STRATEGIES FOR REDUCING RESIDENTIAL COOKING FIRES

Strategies for Reducing Residential Cooking Fires

Kristopher W. Shrader
Deputy Chief
Martinsville Fire & EMS Department
Martinsville, Virginia
Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: 

Kristopher W. Shrader
Abstract

The problem is that the Martinsville Fire & EMS Department (MF&EMS) does not have a risk-reduction program designed to reduce the number of residential cooking fires, which could lead to preventable property loss, injuries and deaths. The Administration of MF&EMS hypothesizes that such a program would reduce the total number of residential cooking related fires within the City of Martinsville. The purpose of this applied research project is to determine the known strategies for reducing residential cooking fires and determining which strategies the department should utilize to develop and implement a residential cooking fire risk-reduction program.

The descriptive research method was used to answer the following research questions: (a) What national strategies are there for reducing the number of residential cooking fires? (b) What strategies are other localities in southwest Virginia using to reduce the number of residential cooking fires within their locality? (c) What strategies should the MF&EMS use in developing a risk-reduction program aimed at reducing the number of residential cooking fires within the City of Martinsville?

The procedures utilized to conduct the research for this applied research project included a review of applicable literature and personal interviews with other fire departments within southwest Virginia. Based on the literature review and personal interviews, it is recommended that the MF&EMS develop a cooking fire risk reduction program utilizing the Five E’s methodology with performance measures to gauge the program’s effectiveness.
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Strategies for Reducing Residential Cooking Fires

Introduction

The United States consistently has one of the highest fire loss records when compared with the rest of the industrialized world (Carson, 2008). In the United States, cooking related fires are the leading cause of residential structure fires and fire injuries (United States Fire Administration [USFA], 2005). Although cooking related fires rarely result in deaths and significant property losses, they accounted for thirty-six percent of the reported residential structure fires in 2002 (USFA, 2005). In essence, cooking related fires account for one-third of all reported residential structure fires. The USFA (2005) states, “Their impact comes from the sheer number of fires experienced each year” (p. 1). This is truly a disturbing fact when we look at the significant progress that has been made in the area of fire prevention and protection over the last thirty years (Carson, 2008).

The City of Martinsville has similar statistics concerning cooking related residential structure fires. Department data shows, on average, cooking related fires account for twenty-two percent of all reported structure fires (Martinsville Fire & EMS Department [MF&EMS], 2008). In Martinsville, cooking related fires are the second leading cause of reported structure fires, with the leading cause of reported structure fires being arson related (MF&EMS, 2008). The Inspections & Code Enforcement Division of the MF&EMS is aggressively addressing arson related fires. However, our department does not currently have any strategies in place to deal with cooking related residential structure fires.
The research problem is that the MF&EMS does not have a risk-reduction program designed to reduce the number of residential cooking fires, which could lead to preventable property loss, injuries and deaths. The purpose of this applied research paper is to identify strategies that could be implemented to reduce the number of residential cooking fires within the City of Martinsville. The descriptive research method is used for this applied research project. The research approach will entail evaluating collected literature to identify strategies aimed at reducing residential cooking fires. Literature will be explored to answer the following research questions: (a) What national strategies are there for reducing the number of residential cooking fires? (b) What strategies are other localities in southwest Virginia using to reduce the number of residential cooking fires? (c) What strategies should the MF&EMS use in developing a risk-reduction program aimed at reducing the number of residential cooking fires within the City of Martinsville?

Background and Significance

The MF&EMS is a small career/volunteer combination department that covers eleven square miles, serving approximately 14,500 citizens from two stations. The department is comprised of thirty uniformed full-time employees, four civilian full-time employees, twelve uniformed part-time employees, and fifteen volunteers. The department is composed of four divisions that include: Administration, Operations, Inspections & Code Enforcement and Emergency Management & Safety. Division staffing levels are outlined in Table 1.
Table 1: *Full-Time Personnel Division Assignments.*

<table>
<thead>
<tr>
<th>Division</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>26</td>
</tr>
<tr>
<td>Administration</td>
<td>2</td>
</tr>
<tr>
<td>Inspections &amp; Code Enforcement</td>
<td>5</td>
</tr>
<tr>
<td>Emergency Management &amp; Safety</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

The department provides fire prevention and protection services, emergency medical services (EMS) at the advanced life support (ALS) level, and operations level response to hazardous materials incidents. In addition, emergency management functions and citywide safety programs are coordinated and maintained through the department.

The City of Martinsville is a small community located in the foothills of the Blue Ridge Mountains, forty-five miles south of Roanoke, Virginia. Martinsville has a Council/Manager form of government. Martinsville attracts visitors from all over the world for NASCAR Sprint Cup Series, Craftsman Truck Series, and Late Model Stock Car Racing at Martinsville Speedway. Cultural activities include the Virginia Museum of Natural History and the Piedmont Arts Association.

However, during the late 1990’s, the city lost many jobs in the furniture and textile industries due to the North American Free Trade Act (NAFTA) and the expanding global economy. Unemployment rates skyrocketed and Martinsville consistently has had the highest unemployment rate in Virginia. For July, 2009, Martinsville’s unemployment rate was 22.1% as compared to the Virginia Statewide average of 6.9% (Virginia Employment Commission [VEC], 2009). The city has also experienced a five percent reduction in its population from July 1, 2000
to July 1, 2007 (United States Census Bureau [USCB], 2007). Population estimates for the City of Martinsville are listed in Table 2 (USCB, 2007).

Table 2: Annual Estimates of the Population for City of Martinsville.

<table>
<thead>
<tr>
<th>Estimate</th>
<th>7/1/2000</th>
<th>7/1/2007</th>
<th>Difference</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15,356</td>
<td>14,578</td>
<td>-778</td>
<td>-5%</td>
</tr>
</tbody>
</table>

The net result of these facts has resulted in a diminishing tax base, which has had an adverse effect on the MF&EMS’s budget.

MF&EMS’s Fiscal Year 09/10 Total Budget is $2,232,893, of which $1,844,834 is personnel expenses. For the past several years only minor adjustments have been made to the department’s operating budget, and a Capital Budget has been virtually non-existent, with the exception of vehicle replacements. However, this fiscal year our Operating Budget was reduced by thirty-one percent. In addition, it is anticipated that the Governor of Virginia will reduce the amount of local funding this current fiscal year. The department may be forced to reduce its budget by five, ten or fifteen percent as a result. The city, in its current economic state, cannot afford any budgetary increases that are not justified by significant improvements in the delivery of services.

Despite our current economic state, the MF&EMS is committed to continuous quality improvement. It is hypothesized that our high unemployment rate, combined with the City’s poor economic state, contributes to the high rate of cooking related fires (as well as other fire types) within Martinsville. However, MF&EMS does not currently track the data necessary to confirm this notion. Research must be conducted to explore feasible strategies that can be implemented to reduce the number of cooking related structure fires. This applied research
project will provide the necessary information for MF&EMS Administrative and Inspections & Code Enforcement staff to make an educated decision as to which strategies the department should utilize.

