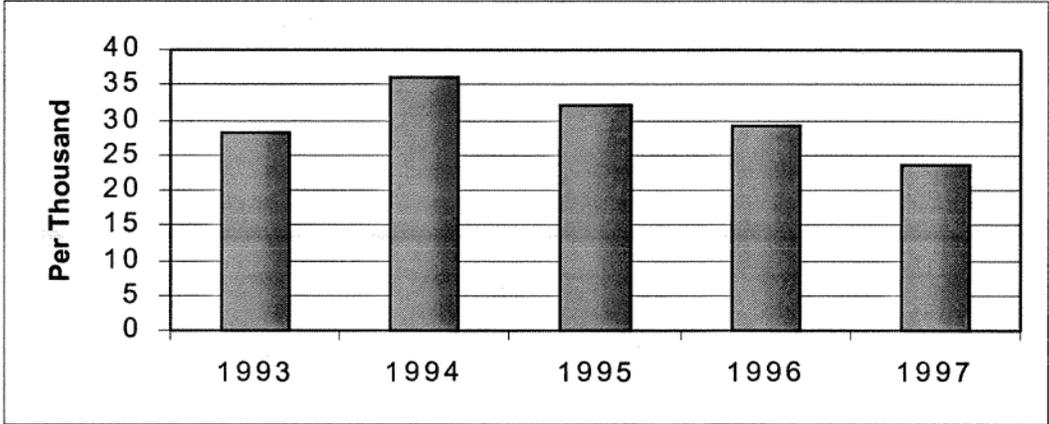
Based on adjusted percentages, NFIRS data from 1994-1997 also revealed that an annual average of 57% of all reported child fire injuries and 50% of all child deaths include either misuse of heat ignition or misuse of material involved in ignition. Over half (58%) of the child fire injuries and 62% of the child fatalities involving misuse of heat ignition or misuse of material involved in ignition were attributed to children playing.

### **Children Playing Fires**

Children playing fires account for a large proportion of reported child fire injuries and deaths. Although, not a total data set of all fires and related deaths and injuries, NFIRS provides a reasonable overall picture of the scope of the problem. Figure 7 presents the number of reported children playing fires for 1994-1997. The 1993 report estimated 25,400 children playing fires occurred in 1993<sup>3</sup> (p.22). Thus, 28.1 per thousand of all fires reported to NFIRS in 1993 were children playing fires. In 1997, 23.6 per thousand of all fires reported to NFIRS were children playing fires, a slight decrease from 1993. A review of the intervening years reveals an increase in 1994 to 36.2 per thousand of total fires reported. From 1995 through 1997, a small, but consistent, decrease is seen.

Figure 7 illustrates the number of children playing fires per thousand total fires reported from 1993 through 1997.

**Figure 7. Children Playing Fires per Thousand of Total Reported Fires, 1993-1997**



Source: NFIRS

**Form of Heat Ignition**

Lighters and matches remain the first and second most common forms of heat ignition in reported children playing fires. The easy availability of matches and lighters and their relative ease in use likely accounts for this high proportion of cases. These data highlight the importance of keeping these materials out of the hands of children.

Down from the 1993 report showing matches as the form of heat ignition in 58% of children playing fires, they are still the most common form. The decrease from the percent noted in the 1993 report has remained relatively consistent at an annual average of 42.2%. Lighters as a form of heat ignition has remained consistent at an annual average of 20.5%, down slightly from the 22% in the 1993 report.

Although matches are the leading form of ignition in children playing fires, lighters account for more injuries and deaths. However, the discrepancy appears to be narrowing. The fact that most lighters sold today are “child proof” as the result of the CPSC lighter regulation may account for some of the decrease in injuries and deaths attributed to lighters and for some of the decrease in the overall number of children playing fires.