Cooking related fires is one of the leading causes of reported residential structure fires within the City of Martinsville, second only to arson related fires (MF&EMS, 2008). Department data shows, on average, cooking related fires account for twenty-two percent of all reported residential structure fires (MF&EMS, 2008). As stated in the introduction, cooking related fires rarely result in deaths and significant property losses, however, they are the leading cause of fires and fire related injuries in the United States (USFA, 2005). Specific data is not currently being tracked by MF&EMS concerning the relationship between cooking related fires and property losses, injuries and deaths. However, information gained through personal experience and casual input from department staff indicates there is a reasonable comparison with national statistics from the USFA.

Historically, cooking related fires have been a leading cause for residential structure fires in Martinsville. Sadly, no coordinated effort has ever been undertaken to specifically address these types of fires. While the department, in general, considers cooking related fires a problem within our community, it was not until the available department data was analyzed in preparation for the Executive Analysis of Community Risk Reduction (EACRR) course, at the National Fire Academy (NFA), that the significance of our cooking related fire problem was realized.

The future impact of cooking related fires within the city is now a concern of department Administration. This applied research project is significant to our department, as
the information obtained through this research process will assist our Administrative and 
Inspections & Code Enforcement staff in developing and implementing strategies aimed at 
reducing the occurrence of cooking related residential structure fires within Martinsville. In 
addition, the MF&EMS mission statement charges the department with providing professional 
services, such as fire prevention and fire education activities, and enhancing the quality of life 
of our citizens.

This applied research project is directly related to the National Fire Academy’s EACRR 
course. “The primary goal of the EACRR course is to empower the Executive Fire Officer (EFO) 
with the ability to lead community risk reduction in a strategic manner” (United States 
Department of Homeland Security [DHS], 2009, p. SM 1-7). EACRR is the second course in the 
EFO Program. This course provided the EFO with the necessary knowledge to become a risk-
reduction strategist, assess their community’s risk, develop strategies for reducing risk, 
objectively evaluate progress and make necessary improvements, as needed, and be a leader in 
their organization and community (DHS, 2009). This applied research project will utilize the 
knowledge gained during this course to identify strategies that could be implemented to reduce 
the number of residential cooking fires within the City of Martinsville.

The USFA (2009) website lists the following goals in their strategic plan:

(1) Reduce risk at the local level through prevention and mitigation. (2) Improve local 
planning and preparedness. (3) Improve the fire and emergency services’ capability for 
response to, and recovery from, all hazards. (4) Improve the fire and emergency 
services’ professional status. (5) Lead the Nation's fire and emergency services by 
establishing and sustaining USFA as a dynamic organization. (Goals Section)
This applied research project supports these goals by conducting research to identify strategies that will reduce the number of residential cooking related fires within the City of Martinsville. The knowledge gained through this applied research project will allow MF&EMS Administrative and Inspections & Code Enforcement staff to develop initiatives that will reduce and/or mitigate the effects from residential cooking related structure fires, thus reducing the amount of property loss, injuries and deaths.

Literature Review

The objective of the literature review process is to collect and evaluate available literature on strategies to reduce the occurrence of residential cooking fires. Research was conducted at the National Fire Academy’s Learning Resource Center located in Emmitsburg, Maryland. In addition, research was done at Virginia Commonwealth University (VCU) Online Libraries. Literature examined for this applied research project included written texts, scholarly journals, trade journals, fire service publications, and internet databases and sites. The focus of the research was to identify relevant sources that directly relate to this research problem.

The literature review began with a review of America Burning: Revisited to gain a historical background and context on residential structure fires. This report (USFA, 1987) frames America’s fire problem in 1985 as follows:

1. The U.S. has one of the highest fire death rate per capita in the industrialized world;
2. Each year, fires kill more Americans than all other natural emergencies combined, including floods, hurricanes, tornados and earthquakes; (3) fire is the third leading cause of accidental death in the home; and (4) the total annual cost to the American public from fires approaches $30 billion. (p. 22)
In 1985, residential structure fires accounted for twenty-five percent of all reported fires; however, they were responsible for seventy-four percent of the deaths, sixty-two percent of the injuries and forty-three percent of the property loss reported that year (USFA, 1987). Cooking related residential fires are not specifically singled out in these statistics, but are included in them.

The report noted that since the publication of *America Burning* the nation’s fire problem has been relatively unchanged (USFA, 1987). The report offers some possible underlying causes for the nation’s continued fire problem. First, the fire service community, in general, has not fully convinced the elected officials of the seriousness of the fire problem (USFA, 1987). Additionally, the fire service does not fully grasp, nor target, underlying causes of fire, such as inadequate housing conditions and public apathy (USFA, 1987). The report states, “The public’s lack of awareness of the fire problem is a key obstacle to reducing the nation’s fire problem” (USFA, 1987, p. 27).

The report does offer some strategies to reduce the nation’s fire problem. The fire service has to encourage safe behaviors and offer incentives to modify hazardous behaviors (USFA, 1987). The report specifically mentions tax incentives, insurance credits and legal and social deterrents as possible suggestions to modify unsafe behaviors (USFA, 1987, p. 27). Greater control over building use and occupancy, along with stricter code enforcement would also be needed (USFA, 1987). Another strategy outlined in the report is educating the public to increase the level of awareness of the fire problem (USFA, 1987). The report states, “… the public’s awareness of the fire problem remains a major obstacle” (USFA, 1987, p. 29). This
education must address the general public and elected officials, and utilize the latest technologies and media available to the fire service (USFA, 1987).

The Solutions 2000 report was also examined to gain additional historical information on residential structure fires. According to this report, “… the fire service does not often act as advocates for young children, older adults, or people with disabilities when fire safety is called into question – or at least do not give them adequate support” (Carson, 1999, p. 3). The report suggests that the three E’s methodology of education, engineering, and enforcement must be utilized to address fire safety in any population (Carson, 1999). Different fire risks must be analyzed to determine which method or combination of methods is best suited to develop solutions to prevent or reduce the occurrence of fire (Carson, 1999).

Solutions 2000 also outlines several prevention and mitigation strategies. The report states, “Preventing a fire is the ultimate goal of fire safety officials” (Carson, 1999, p. 5). It goes on to explain that there are three main ways of preventing fires: (1) change the heat source, (2) change the fuel source, and (3) change the behavior (Carson, 1999). If you can modify or control any of these three factors, it is possible to prevent fire from occurring (Carson, 1999). However, the report states, “Despite our best prevention efforts, fires still occur” (Carson, 1999, p. 5). The report offers the following mitigation strategies: (1) limit fuel loads, (2) rapid detection and notification, (3) rapid suppression, (4) compartmentation, and (5) evacuation (Carson, 1999). Prevention and mitigation efforts can be enhanced by applying the three E’s methodology to help develop strategies to reduce or eliminate the occurrence of fire (Carson, 1999).
Other fire risk factors to be considered are age, disabilities and impairments, poverty and related factors. Fire death rates are the highest for people under age 6 and over age 65 (Carson, 1999). Since age is an un-modifiable risk factor, specific strategies must be developed to protect those within these age groups (Carson, 1999). The report indicates that current reporting systems underreport victims of fires that have disabilities and impairments (Carson, 1999). However, of the conditions captured, only alcohol and drugs are preventable. The remaining conditions must be specifically addressed (Carson, 1999). The report states, “Poverty and education levels may explain up to one-third of the variation in state fire death rates” (Carson, 1999, p. 7). According to the statistics listed in the report, there seems to be a direct correlation between the level of poverty, education levels, and fire death rates (Carson, 1999). The higher the number of people that are below the poverty line, the higher the number of fire deaths. Also, the higher the number of people that did not finish high school, the higher the number of fire deaths.

The report does offer the following solutions. The fire service should incorporate life safety strategies into their fire safety programs (Carson, 1999). Research has also shown that older adults do not like to be singled out, and fire safety programs should apply to all ages of the population (Carson, 1999). The fire service must educate themselves to better develop strategies to reduce fire-risk in people with disabilities (Carson, 1999). We must continue to provide public fire education, with emphasis on modifying people’s behavior (Carson, 1999). Finally, the general “apathy” of American society towards fire safety must also be addressed (Carson, 1999).
Beyond Solutions 2000, the follow up report to Solutions 2000, further discusses America’s fire problem. In the executive summary, the report eludes to the fact that current methods of educating the public on America’s fire problem have been ineffective and new, more aggressive approaches are needed (Carson, 2002). The report states, “People need better understanding of the threat of fire before they will be motivated to change their behavior or their environment” (Carson, 2002, p. 4). The report goes on to exclaim that no real progress has been made in addressing the strategies recommended in the Solutions 2000 publication (Carson, 2002). Realizing this lack of progress, the authors of this report incorporated three measures to help facilitate meaningful work to address the recommendations outlined in the earlier report (Carson, 2002). These measures include:

1. Enabling measures must be initiated to support recommended outcomes.
2. Inclusive and adaptable methods and materials are important guidelines for all initiatives.
3. While developing innovative means of protecting people from fire, we are definitely told to systematically initiate social change so that people will value and use improved technology. (Carson, 2002, p. 4)

The report offers the following information. For the period between 1997 and 1999, most fire deaths occur in the home and homes have proportionally higher death rates than any other occupancy (Carson, 2002). To support this claim the report (Carson, 2002, p. 16) gives the following statistics:

- People in homes outnumber people in hotels/motels by 50-75 to 1; however, fire deaths in homes outnumber fire deaths in hotels/motels by 100 to 1.
• People in homes outnumber people in nursing homes by 200 to 1; however, fire deaths in homes outnumber fire deaths in nursing homes by 250 to 1.

One of the recommendations from this report is the implementation of strategies that incorporate the five E’s methodology of education, enforcement, engineering, economic incentives, and empowerment (Carson, 2002). Each of these strategies can affect changes that can reduce a community’s overall fire risk. It is through these mitigation strategies that realistic and effective solutions can be developed (DHS, 2009).

The Vision 20/20: National Strategies for Fire Loss Prevention report lists five key strategies, with several action items, that were identified by participants to help move fire prevention efforts forward (Carson, 2008). The report acknowledges that many of these strategies and action items have been included in previous reports; however, much work still remains in these areas (Carson, 2008). These five strategies, with brief explanations, are summarized as follows: (1) Increase advocacy for fire prevention. The magnitude of the nation’s fire problem must be accurately documented and communicated to increase the awareness of the economic impact of fire loss (Carson, 2008). (2) Conduct a national fire safety educational/social marketing campaign. An ongoing theme should be developed with a prevention message that is as recognizable as the “everyone goes home” theme from the National Fallen Firefighters Foundation (Carson, 2008). (3) Raise the importance of fire prevention within the fire service. Fire prevention must become a core value within the fire service, and become incorporated into every facet of fire department operations (i.e., recruitment, training, etc.) (Carson, 2008). (4) Promote technology to enhance fire and life safety. Actively support the development of new technologies and engineering solutions to
increase the level of safety of a broad range of residential occupants, with an emphasis on those at highest risk (Carson, 2008). (5) Refine and improve the application of codes and standards that enhance public and firefighter safety and preserve community assets. Actively support research to identify and justify changes to current codes and standards, and increase the level of knowledge and training in building and fire codes at all levels within the fire service (Carson, 2008).

During the EACRR course at the NFA, the concept of the Five E’s was learned as a strategy for addressing risk. The Five E’s include: education, enforcement, engineering, economic incentive and emergency response (DHS, 2009). Education raises the level of awareness and knowledge of a population in an effort to alter risky behaviors and attitudes towards risk (DHS, 2009). Enforcement includes the actions involved in enacting and enforcing local ordinances, codes, standards and laws (DHS, 2009). Engineering is the measures taken to change the physical environment during the design and manufacture of consumer products and occupancies (DHS, 2009). Economic incentives can be used to modify risky behaviors through monetary rewards or penalties (DHS, 2009). Emergency response is the level of preparedness of a locality and their capabilities to respond and mitigate an event, such as a structure fire or natural disaster (DHS, 2009). The Five E’s methodology described above is an invaluable process that can be used to develop realistic and effective risk reduction strategies (DHS, 2009).

In an article in the Commonwealth Chief, Robby Dawson outlines what he calls the “fire safety chain” (Dawson, 2009). Dawson (2009) compares the fire safety chain to the American Heart Association’s CPR concept of the “Chain of Survival”. Dawson (2009) states, “...the components of early access, CPR, early defibrillation, and advanced care can save lives when all
of the links in the chain work properly” (p. 9). The fire safety chain has three links: (1) public education, (2) built in fire protection, and (3) manual fire suppression (Dawson, 2009). Similar to the “Chain of Survival”, each of these links must be in place and working properly to have a positive effect on a community. Dawson (2009) states, “Failure in any part of the chain can result in fire losses, injuries and death, not only for the public we serve, but firefighters as well” (p. 9).

Public education is the first link in the fire safety chain. Dawson (2009) states, “This link is the most proactive and effective way to reduce fire loss” (p. 9). The elements of this link include modifying public behaviors that are at a high risk for causing fires and preparedness in the event of a fire (Dawson, 2009). The public’s attitude of “it will never happen to me” must be changed and replaced with knowledge of fire extinguisher use, home escape and fire drills that prepare them to deal with a fire in their home (Dawson, 2009).