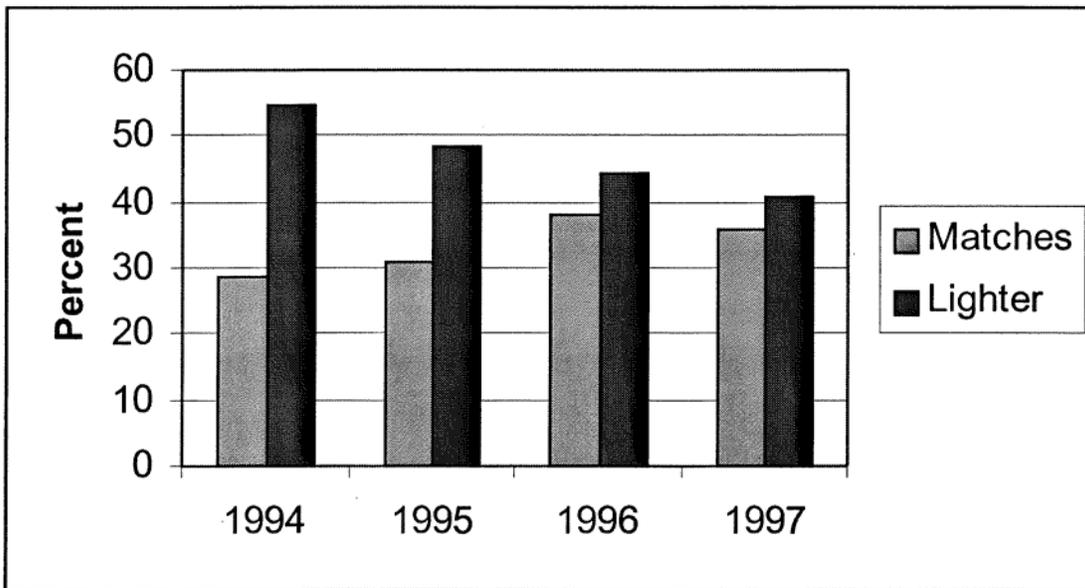
Table 11 shows the breakdown of injuries and fatalities from matches and lighters in children playing fires by year. Figures 8 and 9 show these data graphically.

**Table 11. Percent of Reported Injuries and Deaths from Matches and Lighters in Children Playing Fires Adjusted to Include Apportioned Unknown Responses 1994-1997**

<b>Injuries</b>				
	<b>1994</b> (n=1336)	<b>1995</b> (n=1131)	<b>1996</b> (n=1098)	<b>1997</b> (n=800)
<b>Matches</b>	28.7	30.9	38.0	35.8
<b>Lighter</b>	54.6	48.5	44.4	40.8
<b>Deaths</b>				
	<b>1994</b> (n=149)	<b>1995</b> (n=85)	<b>1996</b> (n=71)	<b>1997</b> (n=65)
<b>Matches</b>	30.9	34.1	32.4	26.2
<b>Lighter</b>	51.7	56.5	46.5	43.1
<b>Unknown* Ignition Form</b>	17.8	15.6	14.4	10.4

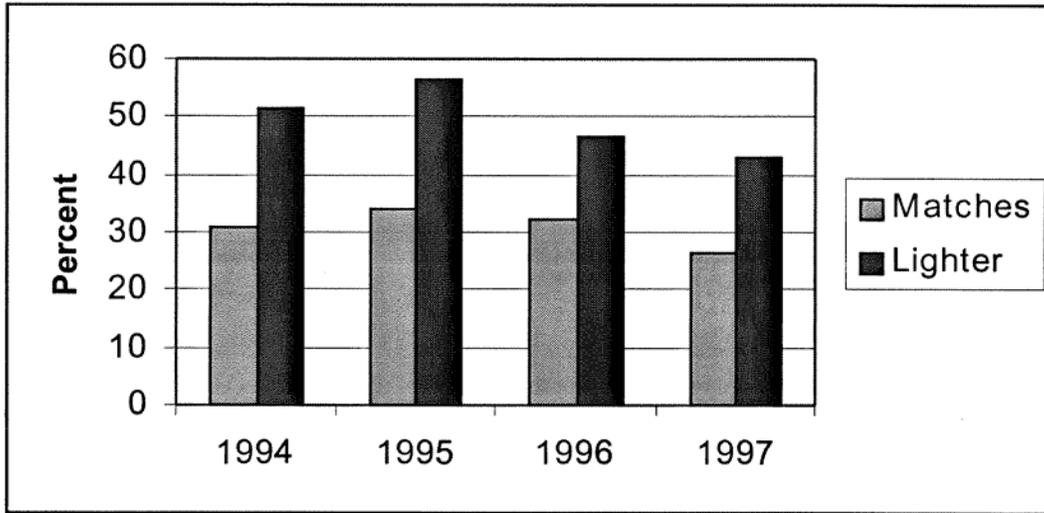
Source: NFIRS; \* Unknown included for reference