The second link in the fire safety chain is built in fire protection. Building codes are adopted at the local or state level, and include two type of fire protection measures, passive and active fire protection systems (Dawson, 2009). Passive fire protection systems are the elements incorporated into building design that prevent or limit fire spread to reduce fire loss and protect occupants (Dawson, 2009). Active fire protection systems, such as alarm systems and suppression systems, are designed to react to the fire condition within a building (Dawson, 2009). In describing the principle behind smoke detectors as an active fire protection system, Dawson (2009) states:
Over the last thirty years, this active protection has been credited as one of the main reasons fire deaths in the United States have declined, but the United States still has one of the highest per capita death rates in the world due to fire. (p. 9)

Water based sprinkler systems has proven to be the most effective active fire protection system (Dawson, 2009). However, widespread use in single family residential applications have been limited (Dawson, 2009).

The final link in the fire safety chain is manual fire suppression. Dawson (2009) cites a comment by retired Fire Chief Alan Brunnicinni stating, “Manual fire suppression is the end of the fire protection chain, the most desperate, dangerous and least effective way for us to protect people and property” (p. 9). The use of manual fire suppression activities means that the first two links of the fire safety chain have failed (Dawson, 2009). However, regardless of the efforts placed in the first two links, fire departments must remain proficient in fire suppression operations (Dawson, 2009).

Additional literature was reviewed to focus more on residential cooking fires and the associated strategies to reduce their occurrence. A USFA publication, published in August 2005, specifically presented data concerning structure cooking fires. Although cooking related fires rarely result in deaths and significant property losses, they accounted for thirty-six percent of the reported residential structure fires in 2002 (USFA, 2005). The report (USFA, 2005) states, “In 2002 alone, cooking-related fires caused an estimated 185,600 fires, eighty deaths, 3,875 injuries, and$481 million in property damage” (p. 1). Most cooking fires occur in residential structures with eighty percent of these fires occurring in one and two family homes or in multifamily occupancies, such as apartment buildings (USFA, 2005). While cooking fires do not
Cooking fires seem to follow any seasonal trend, they do peak during lunch and dinner time periods (USFA, 2005). The most common material ignited in cooking fires was foods, specifically oil and grease (USFA, 2005). The report lists careless cooking activities as the leading cause for cooking fires (USFA, 2005). Unattended cooking accounted for thirty percent of cooking fires.

The report notes that cooking fires are preventable. The report (USFA, 2005) offers the following recommendations:

1. Care should be taken when cooking with oil, butter, or other greasy foods that are highly flammable and can splatter or spill from pots and pans. 
2. Do not use water to extinguish grease-based fires, as water reacts violently when poured on hot grease or oil. 
3. Care should be taken when cooking with alcohol, such as wine and liquor, as they are extremely flammable. 
4. Loose fitting clothes should not be worn while cooking, as they may ignite and potentially cause serious injuries. 
5. Always closely monitor cooking equipment and materials while they are in use. 
6. Double check all dials on stoves and ovens to ensure they are off when cooking activities have ended. 
7. Fire extinguishers should be within easy reach of cooks. 
8. All homeowners and renters should ensure that smoke alarms are installed and are operating properly. 

Another concern noted by the USFA, in a 2006 publication concerning confined structure fires, is the potentially high number of underreported and unreported confined fires. Underreported and unreported fires make it impossible to fully understand the magnitude of the fire problem, and to know how accurate the available data truly is (USFA, 2006). In a report by the USFA (2006), “…an estimated ninety-five percent of unreported residential fires incurred
losses of $100 or less and at least ninety-four percent of unreported fires were either self-extinguished or extinguished by the residents” (p. 2).

The same report notes that of the 52,006 reported confined fires in 2002, fifty-seven percent were cooking related (USFA, 2006). In addition, confined cooking fires accounted for ninety percent of all injuries occurring in confined structure fires (USFA, 2006). The report states, “…cooking is the predominant reason for a confined fire…” (USFA, 2006, p. 11). The report goes on to explain the need for public education programs aimed at cooking fires is still great (USFA, 2006).

In a 2006 report by John Hall for the National Fire Protection Agency (NFPA), he noted that in 2003 cooking equipment structure fires in residential homes resulted in 250 deaths, 3,880 injuries, and $512 million in property damage. Cooking was also the leading cause of fire related injuries in 2003 (Hall, 2006). The leading cause of these fires was attributed to cooking equipment being unattended, followed by combustibles too close to a heat source and failure to ensure cooking equipment was turned off (Hall, 2006).

In an article in the Minnesota Fire Chief, Dennis Stark (2006) states that, “the latest statistics from the NFPA say that one out of every three home fires started in the kitchen and more than 100,000 fires a year were related to cooking” (p. 32). The NFPA’s 2006 Fire Prevention Week theme was “Prevent Cooking Fires – Watch What You Heat”. Stark (2006) offers the following recommendations for safe cooking:

(1) Stay in the kitchen when you are frying, grilling, broiling or boiling food. If you must leave the room, even for a short period of time, turn off the stove. (2) When you are simmering, baking or roasting food, check it regularly, stay in the home and use a timer
Cooking fires are a significant concern in homes, with cooking fires being the leading cause of fire-related injuries and deaths (Nicholson, 2006). In an article in the NFPA Journal, John Nicholson writes about the 2006 NFPA Fire Prevention Week theme “Watch What You Heat.” Nicholson (2006) states that cooking fires are the leading cause of fire in homes and fire-related injuries. Also, cooking equipment is the leading cause of unreported fires and injuries (Nicholson, 2006). In addition, Nicholson (2006) notes that recent research indicates that unattended cooking is the leading cause of cooking-related fires.

Nicholson (2006) warns that leaving cooking unattended, even for a brief time, could lead to disaster. The author notes, “Often when fire departments are called to a cooking-related fire, the residents state they only left the kitchen for a few minutes” (Nicholson, 2006, p. 69). In his article, Nicholson (2006) offered the following suggestions:

1. Keep a close watch on what you heat.
2. Make sure the lid of the stove or oven is in place.
3. Keep cooking areas clean and clear of combustibles.
4. Keep children away from cooking areas by enforcing a “kid-free zone” of three feet around the stove.
5. If you have a fire in your microwave, turn it off immediately and keep the door closed. Never open the door until the fire is completely out. If in doubt, get out of the home and call the fire department.
6. Always keep an oven mitt and a lid nearby. If a small grease fire starts in a pan, smother the flames by carefully sliding the lid over the pan (make sure you are wearing the oven mitt). Turn off the burner and slide the pan off the burner. To keep the fire from restarting, do not remove the lid until it is completely cool. Never pour water on a grease fire. If the fire does not go out, get out of the home and call the fire department.
7. If an oven fire starts, turn off the heat and keep the door closed to prevent flames from burning you or your clothing. If the fire does not go out, get out of the home and call the fire department.
(1) Always use cooking equipment tested and approved by a recognized testing facility.

(2) Never leave cooking food on the stovetop unattended, and keep a close eye on food cooking inside the oven.  (3) Keep cooking areas clean and clear of combustibles.  (4) Keep children away from cooking areas by enforcing a “kid-free zone” of three feet around the stove.  Keep pets from underfoot so you do not trip while cooking. Also, keep pets off cooking surfaces and nearby countertops to prevent them from knocking things onto burners.  (5) Wear short, close fitting or tightly rolled sleeves when cooking. Loose clothing can dangle onto stove burners and catch fire.  (6) Never use a wet oven mitt, as it presents a scald danger if the moisture in the mitt is heated.  (7) Always keep a potholder, oven mitt, and lid handy. If a small fire starts in a pan on the stove, put on an oven mitt and smother the flames by carefully sliding the lid over the pan. Turn off the burner. Don’t remove the lid until it is completely cool. Never pour water on a grease fire and never discharge a fire extinguisher onto a pan fire, as it can spray or shoot burning grease around the kitchen, actually spreading the fire. (8) If there is an oven fire, turn off the heat and keep the door closed to prevent flames from burning you and your clothing.  (9) If there is a microwave fire, keep the door closed and unplug the microwave. Call the fire department and make sure to have the oven serviced before you use it again. Food cooked in a microwave can be dangerously hot. Remove the lids or other coverings from microwaved food carefully to prevent steam burns. (pp. 69-70)

From 1999 to 2003, statistics show that forty-one percent of cooking related fire fatalities in the home occurred while the victim was sleeping (Nicholson, 2006). Alcohol or
drugs were a contributing factor in twenty percent of these deaths (Nicholson, 2006).

However, studies indicate that this number is likely to be underreported (Nicholson, 2006). In addition, most cooking related fires are not reported. The author cites a survey done between December 1983 and November 1984 by the Consumer Product Safety Commission (CPSC), which estimates that over 12 million fires and 642,000 associate injuries related to cooking fires went unreported (Nicholson, 2006). In addition, Nicholson (2006) notes that studies concerning unreported fires are uncommon.

Children and the elderly are significantly affected by cooking fires. Nicholson (2006) states, “Older adults and children under five account for a disproportionate share of cooking fire deaths while those age fifteen to sixty-four suffered more than their share of injuries” (p. 71). Those with disabilities can benefit from kitchen areas designed for people with various ranges of physical abilities (Nicholson, 2006). The author (Nicholson, 2006) offers the following suggestions for making the kitchen safer for everyone:

(1) Universal design – If you are building a new home, consider incorporating elements of Universal Design. This approach to designing and building homes is based on the idea that spaces and products should accommodate people of all ages, heights, and physical abilities. (2) Room to move – Open kitchens or kitchens that are “L” or “U” shaped can most easily accommodate wheelchairs or walkers. (3) Extreme makeover – Consider installing appliances that can easily be operated by individuals with a wide range of physical abilities. (4) Easy to reach – Most kitchen cabinets are placed one and a half feet above the countertop. Placing them closer to the counter makes them easier to reach. (5) Lots of light – Make sure that your kitchen has sufficient lighting to eliminate
safety risks. (6) Adding options – Typical countertops are three feet above the floor. Adding a section that’s lower, approximately thirty inches, gives you more workspace options and can accommodate a wider range of physical abilities. (7) A la carte – Place commonly used items in a rolling cart with pull-out drawers. (8) Side-by-side – If you are in the market for a new refrigerator/freezer, consider a model with side-by-side doors that can be opened without having to reach overhead. (9) Hardware helpers – Replace fixtures on cabinets or drawers with large easy-to-grasp “D” handles. (10) Remote control – While switches and outlets are often located high above the floor, remote control devices are available that can be used to operate them from any level or location within the home. (pp. 71-72)

In another article in the same NFPA Journal, Amy Lebeau writes about the 2006 NFPA Fire Prevention Week theme. Lebeau (2006) also states that cooking fires are the leading cause of fire and fire related injuries in the home. She goes on to explain that unattended cooking is the leading cause of home cooking fires (Lebeau, 2006). Lebeau (2006) states, “More fires start in the kitchen than in any other part of the home” (p. 44). Failure to pay attention to items while they are cooking is a major factor in these types of fires (Lebeau, 2006).

Lebeau (2006) writes, “Educating people on how to be safer in the kitchen is crucial” (p. 44). She also advised that safety education must be practical and contain advice people can use (Lebeau, 2006). Lebeau (2006) mentions the following safety tips:

(1) Stay in the kitchen when you are frying, grilling, or broiling food. (2) If you leave the kitchen for even a short period of time, turn off the stove. (3) If you are simmering, boiling, baking, or roasting food, check it regularly, remain in the home while food is
cooking, and use a timer to remind you that the stove or oven is on. (4) Keep kids away from cooking areas by enforcing a “kid-free zone” of three feet around the stove. (5) When young children are in the home, use the stove’s back burners whenever possible, and turn pot handles back to reduce the risk that pots with hot contents will be knocked over. (6) Never hold a small child while cooking. (p. 44)

The most recent publication discovered while researching cooking related residential structure fires was a joint report by the USFA and NFPA entitled Behavioral Mitigation of Cooking Fires through Strategies Based on Statistical Analysis. The report cites cooking equipment as being involved in thirty-one percent of the home structure fire in 2003 (USFA, 2007). Cooking equipment is the leading cause of both reported and unreported home fires in the United States (USFA, 2007). It is also the leading cause of reported and unreported home fire injuries (USFA, 2007). In 2003, United States fire departments responded to 118,700 cooking related structure fires, which resulted in 250 deaths, 3,880 injuries, and $512 million in direct property damage (USFA, 2007). These numbers are deceivingly low, as many cooking fires are not reported (USFA, 2007).

Statistically, males are at greater risk of a cooking fire injury when compared to females (USFA, 2007). The report states, “Although women do the majority of the cooking and were the cooks in most of the fires in studies that examined gender, more than half of the people killed and almost half of those injured in reported cooking fire were male” (USFA, 2007, p. 1). In addition, fifty-six percent of the males and fifty-four percent of the females injured as result of cooking fires incurred their injuries while attempting to extinguish the fire (USFA, 2007).
Young children and the elderly are at a higher risk of death from cooking related fire than any other age groups (USFA, 2007). Statistics show that children under five and adults over sixty-five have higher death rates from most causes of fire, including cooking fires (USFA, 2007). Also, children are at a higher risk of thermal burns and scald injuries from cooking related equipment and contents (USFA, 2007). Adults twenty-five to thirty-four have the highest injury rates of cooking related fires (USFA, 2007).