**Figure 8. Percent of Injuries from Matches and Lighters in Children Playing Fires**



Source: NFIRS ; Adjusted percentages

**Figure 9. Percent of Deaths from Matches and Lighters in Children Playing Fires**



Source: NFIRS; Adjusted percentages

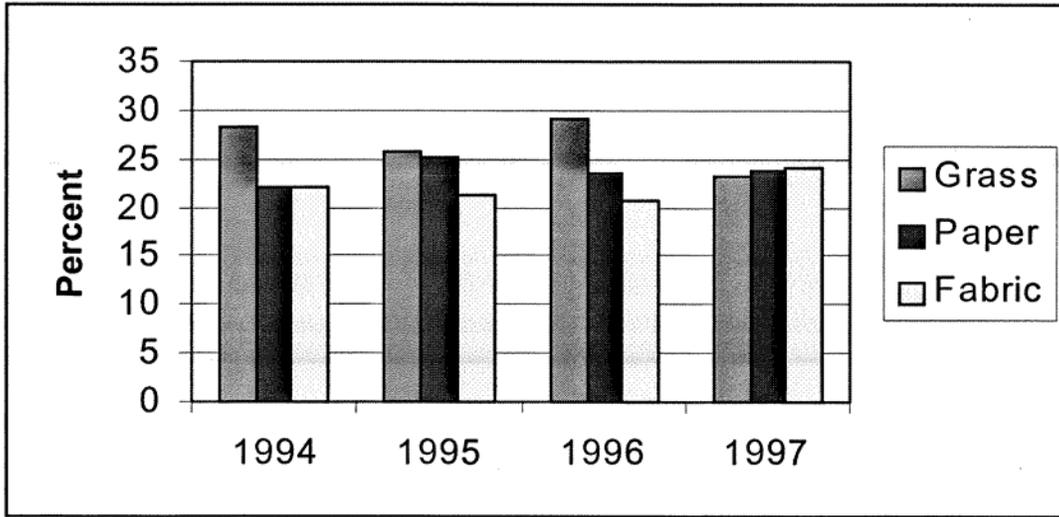
### Material Ignited

Of the nine NFIRS categories for material ignited, two-thirds of all children playing fires reported for 1994-1997 are relatively evenly distributed between three categories: grass/leaves, wood/paper, and fabric. Grass/leaves account for approximately 25% of all reported children playing fires. The fact that so many fires are set by children outdoors raises an interesting issue. “Children playing” fires involve three categories of child fire setters. These are children too young to understand the dangerous implications of playing with fire, children having reached the “age of reason” (usually defined as eight and older), and children who set fires intentionally. This last category raises special concerns. According to the United States Fire Administration’s report “Arson and Juveniles: Responding to the Violence”, two-thirds of all arson fires in 1994 occurred outdoors.<sup>4</sup> Intervention may be needed to prevent these “children playing” fire setters from becoming juvenile fire setters and, perhaps, juvenile or adult arsonists.

Although NFIRS data do not allow identification of the age of a child who starts a fire, one hypothesis is that younger children set more indoor fires, especially those involving the ignition of fabrics, and older children are more involved with igniting materials found outdoors. Figure 10 depicts the breakdown of material ignited in the reported children

playing fires for the years 1994-1997. “Paper/cardboard” is a subcategory of Wood/Paper and “cotton” is a subcategory of Fabrics. These subcategories account for half of the material ignited in each of their respective categories.