The reports lists unattended cooking as the single leading factor in cooking fires, and was listed as the cause of thirty-seven percent of the cooking related fires from 1999 to 2003 (USFA, 2007). The report states, “People who begin cooking when drowsy, impaired by alcohol or drugs, or otherwise limited may be more likely to stop paying attention to their cooking inadvertently” (USFA, 2007, p. 2). The report also mentions that properly installed and working smoke detectors can provide an early warning to cooks that have fallen asleep, or those who had simply forgotten they were cooking (USFA, 2007). Another cause of cooking fires is combustible materials being too close to cooking equipment (USFA, 2007). Items such as potholders, oven mitts, paper products and the like, account for thirteen percent of home cooking fires, making heat source too close to combustibles the second leading cause of cooking fires (USFA, 2007). The cooking method which has the highest risk of fire is frying (USFA, 2007). The reports states, “Frying accounts for a majority share of cooking fires in the few studies that identify cooking method” (USFA, 2007, p. 2).

The report does make several recommendations for strategies that should help reduce the number of cooking related fires. The report suggests that fire prevention education should be combined with burn prevention (USFA, 2007). This will enhance the retention of the overall
safety message by educating people by showing cause and effect relationships between the
causes of fire and their possible outcomes (USFA, 2007). Technology and engineering solutions
should be developed and implemented to increase the safety of cooking equipment (USFA,
2007). An example would be automatic shut off systems and motion sensors for stoves, which
would activate should cooking be left unattended (USFA, 2007). The report (USFA, 2007) also
lists the following safety/educational messages that were developed based on their research
findings:

(1) Choose the right cooking equipment. Install and use it properly. (2) Watch what you
heat. (3) Stay alert. (4) Use equipment for intended purposes only. (5) Keep things that
can catch fire and heat sources apart. (6) Know what to do if your clothes catch fire. (7)
Know what to do if you have a cooking fire. (8) Prevent and treat scalds and burns. (9)
Protect children from scalds and burns. (10) Install and use microwave ovens safely.
(11) Use barbecue, charcoal and propane grills safely. (12) Have working smoke alarms.

(pp. 5-7)

In addition to the literature review above, personal interviews were conducted to
ascertain what strategies other localities in southwest Virginia are using to reduce the number
of residential cooking fires. The interview itself consisted of two questions: (1) Are cooking
related structure fires seen as a problem in your locality? (2) Does your department currently
have a specific program or strategy aimed at reducing the number of cooking related residential
structure fires in your locality? Each of the individuals interviewed held the position of Fire
Marshal, and had knowledge of the leading causes of fire in their localities and the public
education programs offered by their department. Additionally, each was informed of the purpose of the interview.

Fire Marshal Doug Moore (personal communication, October 19, 2009) of the Salem Fire Department, Virginia, stated that they have a few cooking related residential structure fires and that cooking related fires were not one of the leading causes of residential fires within their jurisdiction. He advised that they have a general fire prevention program, of which cooking safety is a part, but no specific program for cooking related fires. Fire Marshal Daniel Rakes (personal communication, October 19, 2009) of the Roanoke City Fire-EMS Department, Virginia, indicated that cooking related fires accounted for twenty to twenty-five percent of the causes of residential structure fires. He stated that their department does not have a specific program or strategy in place to reduce their number of cooking related fires. Fire Marshal Shelby Irving (personal communication, October 19, 2009) of the Danville Fire Department, Virginia, said that cooking related residential structure fires are a leading cause of fire within Danville; however, they do not have any specific program addressing cooking related fires.

Fire Marshal Greg Wormser (personal communication, November 2, 2009) of the Lynchburg Fire Department, Virginia, stated that cooking related fires are a leading cause of fire in Lynchburg. In fact, he indicated that they have seen a huge increase in the number of cooking related structure fires this year. Fire Marshal Wormser stated that he has been working with the media to increase cooking safety awareness, and even included cooking safety with their annual “change your clocks, change your batteries” campaign. Prior to these media campaigns, they did not have a specific cooking fire program or strategy.
Fire Marshal Gary Huffman (personal communication, October 19, 2009) of the Roanoke County Fire and Rescue Department, Virginia, stated that cooking related residential structure fires were the leading cause of fire within their jurisdiction. He advised that a large percentage of their fire problem was specifically with their older population living in assisted living homes leaving their cooking unattended. Currently they have a cooking safety program tailored around unattended cooking. He advised that the department has partnered with the League of Older Americans, an advocacy organization focused on investigating concerns about the quality of care provided for residents of nursing homes, assisted living centers and users of adult day care and home health care agencies, to assist them in educating their elderly population.

Fire Marshal Eric Blevins (personal communication, October 19, 2009) of the Bristol Fire Department, Virginia, stated that they had a significant problem with cooking related fires. During a three year study, done by the department, cooking related fires on average accounted for fifty percent of the cause of residential fires within their jurisdiction. The data gathered through this study was used to obtain grant funding for 1,000 pairs of StoveTop FireStop automatic stovetop fire suppressor. These devices are designed as the first line of defense against small residential stovetop fires and works automatically to deploy extinguishing agent directly onto the stove top in the event of a fire. The devices were placed in rental properties, assisted living homes and apartments throughout the city. Also, an aggressive cooking fire safety education program was instituted. Fire Marshal Blevins cited several success stories as a result of this program, including a significant reduction in the number of cooking related fires and several instances where the devices had activated resulting in no injuries and only minimal property losses.
In summary, this literature review reveals the following concerning cooking related residential structure fires. America has had one of the highest fire loss rates per capita in the world for over twenty years (Carson, 2008; USFA, 1987). Many of the strategies mentioned in *America Burning* to reduce the nation’s fire problem are also suggested as strategies in *Solutions 2000* and *Beyond Solutions 2000*. These strategies include the modification of unsafe behaviors, education that includes life safety strategies as well as fire safety, and increasing the public’s awareness of the nation’s fire problem, specifically addressing the general apathy of our society towards fire safety (Carson, 1999; Carson, 2002; USFA, 1987). The utilization of the Five E’s: education, enforcement, engineering, economic incentive and emergency response, can reduce a community’s overall fire risk (Carson, 2002; DHS, 2009). Many of the recommendations for safe cooking cited in the literature review are the same among the various authors. Some of these recommendations include never leave cooking unattended, keep cooking areas clear of combustibles, and ensure the home has working smoke detectors (Lebeau, 2006; Nicholson, 2006; Stark, 2006; USFA, 2005; USFA, 2007). Finally, most of the fire departments contacted indicated that residential cooking fires are one of their leading causes of fire; however, few of them had specific programs or strategies to reduce the number of cooking related fire within their locality.

**Procedures**

This applied research project utilized the descriptive research method to explore available literature for strategies that could be implemented to reduce the number of residential cooking fires within the City of Martinsville. The procedures used to gather the needed information began with recognition of the stated research problem; which is, the
MF&EMS does not have a risk-reduction program designed to reduce the number of residential cooking fires which could lead to preventable property loss, injuries and deaths. The data collected during the research was used to answer the following research questions: (a) What national strategies are there for reducing the number of residential cooking fires? (b) What strategies are other localities in southwest Virginia using to reduce the number of residential cooking fires? (c) What strategies should the MF&EMS use in developing a risk-reduction program aimed at reducing the number of residential cooking fires within the City of Martinsville?

The first phase of the applied research project was to conduct a review of available, applicable literature. Research literature for this applied research project came from written texts, scholarly journals, trade journals, fire service publications, and internet databases and sites that were discovered by the author of this research paper. Research was conducted at the National Fire Academy’s Learning Resource Center located in Emmitsburg, Maryland. Utilizing the National Fire Academy’s Learning Resource Center Card Catalog, a search was conducted to identify literature related to residential cooking fires and strategies aimed at reducing their occurrence. In addition, research was done at VCU Online Libraries for literature pertaining to cooking fires and prevention strategies. The focus of the research was to identify relevant sources of information that directly related to the research problem, research questions, and ultimately the intended purpose of this applied research project.

Secondly, personal interviews were conducted to gather additional information to answer the research questions. These personal interviews were conducted by telephone to ascertain what strategies other localities in southwest Virginia are using to reduce the number
of residential cooking fires. Departments were selected based on their geographical location within southwest Virginia, and their status as a career department. Each department’s Fire Marshal was contacted and asked to participate in the interview. During the initial conversation with each Fire Marshal, it was determined that each interviewee had knowledge of the leading causes of fire in their localities and the public education programs offered by their department. Additionally, each was informed of the purpose of the interview.

The interview itself consisted of two questions: (1) Are cooking related structure fires seen as a problem in your locality? (2) Does your department currently have a specific program or strategy aimed at reducing the number of cooking related residential structure fires in your locality? Question one was asked to establish if cooking related structure fires were a leading cause of fires for the locality, while question two was asked to determine if the department had a specific program or strategy they were using to reduce the number of cooking related structure fires within their locality.

The limited number of personal interviews and the lack of a more formal survey instrument are known limitations with this applied research project. Although one-hundred percent of the departments contacted participated in the personal interviews, only six departments were contacted. Additionally, all of the departments interviewed were career. It is assumed that a more formal survey instrument would have yielded more in depth data from a broader demographic of departments within southwest Virginia. It is assumed that there are other departments within southwest Virginia who have programs or strategies they are using to reduce the number of residential cooking related structure fires within their jurisdiction.
Results

In this applied research project, three research questions were developed based upon the problem statement and purpose of the research. Utilizing the descriptive research method, relevant literature was collected and examined for information to answer each of the research questions. In addition, personal interviews were conducted to gather more data related to the research questions. The results of the literature and personal interviews are organized by research question.

**Research Question #1:** What national strategies are there for reducing the number of residential cooking fires?

The literature review indicates the most common strategy for reducing the number of residential cooking fires is education. The fire service can increase the level of awareness and knowledge of the public through education (Carson, 1999; Carson, 2002; Carson, 2008; Dawson, 2009; DHS, 2009; Lebeau, 2006; USFA, 1987; USFA, 2007). Fire safety education programs must be designed to encourage the public to modify risky behaviors and change their attitudes towards fire risk (Carson, 1999; Carson, 2002; Dawson, 2009; DHS, 2009; USFA, 1987). Fire safety education programs also benefit from incorporating life safety strategies to enhance the retention of the overall safety message (Carson, 1999; USFA, 2007). Also, fire safety education programs must be tailored to address a specific risk (Carson, 1999; Carson, 2002; Lebeau, 2006).

Other strategies discovered through the literature review include code enforcement, engineering technologies and economic incentives. Fire safety codes should be modified through research to improve public and firefighter safety, and be uniformly enforced (Carson,
The fire service must promote and support new technologies, such as residential sprinkler systems and automatic shut off systems for stoves, which enhance fire and life safety (Carson, 2008; Dawson, 2009; DHS, 2009; Nicholson, 2006; USFA, 2007). Lastly, economic incentives, such as tax breaks and insurance credits, can be used to motivate the public to modify or eliminate their risky behaviors or their environment (DHS, 2009; USFA, 1987).

Research Question #2: What strategies are other localities in southwest Virginia using to reduce the number of residential cooking fires?

Personal interviews were conducted to ascertain what strategies other fire departments are using in southwest Virginia to reduce the number of residential cooking fires within their locality. The interview consisted of two questions: (1) Are cooking related structure fires seen as a problem in your locality? (2) Does your department currently have a specific program or strategy aimed at reducing the number of cooking related residential structure fires in your locality? Six fire departments were selected to participate in the personal interview process based on their geographical location within southwest Virginia, and their status as a career department. The Fire Marshal of each department was contacted by telephone and informed of the purpose of the interview. One-hundred percent of the departments contacted participated in the personal interviews.

The first question was asked to establish if cooking related structure fires were a leading cause of fires for the locality. Five of the six fire departments contacted indicated that cooking related residential structure fires were a leading cause of fire within their locality. One of those departments indicated that the number of cooking related fires in their jurisdiction was actually
increasing. Another department advised that cooking related fires in previous years accounted for as much as fifty percent of the cause of residential fires within their locality. The one department that stated cooking related fires were not a leading cause of residential structure fires within their locality indicated that their department responded to a few cooking related fires, but cooking related fires was not a leading cause of residential structure fires for their jurisdiction.

The second question was asked to determine if the department had a specific program or strategy they were using to reduce the number of cooking related structure fires within their locality. Three of the six departments contacted advised they have a specific strategy or program to reduce the number of cooking related structure fires within their locality. One department indicated they have begun working with local media to increase cooking safety awareness through public service announcements, as well as incorporate their cooking safety message into other fire prevention campaigns, such as “change your clocks, change your batteries”. The second department advised they determined their cooking fire problem was with unattended cooking in their older population living in assisted living homes. They developed a specific program and partnered with a local civic organization to help educate their elderly population about the dangers of unattended cooking. The third department conducted an in-house study due to the unusually high occurrence of cooking related structure fires within their locality. The data gathered through the study was then used to pursue grant funding for automatic extinguishing devices that were placed in rental properties, assisted living homes and apartments, as well as institute an aggressive cooking fire safety education program within their locality.
Research Question #3: What strategies should the MF&EMS use in developing a risk-reduction program aimed at reducing the number of residential cooking fires within the City of Martinsville?