**Figure 10. Material Ignited in Children Playing Fires Adjusted to Include Apportioned Unknown Responses**

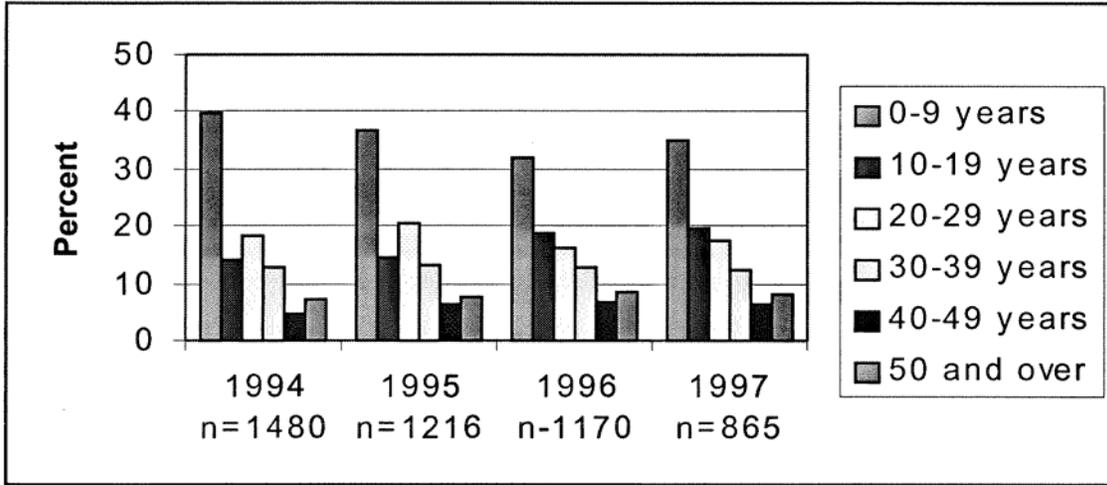


Source: NFIRS; Adjusted Percentages

### Victims of Children Playing Fires

Victims of children playing fires occur in all age groups, but children themselves account for the greatest number of victims. Combining age groups to include those from birth through nine years, children account for over one-third of the reported casualties resulting from children playing fires. Figure 11 displays the breakdown by age group of all reported fire casualties associated with children playing fires for the years 1994-1997. This varies from the 1993 report that analyzed deaths due to children playing fires by age group for only residential fires.

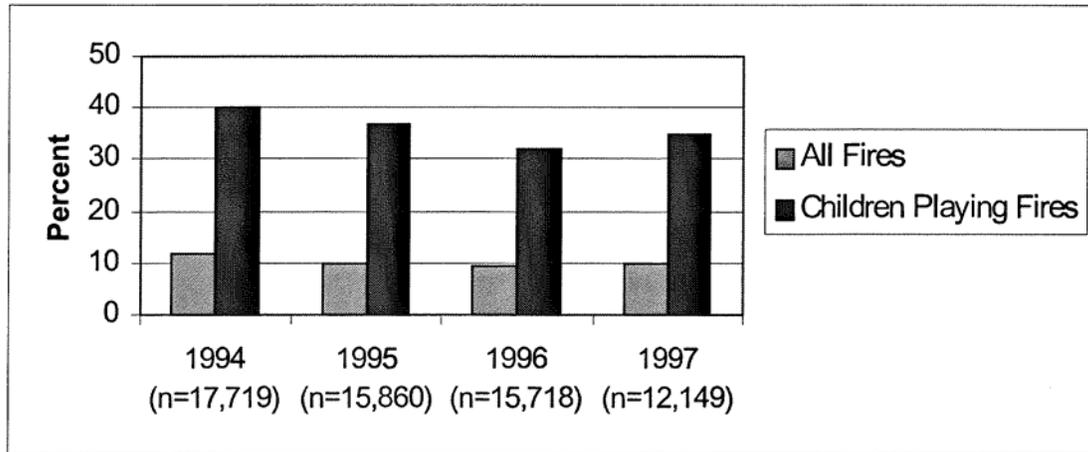
Figure 11. Percent of Casualties by Age Due to Children Playing Fires



Source: NFIRS; Adjusted Percentages

An additional comparison of child casualties between the total casualty data and the children playing fires data was also conducted. Comparing these data further supports the fact that the majority of child fire casualties occur in relationship to children playing fires. This should further the concern for the need to remove materials that can ignite fires from the reach of children. Figure 12 presents the reported total child fire casualties compared to child casualties related to children playing fires.