Based on the literature review and the knowledge gained through the EACRR course at the NFA, any risk reduction strategy or program developed by MF&EMS to reduce the number of cooking related residential structure fires should be developed utilizing the Five E’s methodology. The utilization of the Five E’s: education, enforcement, engineering, economic incentive and emergency response, can reduce a community’s overall fire risk (Carson, 2002; DHS, 2009). Fire risk must be analyzed to determine which method or combination of methods is best suited to develop strategies or programs to prevent or reduce the occurrence of cooking related structure fires (Carson, 1999). The Five E’s methodology described earlier has proven to be an invaluable process that can be used to develop realistic and effective risk reduction strategies (DHS, 2009).

Discussion

The United States consistently has one of the highest fire loss records when compared with the rest of the industrialized world (Carson, 2008). The leading cause of residential fires and fire related injuries in the United States is cooking related structure fires (USFA, 2005). This is a disturbing fact when we look at the significant progress that has been made in the area of fire prevention and protection over the last thirty years (Carson, 2008). Another disheartening fact is that cooking related fires are preventable (USFA, 2005).

The literature review for this applied research project began with a review of some dated, but well known, publications to establish a historical background and context on
residential structure fires. *America Burning: Revisited*, stated that since the publication of *America Burning* in 1973, the nation’s fire problem has been relatively unchanged (USFA, 1987). It listed failure of the fire service to convince the public of the severity of the fire problem, inadequate housing conditions and public apathy as possible underlying causes for the nation’s continued fire problem (USFA, 1987). Additionally, Carson (2002) noted in *Beyond Solutions 2000*, that no real progress had been made in addressing the recommended strategies outlined in the earlier *Solutions 2000* publication.

These historical texts provide various strategies for addressing the nation’s fire problem; however, for whatever reason it seems no real progress has been made. In the *Vision 20/20: National Strategies for Fire Loss Prevention* report, Carson (2008) acknowledges that many of the strategies and action items in this report have been included in other publications; however more work in these areas is still needed. It will be imperative for the MF&EMS to not follow this pattern of identifying a problem, and then failing to address the causes. MF&EMS must promote risk reduction and constantly evaluate any strategy or programs implemented to reduce the number of cooking related structure fires within our jurisdiction to ensure program effectiveness.

During the literature review, it was noted that education was the prevalent strategy for reducing the number of residential structure fires (Carson, 1999; Carson, 2002; Carson, 2008; Dawson, 2009; DHS, 2009; Lebeau, 2006; USFA, 1987; USFA, 2007). Fire safety education must place emphasis on modifying risky behavior and the general apathy of American society towards fire safety (Carson, 1999). Carson (2002) noted that our current methods of educating the public on America’s fire problem have been ineffective and new, more aggressive
approaches are needed. Carson (2002) goes on to explain that the public must realize and understand the threat of fire before they will become motivated to modify their risky behaviors. Lebeau (2006) advises that fire safety education must be practical and contain advice people can use. It was also suggested that fire prevention education should be combined with burn prevention to enhance the retention of the overall safety message (USFA, 2007). Educating people by showing cause and effect relationships between the causes of fire and the possible outcomes has proven to be an effective way to get people to change unsafe behaviors (USFA, 2007). MF&EMS must consider these points as they begin developing their cooking fire safety educational materials and programs.

Education is important, but it is only one method of the Five E’s methodology (Carson, 2002; DHS, 2009). The other strategies that make up the Five E’s methodology include code enforcement, engineering technologies, economic incentives and emergency response (Carson, 2002; DHS, 2009). Fire safety codes should be modified through research to improve public and firefighter safety, and be uniformly enforced (Carson, 2008; DHS, 2009; USFA, 1987). The fire service must promote and support new engineering technologies, such as residential sprinkler systems and automatic shut off systems for stoves, which enhance fire and life safety (Carson, 2008; Dawson, 2009; DHS, 2009; Nicholson, 2006; USFA, 2007). Economic incentives could be used to modify risky behaviors through tax breaks and insurance credits (DHS, 2009; USFA, 1987). Emergency response is the level of preparedness of a locality to respond to an emergency event (DHS, 2009). Dawson (2009) cites a comment by retired Fire Chief Alan Brunicinni stating, “Manual fire suppression is the end of the fire protection chain, the most desperate, dangerous and least effective way for us to protect people and property” (p. 9).
However, fire departments must remain proficient in fire suppression operations (Dawson, 2009). MF&EMS must analyze their cooking fire problem and determine which method or combination of methods is best suited to reduce or prevent the occurrence of cooking related structure fires. Once they have determined which methods to use, a comprehensive program must be developed, implemented, and constantly evaluated to ensure the program is having a positive effect in reducing cooking related structure fires.

Many of the recommendations for safe cooking cited in the literature review are the same among the various authors. Some of these recommendations include never leave cooking unattended, keep cooking areas clear of combustibles, and ensure the home has working smoke detectors (Lebeau, 2006; Nicholson, 2006; Stark, 2006; USFA, 2005; USFA, 2007). It seems that the 2006 NFPA Fire Prevention Week theme “Watch What You Heat” was the first nationwide program designed to reduce the number of cooking related residential structure fires. MF&EMS could benefit by using this program as a model or guide for developing their educational materials program.

Recommendations

Based on the knowledge gained through this applied research project, it is recommended that the MF&EMS develop and implement a risk reduction program designed to reduce or prevent the occurrence of cooking related structure fires within the City of Martinsville. The strategies utilized in this program should be developed through the use of the Five E’s methodology of education, enforcement, engineering, economic incentive and emergency response. In addition, performance measures must be developed to evaluate the program’s effectiveness.
However, it is realized that for any risk reduction program to be successful there must be support from the public, elected officials and from within the department. Each of these stakeholders must have an active role with the development, implementation and evaluation of the risk reduction program. This stakeholder involvement will be a key element in developing a successful program.

The impact of this applied research project is significant to our department and locality. The information obtained through this research process will assist our Administrative and Inspections & Code Enforcement staff in developing and implementing strategies aimed at reducing the occurrence of cooking related residential structure fires within Martinsville. The ultimate goal of such a program is to reduce the amount of property loss, injuries and deaths as the result. Regardless of what strategies are used to reduce the number of cooking related residential structure fires, the most efficient approach is to prevent it from occurring in the first place. While the strategies contained in this applied research project are not based exclusively on funding, several of these initiatives will require money from the general operating fund, grants or other financial support sources. Additionally, MF&EMS will have to capitalize on the diverse talents of our personnel to accomplish the goals that do not require funding. The strategies and initiatives contained within this document shall be implemented upon the approval of the Fire Chief, and City Council where appropriate. The Administrative staff shall monitor the progress of these strategies and initiatives and make the necessary changes and update this plan as needed.
References