Figure 12. Percent of Child Casualties in All Fires Compared to Children Playing Fires



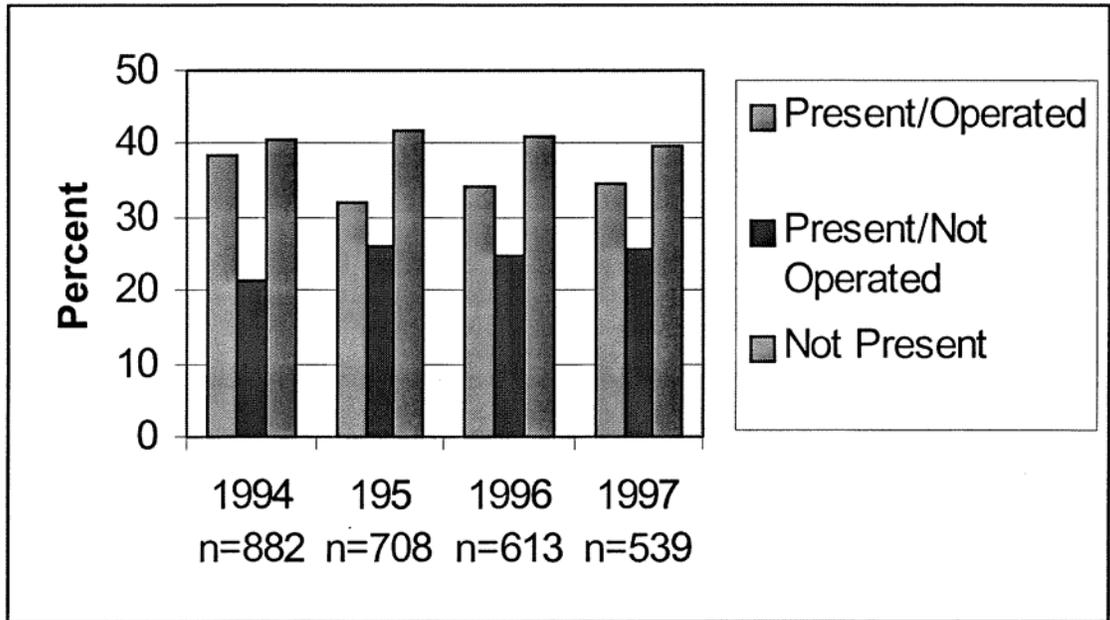
Source: NFIRS; Adjusted Percentages

**Impact of Smoke Detectors**

The importance of smoke detectors in preventing fire injuries and deaths among children cannot be overstated. Figures 13 and 14 show smoke detector status in fires involving child injuries and deaths for the years 1994-1997. Data used in these figures are only for cases where detector presence and operability were known.

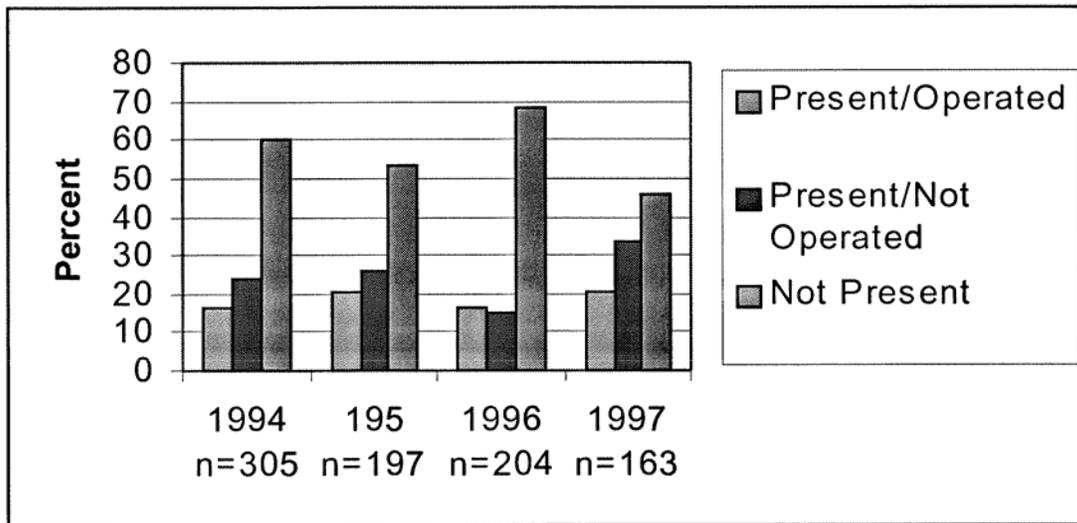
Based on reported data, the impact of detectors is compelling. Two-thirds of the annual reported child fire injuries and over three-fourths of child fire deaths occurred where there was no operable smoke detector. This raises a concern of a potential false sense of security with a detector present. It also reinforces the importance of educating the public to changing batteries on a regular basis to maintain existing detectors and placing detectors in sleeping areas where approximately one-third of fires involving child injuries and deaths originate.

**Figure 13. Percent Comparison of Reported Smoke Detector Status in Fires Resulting in Child Injuries**



Source: NFIRS

Figure 14. Percent Comparison of Reported Smoke Detector Status in Fires Resulting in Child Deaths



Source: NFIRS

### Conclusions

This report has highlighted a number of facts about the fire experiences of children in the U.S. that should help mold public education efforts aimed at this target group. Among the key findings are:

- All children do not experience the same risk. Younger children (birth through 4 years) are at a significantly higher risk than older children (5 through 9 years). Among all children under age ten, African American children face inordinate fire risks relative to white children. This finding must be taken in context of other studies that show a strong correlation between socioeconomic factors such as poverty and education. A larger percentage of African Americans fall into the poverty and lower education categories than other cultures. The reader is referred to the United States Fire Administration, *Socioeconomic Factors and the Incidence of Fire* report for further information. However, the findings of this report should help public educators target their efforts to affected groups to make them aware of the gravity of the situation.

- Data demonstrate that the majority of child fire deaths occur during the colder months. This is substantiated in the data that show heating equipment as the top-ranking cause in fires with equipment involved in ignition.
- Although occurrence of injuries and deaths is relatively consistent for day of the week, the time of day analysis shows the greatest number of injuries occurred from 0800-1159 and the greatest number of deaths occurred between midnight and 0400.
- The majority of fires resulting in child fire injuries and deaths originate in the sleeping area, with the most common form of material ignited indoors being fabric.
- Children playing fires are a major factor in fire injuries and deaths in general and child fire injuries and deaths in specific. Comparison of NFIRS data reveals that the majority of all child injuries and deaths are related to children playing fires. These fires are usually started with matches or a lighter. These findings highlight the critical importance of adequate supervision of children.
- A disproportionate number of child fire injuries and deaths occur in homes without operating smoke detectors. Universal installation in high incidence areas of fire origin and maintenance of smoke detectors is of the utmost importance for the prevention of future child fire deaths.

References

- <sup>1</sup> United States Fire Administration. (1995). *Fire in the United States* (10<sup>th</sup> ed.); 11-16.
- <sup>2</sup> Hall, J. & Harwood, B. (1989). The national estimates approach to U.S. fire statistics. *Fire Technology*, 25(2); 99-113.
- <sup>3</sup> United States Fire Administration (1991). *Children and fire*. p. 6.
- <sup>4</sup> United States Fire Administration (1994). *Arson and juveniles: responding to the violence*. p. 3.

